97-06

NATIONAL WATER RESEARCH INSTITUTE

INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Ecosystem Interlaboratory QA Program
Study FP 71 - Trace Metals and Mercury in Surface Waters
(September & October 1997)

H. Alkema and L. Hjelm

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Environment Canada | Environnement Canada

National Water Research Institute
867 Lakeshore Road
Burlington, Ontario
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December 19, 1997

To: Participants of the NWRI Ecosystem Interlaboratory QA Program

Re: Final Report for NWRI Study FP 71 - Trace Metals and Mercury Portions

Dear Participant:

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

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

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

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

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

Yours truly,

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Attachment: Individual Laboratory Appraisal

Canada

National Water Research Institute
National Laboratory for Environmental Testing

Report no. NWRI-QA-97-06

Ecosystem Interlaboratory Quality Assurance Propram
Study FP 71 - Final Report

September and October 1997

An Interlaboratory Quality Assurance Study for Trace Metals and Mercury in Surface Waters*

by

H. Alkema and L. Hjelm

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

December 1997

* companion studies: Rain and Soft Waters; Report NWRI-QA-97-04 and Major Ions/Total P; Report NWRI-QA-97-05

NWRI Interlaboratory Quality Assurance Studies
for
Acid Rain and Surface Waters

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

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

The QA studies are executed twice a year and accommodate environmental programs in both Canada and the United States of America. The US Environmental Protection Agency, US Geological Survey, and numerous university acid rain programs show a continued interest in this program. More than 200 laboratories are invited to participate on a voluntary basis in each study. Currently, 40 of these labs participate in the various study matrixes. One study consists of five (5) series of ten (10) samples each and includes numerous parameters for analysis. The primary feature of these studies is to report the quality of data produced by the participating laboratories. Laboratory performance is ranked in terms of the number of biased parameters (systematic bias) and flagged results (precision measurement). The reports produced from the client data provide a powerful tool for the diagnosis of problematic analysis. Environmental programs and data users are therefore encouraged to have their labs participate as a means of quantifying laboratory performance and data quality.

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

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Table 1 List of participating† laboratories in the trace metals and mercury portions of interlaboratory study FP 71 (September & October 1997).

Accutest Laboratories Ltd.
AECL Research - ASB, Whiteshell
Alberta Research Council
Aqualta
ASL - Analytical Service Lab Ltd.
Can Test Ltd.
Chemex Environmental Services
City of Calgary - Waterworks
Environment Canada - EPL, Prairie & Northern Region
Environment Canada - EQL, Atlantic
Environment Canada - NWRI, NLET
Environment Canada - Pacific Environmental Science Centre
Enviro-Test Laboratories
Enviro-Test Manitoba Technology Centre
Falconbridge - Kidd Creek Division
Frontier Geosciences Inc.
Laboratoire de Santé Publique du Québec
Maxxam Analytics
Ministère de l'Environnement et de la Faune du Québec - Laval
Ministère de l'Environnement et de la Faune du Québec - Sainte-Foy
Natural Resources Canada - CFS, Atlantic Region
Natural Resources Canada - CFS, Ontario Region
New Brunswick Department of the Environment - ASL
Norwest Labs
Ontario Hydro Technologies
Ontario Ministry of Environment and Energy - Dorset
Ontario Ministry of Environment and Energy - Etobicoke
Prince Edward Island Department of Fisheries and Environment
Philip Analytical Services Corporation
Saskatchewan Health - LDCSB
Saskatchewan Research Council
TAIGA Environmental Laboratory
The National Physical Laboratory of Israel
University of Maryland - Appalachian Laboratory
Wisconsin State Laboratory of Hygiene

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

Table 2a

Laboratory Performance Scores (Study 0071)

Trace Metals in Water

	SYSTEMATIC BIAS				FLAGGED RESULTS		
LAB CODE	NO. OF PARAMETERS ANALYZED	NO. OF PARAMETERS BIASED	PERCENTAGE OF PARAMETERS BIASED (%)	NO. OF RESULTS RANKED	NO. OF FLAGS ASSIGNED	PERCENTAGE OF RESULTS FLAGGED (%)	SUM OF % BIAS AND % FLAGS SCORE
F001	23	0	0.00	219	2	0.91	0.91
F002	8	0	0.00	64	1	1.56	1.56
F048	22	0	0.00	188	7	3.72	3.72
F003	21	1	4.76	199	3	1.51	6.27
F138	18	0	0.00	180	13	7.22	7.22
F060	23	0	0.00	186	15	8.06	8.06
F038	23	0	0.00	204	17	8.33	8.33
F019	14	0	0.00	95	13	13.68	13.68
F032b	15	0	0.00	145	21	14.48	14.48
F013	8	1	12.50	35	2	5.71	18.21
F008	14	0	0.00	108	20	18.52	18.52
F094	23	2	8.70	202	22	10.89	19.59
F010	18	1	5.56	168	25	14.88	20.44
F096	21	2	9.52	157	19	12.10	21.63
F015	19	1	5.26	149	25	16.78	22.04
F011	23	3	13.04	211	24	11.37	24.42
F046	22	3	13.64	197	22	11.17	24.80
F026	8	0	0.00	59	16	27.12	27.12
F063	16	2	12.50	133	25	18.80	31.30
F133	22	4	18.18	203	31	15.27	33.45
F080	20	0	0.00	114	43	37.72	37.72
F014	16	3	18.75	125	24	19.20	37.95
F037	10	2	20.00	92	17	18.48	38.48
F024	15	3	20.00	126	24	19.05	39.05
F032	16	5	31.25	137	16	11.68	42.93
F093	19	4	21.05	180	45	25.00	46.05
F025	23	4	17.39	212	64	30.19	47.58
F012	18	4	22.22	118	33	27.97	50.19
F131	12	1	8.33	102	43	42.16	50.49
F009	19	6	31.58	170	36	21.18	52.76
F109	19	6	31.58	170	36	21.18	52.76
F134	11	1	9.09	56	27	48.21	57.31
F022	20	6	30.00	135	53	39.26	69.26
F036	3	1	33.33	22	9	40.91	74.24
F031	12	8	66.67	95	30	31.58	98.25

The following parameters were used in the analysis:

Al	V	Cr	Mn	Fe	Co
Ni	Cu	Zn	As	Sb	Sr
Mo	Ag	Cd	Bi	Ba	Th
Pb	U	Li	Be	Se	

Table 2b

Laboratory Performance Scores (Study 0071)

Mercury in Water

	SYSTEMATIC BIAS				FLAGGED RESULTS		
LAB CODE	NO. OF PARAMETERS ANALYZED	NO. OF PARAMETERS BIASED	PERCENTAGE OF PARAMETERS BIASED (%)	NO. OF RESULTS RANKED	NO. OF FLAGS ASSIGNED	PERCENTAGE OF RESULTS FLAGGED (%)	SUM OF % BIAS AND % FLAGS SCORE
F001	1	0	0.00	8	0	0.00	0.00
F002	1	0	0.00	9	0	0.00	0.00
F003	1	0	0.00	9	0	0.00	0.00
F015	1	0	0.00	9	0	0.00	0.00
F025	1	0	0.00	9	0	0.00	0.00
F032	1	0	0.00	8	0	0.00	0.00
F036	1	0	0.00	9	0	0.00	0.00
F046	1	0	0.00	8	0	0.00	0.00
F116	1	0	0.00	10	0	0.00	0.00
F093	1	0	0.00	10	1	10.00	10.00
F011	1	0	0.00	9	1	11.11	11.11
F006	1	0	0.00	9	2	22.22	22.22
F010	1	0	0.00	9	2	22.22	22.22
F037	1	0	0.00	9	2	22.22	22.22
F038	1	1	100.00	9	0	0.00	100.00
F008	1	1	100.00	10	3	30.00	130.00
F080	1	1	100.00	9	3	33.33	133.33
F133	1	1	100.00	7	6	85.71	185.71

Table 3a

SUMMARY OF STUDY-TO-STUDY PERFORMANCE

Trace Metals in Water

LAB CODE	%BIAS PLUS %FLAGS ON STUDIES 0062	0063	0064	0065	0066	0067	0068	0069	0070	0071	MEDIAN SCORE	COMMENTS
F001	12.9	7.7	5.8	10.5	4.2	6.4	1.4	10.5	10.0	0.9	7.1	GOOD
F002	22.5	9.2	3.5	3.4	-	11.5	0.0	2.7	1.3	1.6	3.4	GOOD
F003	4.9	0.0	4.5	11.6	8.5	12.2	15.5	1.4	2.5	6.3	5.6	GOOD
F008	38.6	17.0	16.4	21.6	12.5	18.3	3.6	5.7	17.1	18.5	17.0	SATISFACTORY
F009	-	64.7	85.9	41.0	39.4	49.4	61.7	21.6	44.5	52.8	49.4	MODERATE
F010	26.6	21.0	36.1	26.7	38.9	50.0	25.0	-	40.4	20.4	26.7	MODERATE
F011	22.7	48.3	14.8	34.3	19.7	14.7	7.3	45.4	27.9	24.4	23.5	SATISFACTORY
F012	-	-	-	-	-	-	41.2	52.4	56.1	50.2	51.3	MODERATE
F013	26.4	29.3	16.8	27.1	15.9	5.1	6.2	9.6	26.2	18.2	17.5	SATISFACTORY
F014	50.1	38.1	52.7	50.7	52.5	54.6	53.8	61.8	19.2	38.0	51.6	MODERATE
F015	6.6	7.1	9.4	9.1	10.7	19.7	3.8	11.8	14.0	22.0	10.1	SATISFACTORY
F016	38.7	17.6	72.0	58.6	114.7	-	-	-	-	-	58.6	MODERATE
F019	-	-	-	-	60.3	41.4	53.2	25.8	28.5	13.7	34.9	MODERATE
F020	17.5	45.6	46.4	40.2	52.8	54.7	-	-	-	-	46.0	MODERATE
F022	-	-	-	-	-	-	56.4	-	-	69.3	62.8	POOR
F023	-	42.8	-	-	-	-	-	-	-	-	-	-
F024	65.0	10.3	7.8	6.2	21.6	19.3	21.0	28.8	16.2	39.0	20.1	SATISFACTORY
F025	49.7	22.8	48.0	38.8	41.8	-	-	-	118.0	47.6	47.6	MODERATE
F026	30.9	70.0	9.0	31.0	-	71.0	29.4	57.0	44.5	27.1	31.0	MODERATE
F030	45.1	49.5	50.3	-	45.1	122.6	28.9	-	-	-	47.3	MODERATE
F031	-	65.7	45.2	49.7	33.6	58.0	56.6	64.7	65.7	98.2	58.0	MODERATE
F032	148.7	11.3	10.7	15.9	1.4	2.8	18.7	25.9	6.2	42.9	13.6	SATISFACTORY
F033	8.1	67.2	110.5	11.9	37.3	10.9	16.5	-	-	-	16.5	SATISFACTORY
F035	-	111.3	49.8	64.7	50.7	14.1	-	-	-	-	50.7	MODERATE
F036	-	72.9	54.8	-	-	78.6	106.4	73.6	53.3	74.2	73.6	POOR
F037	55.8	65.0	41.0	79.4	-	41.0	34.1	83.3	51.9	38.5	51.9	MODERATE
F038	15.3	51.8	17.1	56.2	20.8	19.3	8.0	10.8	10.5	8.3	16.2	SATISFACTORY
F039	30.5	-	-	-	-	-	-	-	-	-	-	-
F040	37.0	-	-	-	-	-	-	-	-	-	-	-
F042	10.0	0.0	50.0	-	10.0	0.0	-	-	-	-	10.0	SATISFACTORY
F043	46.7	48.0	-	-	65.4	-	14.2	-	-	-	47.3	MODERATE
F044	5.7	21.0	-	-	-	-	-	-	-	-	13.4	SATISFACTORY
F045	36.7	-	-	-	-	-	-	-	-	-	-	-
F046	27.7	30.2	17.0	35.7	20.8	42.7	30.0	30.8	34.8	24.8	30.1	MODERATE
F047	65.9	42.3	-	-	-	47.9	-	-	-	-	47.9	MODERATE
F048	-	69.7	30.0	29.4	54.2	5.7	10.4	62.5	22.0	3.7	29.4	MODERATE
F050	-	-	-	80.0	-	-	22.7	53.8	-	-	53.8	MODERATE
F051	-	-	-	24.7	27.0	8.6	-	-	-	-	24.7	SATISFACTORY
F052	-	-	-	56.3	-	-	-	-	-	-	-	-
F055	66.8	110.6	-	133.1	-	-	-	-	-	-	110.6	POOR
F059	-	-	-	67.4	63.8	-	-	-	-	-	65.6	POOR
F060	-	47.8	80.4	-	-	-	15.4	-	18.5	8.1	18.5	SATISFACTORY
F061	-	-	-	-	105.3	105.9	-	-	-	-	105.6	POOR
F062	-	88.8	-	73.7	-	-	-	49.2	-	-	73.7	POOR
F063	-	-	97.5	-	-	-	44.0	25.6	46.5	31.3	44.0	MODERATE
F064	-	-	133.6	-	-	-	43.0	-	-	-	88.3	POOR
F065	-	-	121.8	-	-	-	-	12.9	-	-	67.3	POOR
F066	-	-	93.8	18.2	-	-	-	-	-	-	56.0	MODERATE
F067	-	-	49.6	-	-	-	-	-	-	-	-	-
F068	-	-	91.7	33.3	36.8	52.9	100.0	33.3	75.0	-	52.9	MODERATE
F069	-	-	21.6	16.6	16.0	34.3	22.8	2.0	7.5	-	16.6	SATISFACTORY
F071	-	-	-	-	73.0	141.4	-	-	-	-	107.2	POOR
F072	-	-	-	43.7	-	-	-	-	-	-	-	-
F075	-	-	22.9	-	-	-	-	-	-	-	-	-
F076	-	-	2.9	-	3.4	-	-	-	-	-	3.1	GOOD
F077	-	-	77.9	-	-	-	-	-	-	-	-	-
F078	-	-	-	41.3	-	-	-	-	-	-	-	-
F080	-	-	-	41.2	39.9	17.8	53.5	49.2	-	37.7	40.6	MODERATE
F081	-	-	-	22.8	-	-	-	-	-	-	-	-
F082	-	-	-	22.3	-	17.4	-	-	-	-	19.8	SATISFACTORY
F083	-	-	-	50.0	-	-	-	-	-	-	-	-
F088	-	-	-	40.0	27.2	-	-	-	-	-	33.6	MODERATE
F089	-	-	-	-	40.4	-	63.6	-	74.8	-	63.6	POOR
F091	-	-	-	-	52.0	-	-	-	-	-	-	-
F093	-	-	-	-	-	34.4	23.7	45.0	35.8	46.1	35.8	MODERATE
F094	-	-	-	-	-	91.7	74.5	9.6	13.0	19.6	19.6	SATISFACTORY
F095	-	-	-	-	-	15.7	-	-	-	-	-	-
F096	-	-	-	-	-	-	64.5	-	14.9	21.6	21.6	SATISFACTORY
F097	-	-	-	-	-	0.9	-	-	-	-	-	-
F098	-	-	-	-	-	12.5	-	-	-	-	-	-
F099	-	-	-	-	-	62.5	-	-	-	-	-	-
F103	-	-	-	-	-	-	78.6	-	-	-	-	-
F109	-	-	-	-	-	-	-	-	-	52.8	-	-
F131	-	-	-	-	-	-	-	-	-	50.5	-	-
F133	-	-	-	-	-	-	-	-	108.4	33.5	70.9	POOR
F134	-	-	-	-	-	-	-	-	-	57.3	-	-
F138	-	-	-	-	-	-	-	-	40.0	7.2	23.6	SATISFACTORY
INTERLAB MEDIAN	30.9	42.8	45.2	38.8	37.3	19.7	25.0	25.9	28.5	27.1		

STUDY DATES: 0062(06-JAN-93), 0063(05-JUL-93), 0064(05-JAN-94), 0065(05-JUL-94), 0066(04-JAN-95), 0067(05-JUL-95), 0068(01-MAR-96), 0069(01-SEP-96), 0070(03-MAR-97), 0071(02-SEP-97)

Table 3b SUMMARY OF STUDY-TO-STUDY PERFORMANCE

Mercury in Water

LAB CODE	%BIAS PLUS %FLAGS ON STUDIES 0063	0065	0067	0069	0071	MEDIAN SCORE	COMMENTS
F001	50.0	0.0	11.1	10.0	0.0	10.0	SATISFACTORY
F002	0.0	11.1	0.0	0.0	0.0	0.0	GOOD
F003	0.0	0.0	0.0	0.0	0.0	0.0	GOOD
F006	-	0.0	130.0	-	22.2	22.2	SATISFACTORY
F007	-	-	166.7	-	-	-	-
F008	0.0	-	-	177.8	130.0	130.0	POOR
F010	0.0	70.0	57.1	-	22.2	39.7	MODERATE
F011	20.0	10.0	0.0	133.3	11.1	11.1	SATISFACTORY
F015	-	0.0	0.0	0.0	0.0	0.0	GOOD
F016	183.3	-	-	-	-	-	-
F020	55.6	0.0	12.5	-	-	12.5	SATISFACTORY
F023	80.0	-	-	-	-	-	-
F024	44.4	-	-	-	-	-	-
F025	-	114.3	-	-	0.0	57.1	MODERATE
F030	-	-	100.0	-	-	-	-
F032	0.0	-	0.0	0.0	0.0	0.0	GOOD
F033	0.0	0.0	0.0	-	-	0.0	GOOD
F035	16.7	0.0	10.0	-	-	10.0	SATISFACTORY
F036	140.0	140.0	-	160.0	0.0	140.0	POOR
F037	16.7	25.0	20.0	11.1	22.2	20.0	SATISFACTORY
F038	0.0	50.0	11.1	0.0	100.0	11.1	SATISFACTORY
F044	20.0	-	-	-	-	-	-
F046	0.0	100.0	22.2	0.0	0.0	0.0	GOOD
F047	150.0	-	-	-	-	-	-
F050	-	0.0	-	-	-	-	-
F051	-	-	50.0	-	-	-	-
F052	-	100.0	-	-	-	-	-
F055	100.0	-	-	-	-	-	-
F059	28.6	-	-	-	-	-	-
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	157.1	133.3	145.2	POOR
F086	-	140.0	-	-	-	-	-
F089	-	-	-	30.0	-	-	-
F093	-	-	-	-	10.0	-	-
F095	-	-	0.0	-	-	-	-
F116	-	-	-	100.0	0.0	50.0	MODERATE
F133	-	-	-	-	185.7	-	-
INTERLAB MEDIAN	20.0	25.0	11.1	11.1	10.0		

STUDY DATES: 0063(05-JUL-93), 0065(05-JUL-94), 0067(05-JUL-95), 0069(01-SEP-96), 0071(02-SEP-97)

Table 4a Sample design[‡] for the trace metals portion of interlaboratory study FP 71 (September & October 1997).

Sample Number	Sample Name	Type (DA[§] /Low)	Expected Copper Concentration (µg/L)
FP 71 TM-1	TMHumb-95	Low	1.4
FP 71 TM-2	TM-27.2	Low	4.5
FP 71 TM-3	TM-28.2	Low	6.2
FP 71 TM-4	TM-FSCal	Low	4.0
FP 71 TM-5	TM-23.2	Low	9.7
FP 71 TM-6	TM-24.2	Low	7.5
FP 71 TM-7	TM-26.2	Low	14.0
FP 71 TM-8	TMDA-54.2	DA	467.0
FP 71 TM-9	TMDA-52.2	DA	216.5
FP 71 TM-10	TMDA-53.2	DA	317.0

[‡] All samples are preserved with 0.2% HNO_3.
[§] direct aspiration

Table 4b Sample design** for the mercury portion of interlaboratory study FP 71 (September & October 1997).

Sample Number	Sample Name	Expected Value - Median (µg/L)
FP 71 HG-1	Merc-BLK	0.0050
FP 71 HG-2	Merc-02	0.1020
FP 71 HG-3	Merc-03	0.1300
FP 71 HG-4	Merc-04	0.0600
FP 71 HG-5	Merc-05	0.2500
FP 71 HG-6	Merc-06	0.1800
FP 71 HG-7	Merc-07	0.2780
FP 71 HG-8	Merc-08	0.3550
FP 71 HG-9	Merc-09	0.3200
FP 71 HG-10	Merc-10	0.4050

** All samples are preserved with1% H_2SO_4 and 0.05% K_2CrO_7.

Table 5a

Summary of Interlaboratory Median Values for Trace Metals in Water - Study 0071

PARAMETER		SAMPLE NUMBER						
		TMHUMB-95 SAMPLE 1	TM-27.2 SAMPLE 2	TM-28.2 SAMPLE 3	TM-FSCal SAMPLE 4	TM-23.2 SAMPLE 5	TM-24.2 SAMPLE 6	TM-26.2 SAMPLE 7
Aluminum	ug/L	5.0500	14.000	48.000	32.000	98.000	30.500	67.300
Vanadium	ug/L	0.2851	2.4000	2.5000	0.2206	2.1000	7.0000	12.000
Chromium	ug/L	0.3000	1.9300	4.8550	0.2000	6.5000	4.6350	11.000
Manganese	ug/L	1.2000	2.7000	7.2000	0.8450	8.6000	8.4000	16.900
Iron	ug/L	7.0000	12.100	17.000	9.0500	14.000	11.000	23.700
Cobalt	ug/L	0.1000	2.4400	3.7000	0.1000	7.5000	6.0000	8.1000
Nickel	ug/L	0.8000	2.6983	11.350	0.2000	5.4000	5.0000	10.000
Copper	ug/L	1.4000	4.5000	6.2000	4.0000	9.7000	7.5000	14.000
Zinc	ug/L	2.2765	11.000	13.000	6.0000	12.000	19.000	30.600
Arsenic	ug/L	0.9150	2.5000	6.0000	0.3000	8.5000	5.0000	7.9451
Selenium	ug/L	0.3900	1.6930	4.4000	0.4000	4.5575	3.4900	5.1700
Strontium	ug/L	177.000	55.300	51.500	190.000	60.000	70.500	101.000
Molybdenum	ug/L	1.3000	2.4499	4.1500	0.8800	5.1689	5.5848	8.5465
Silver	ug/L	0.1000	2.2500	5.0000	0.1000	4.0000	4.0000	7.3000
Cadmium	ug/L	0.0200	1.2400	1.3200	0.0221	2.7344	4.1000	7.0000
Antimony	ug/L	0.2060	1.9000	3.0950	0.0475	2.5500	2.4750	2.0817
Barium	ug/L	21.800	5.1000	16.000	36.000	15.000	9.0000	25.000
Thallium	ug/L	0.0500	1.8100	3.7800	0.0500	3.7700	3.8000	5.0600
Lead	ug/L	0.4070	3.0900	4.0000	0.1800	3.8700	6.0000	10.000
Bismuth	ug/L	-	1.3000	3.4800	0.0500	3.1400	2.5000	4.3000
Uranium	ug/L	0.3700	2.0000	5.9050	0.5000	5.5100	4.5000	7.7900
Lithium	ug/L	2.0000	4.0000	3.8500	3.0000	3.6600	5.2000	6.8500
Beryllium	ug/L	-	1.4000	2.5000	-	1.6000	2.0000	3.3000

		TMDA-54.2 SAMPLE 8	TMDA-52.2 SAMPLE 9	TMDA-53.2 SAMPLE 10
Aluminum	ug/L	466.000	310.000	360.600
Vanadium	ug/L	347.500	148.500	289.500
Chromium	ug/L	434.000	165.000	310.500
Manganese	ug/L	346.054	201.500	364.000
Iron	ug/L	389.500	430.000	340.000
Cobalt	ug/L	275.650	140.000	253.500
Nickel	ug/L	326.000	270.000	322.734
Copper	ug/L	467.000	216.500	317.025
Zinc	ug/L	546.000	264.000	375.500
Arsenic	ug/L	25.000	26.100	34.000
Selenium	ug/L	15.200	21.000	21.600
Strontium	ug/L	595.000	293.000	384.500
Molybdenum	ug/L	300.000	203.500	211.750
Silver	ug/L	14.950	19.355	18.950
Cadmium	ug/L	164.000	92.100	121.200
Antimony	ug/L	11.000	15.300	16.100
Barium	ug/L	268.000	152.000	291.000
Thallium	ug/L	8.8000	17.350	15.685
Lead	ug/L	524.000	370.000	360.000
Bismuth	ug/L	10.300	12.000	12.800
Uranium	ug/L	65.000	24.250	33.000
Lithium	ug/L	9.0000	12.500	11.500
Beryllium	ug/L	7.1000	17.000	11.400

Table 5b

Summary of Interlaboratory Median Values for Mercury in Water - Study 0071

PARAMETER		SAMPLE NUMBER						
		Merc-Blk SAMPLE 1	Merc-02 SAMPLE 2	Merc-03 SAMPLE 3	Merc-04 SAMPLE 4	Merc-05 SAMPLE 5	Merc-06 SAMPLE 6	Merc-07 SAMPLE 7
Mercury	ug Hg/L	0.0050	0.1020	0.1300	0.0600	0.2500	0.1800	0.2780

		Merc-08 SAMPLE 8	Merc-09 SAMPLE 9	Merc-10 SAMPLE 10
Mercury	ug Hg/L	0.3550	0.3200	0.4050

Appendix A

Glossary of Terms
Quantifying Bias in NWRI QA Studies

GLOSSARY OF TERMS

Used for the Evaluation of Interlaboratory Results

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

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

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

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

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

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

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

Satisfactory: Fully acceptable, 'good results'.

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

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

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

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

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

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

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

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

The calculated acceptable difference is termed **1 criteria** or **crit**. This value and the value of three standard deviations (**3SD**) are both action criteria in the determination of flags. When the

reported value is subtracted from the **target value**, the difference is then divided by the **1 criteria** value. This produces the number of **1 crit** deviations. The assigned flag depends upon what range this number falls into.

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

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

References:

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

June 1996

Quantifying Bias in NWRI QA Studies

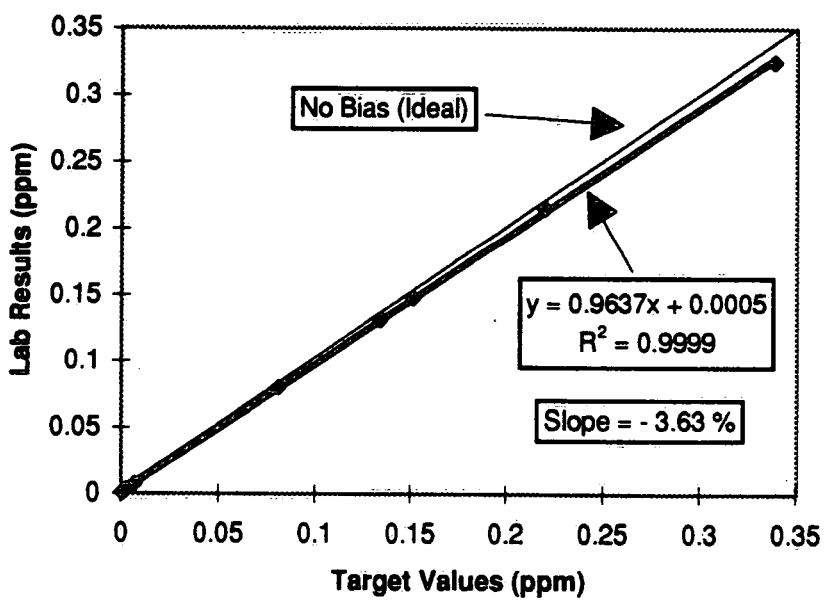
Introduction

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

Degree of Bias

In the NWRI QA studies with 10 sample series, systematic bias[1] is assessed non-parametrically by the procedure of Youden. 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**



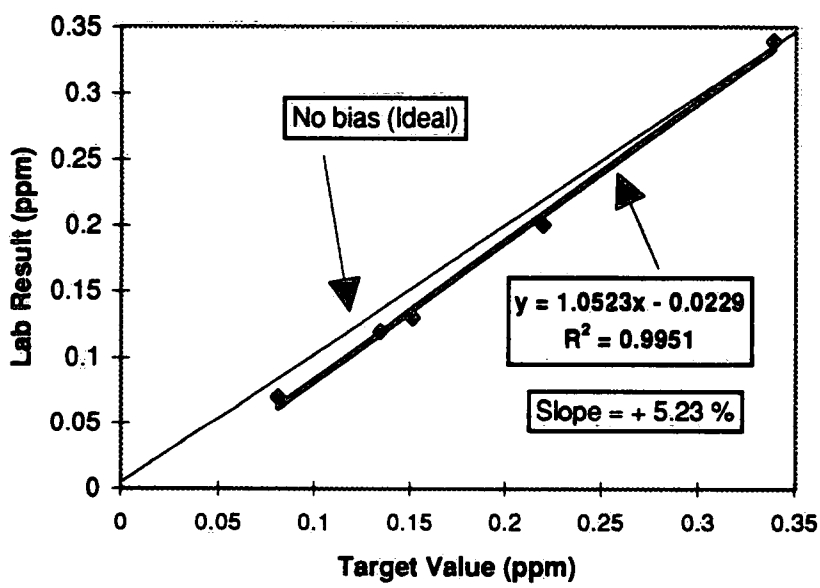
[1] Systematic bias is often identified with the comparison of data to a certified standard.

Parameter Performance Graph and Bias

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

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

Figure 2 **Parameter Performance**



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

Conclusion

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

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NWRI Ecosystem Interlaboratory QA Program

Bias Critical Values
Trace Metals and Mercury

Parameter	%
Aluminum	5
Vanadium	5
Chromium	5
Manganese	5
Iron	5
Cobalt	5
Nickel	5
Copper	5
Zinc	5
Strontium	5
Molybdenum	5
Cadmium	5
Barium	5
Lead	5
Arsenic	10
Selenium	10
Silver	10
Antimony	10
Bismuth	25
Lithium	10
Beryllium	10
Uranium	10
Mercury	10

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Appendix B

Data & Evaluation Summary

a) Trace Metals
b) Mercury

PARAMETER: 13095 Aluminum ug/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 5.0000 BASIC ACCEPTABLE ERROR= 5.0000 CONCENTRATION ERROR INCREMENT= 0.1000

SAMPLE	1 = TMHUMB-95		2 = TM-27.2		3 = TM-28.2		4 = TM-FSCal		5 = TM-23.2		6 = TM-24.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	3.4	5.00	14.	14.50	45.	7.00	27.	4.00	95.	11.00	29.	7.00
F002	<100.	0.00	14.	14.50	46.	10.50	31.	11.00	94.	8.00	30.	13.00
F003	7.	13.50	14.	14.50	46.	10.50	32.	16.00	96.	12.50	30.	13.00
F008	<10.	0.00	16.	19.00	47.	14.50	40. H	28.50	97.	15.00	35.	28.00
F009	<5.	0.00	17.	22.00	47.	14.50	31.	11.00	98.	17.50	31.	18.00
F010	20. EH	19.00	19.	26.00	42.	3.00	59. EH	32.00	104.	29.00	34.	25.50
F011	1.2	1.00	12.2	6.00	44.3	6.00	26.4	3.00	94.7	10.00	27.8	3.00
F012	<5.	0.00	11.	3.00	49.	22.00	29.	6.00	98.	17.50	28.	4.50
F014	8.0	16.00	13.8	11.00	45.6	9.00	22.2 L	1.00	92.3	5.00	30.0	13.00
F015	7.	13.50	17.	22.00	51.	29.00	37.	26.00	99.	21.50	33.	23.00
F019	<20.	0.00	26. EH	31.00	43.	4.00	40. H	28.50	106.	30.00	40. H	30.00
F022	<10.	0.00	10.	2.00	30. EL	1.00	<10. EL	0.00	80. EL	2.00	20. L	1.00
F024	9.	17.00	18.	24.00	50.	26.00	33.	19.00	110.	33.00	38.	29.00
F025	11. H	18.00	20. H	28.00	55.	32.00	34.	20.00	87.	3.00	28.	4.50
F026	7.7	15.00	18.9	25.00	48.4	21.00	34.7	21.00	102.4	27.00	32.4	22.00
F031	<20.	0.00	<20.	0.00	50.	26.00	40. H	28.50	100.	24.00	30.	13.00
F032	6.6	12.00	15.2	17.00	49.6	24.00	35.6	24.00	98.1	20.00	32.0	21.00
F032b	3.56	7.00	13.3	9.00	45.5	8.00	31.6	14.00	93.8	7.00	30.	13.00
F036	<2.	0.00	20. H	28.00	48.	18.00	36.	25.00	96.	12.50	34.	25.50
F037	3.7	8.00	13.1	8.00	44.0	5.00	27.7	5.00	107.3	31.00	29.1	8.00
F038	<5.	0.00	14.	14.50	48.	18.00	31.	11.00	99.	21.50	30.	13.00
F046	3.3	4.00	12.	5.00	38. L	2.00	25.	2.00	76. EL	1.00	24.	2.00
F048	4.1	10.00	13.6	10.00	46.3	12.00	29.2	7.00	94.3	9.00	29.8	9.00
F060	<8.	0.00	13.	7.00	53.	30.00	31.	11.00	100.	24.00	30.	13.00
F063	<10.	0.00	20. H	28.00	50.	26.00	40. H	28.50	100.	24.00	<10. EL	0.00
F080	<25.	0.00	<25.	0.00	56.	33.00	42. H	31.00	98.	17.50	46. EH	32.00
F093	2.8	2.00	11.3	4.00	54.7	31.00	32.3	18.00	92.0	4.00	28.5	6.00
F094	20.5 EH	20.00	21.1 H	30.00	50.7	28.00	35.2	23.00	96.3	14.00	45.1 EH	31.00
F096	6.	11.00	16.	19.00	47.	14.50	32.	16.00	93.	6.00	31.	18.00
F109	<5.	0.00	17.	22.00	47.	14.50	31.	11.00	98.	17.50	31.	18.00
F133	3.5	6.00	9.0	1.00	49.5	23.00	35.0	22.00	108.0	32.00	34.0	25.50
F134	4.	9.00	16.	19.00	48.	18.00	32.	16.00	103.	28.00	34.	25.50
F138	3.0193	3.00	13.9661	12.00	48.2243	20.00	30.1404	8.00	100.9791	26.00	31.3257	20.00
MEDIAN	5.0500		14.0000		48.0000		32.0000		98.0000		30.5000	
1CRIT	5.0050		5.9000		9.3000		7.7000		14.3000		7.5500	
N	18		29		31		30		31		30	
MEAN	6.3155		15.3264		47.6395		33.0613		97.4574		31.6675	
3STDEV	12.1601		8.8937		10.4447		12.9278		16.7141		11.9254	

PARAMETER: 13095 Aluminum ug/L

SAMPLE	7 = TM-26.2		8 = TMDA-54.2		9 = TMDA-52.2		10 = TMDA-53.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	66.	9.50	452.	8.50	305.	14.00	357.	9.00
F002	67.	15.00	460.	15.50	310.	17.50	360.	14.50
F003	60.	3.00	450.	5.50	300.	8.00	360.	14.50
F008	67.	15.00	460.	15.50	310.	17.50	370.	22.00
F009	68.	20.00	458.	12.50	298.	5.50	358.	10.50
F010	74.	29.00	470.	22.50	311.	20.50	368.	20.00
F011	67.	15.00	419.	1.00	279.	1.00	312. EL	1.00
F012	66.	9.50	499.	32.00	333.	31.00	383.	27.00
F014	66.9	13.00	467.	19.00	308.	15.00	340.	3.50
F015	70.	24.00	470.	22.50	320.	24.00	360.	14.50
F019	73.	27.00	466.	17.00	310.	17.50	356.	8.00
F022	60.	3.00	530. EH	33.00	340.	32.00	406. H	33.00
F024	80. EH	32.50	480.	26.50	320.	24.00	390.	29.50
F025	66.	9.50	483.	28.00	321.	26.50	387.	28.00
F026	70.5	26.00	457.5	11.00	326.9	28.00	368.3	21.00
F031	80. EH	32.50	490.	30.00	330.	29.00	400.	32.00
F032	70.0	24.00	484.0	29.00	321.0	26.50	370.8	23.00
F032b	73.6	28.00	455.	10.00	311.	20.50	350.	6.00
F036	70.	24.00	476.	25.00	332.	30.00	392.	31.00
F037	63.1	6.00	440.9	3.00	301.1	9.00	363.6	18.00
F038	66.	9.50	470.	22.50	299.	7.00	365.	19.00
F046	53. EL	1.00	450.	5.50	290.	2.00	340.	3.50
F048	67.3	17.00	466.3	18.00	295.9	4.00	344.8	5.00
F060	62.	5.00	469.	20.00	317.	22.00	372.	24.00
F063	60.	3.00	470.	22.50	320.	24.00	360.	14.50
F080	75.	30.50	480.	26.50	310.	17.50	390.	29.50
F093	66.6	12.00	451.0	7.00	302.0	10.00	360.6	17.00
F094	67.6	18.00	434.	2.00	294.	3.00	336.	2.00
F096	65.	7.00	452.	8.50	304.	11.50	353.	7.00
F109	68.	20.00	458.	12.50	298.	5.50	358.	10.50
F133	68.0	20.00	459.5	14.00	304.0	11.50	359.0	12.00
F134	75.	30.50	492.	31.00	343.	33.00	379.	26.00
F138	68.3953	22.00	441.214	4.00	304.512	13.00	378.5166	25.00
MEDIAN	67.3000		466.0000		310.0000		360.6000	
1CRIT	11.2300		51.1000		35.5000		40.5600	
N	30		31		31		31	
MEAN	67.5665		464.8843		311.1746		365.4715	
3STDEV	12.0870		46.0808		37.2781		47.5230	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	89.50	8.950	10					ICP-MS
F002	119.50	13.278	9					Atomic Absorbtion
F003	111.00	11.100	10					ICP-OES
F008	175.00	19.444	9	H				GF/ICP
F009	131.50	14.611	9					ICP-MS
F010	226.50	22.650	10	EH EH				ICP
F011	47.00	4.700	10	EL	BIASED LOW	-11.17	1.2010	EPA-200.8
F012	152.50	16.944	9					ICP-MS
F014	105.50	10.550	10	L				ICP-MS
F015	220.00	22.000	10					GFAA/ICP
F019	193.00	21.444	9	EH H H				ICAP
F022	107.00	13.375	8	ELELELL EH H				ICP
F024	260.50	26.050	10	EH	BIASED HIGH*	3.45	4.7154	ICP-AES
F025	197.50	19.750	10	H H				ICP-AES
F026	217.00	21.700	10					I.C.P.
F031	215.00	26.875	8	H EH	BIASED HIGH	6.59	1.8234	ICP
F032	220.50	22.050	10					ICP-AES E3386A
F032b	122.50	12.250	10					ICP-MS E3391A
F036	219.00	24.333	9	H				
F037	101.00	10.100	10					ICP-MS
F038	136.00	15.111	9					ICPMS
F046	28.00	2.800	10	L EL EL	BIASED LOW*	-3.09	-7.5908	ICP-MS As Recd
F048	101.00	10.100	10					ICP
F060	156.00	17.333	9					Trace - ICP
F063	170.50	21.313	8	H H EL				ICP-AES
F080	217.50	27.188	8	H EH	BIASED HIGH*	1.83	7.3450	ICP dig. conc.
F093	111.00	11.100	10					ICP
F094	171.00	17.100	10	EHH EH				ICP-MS
F096	118.50	11.850	10					USN -ICP
F109	131.50	14.611	9					ICP-MS
F133	167.00	16.700	10					ICP-MS
F134	236.00	23.600	10					GFAA
F138	153.00	15.300	10					ICP-MS

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

OVERALL AVERAGE
RANK IS 16.383

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F046	28.00	2.800	10	LELEL	BIASED LOW*	-3.09	-7.5908	ICP-MS As Recd
F011	47.00	4.700	10	EL	BIASED LOW	-11.17	1.2010	EPA-200.8
F001	89.50	8.950	10					ICP-MS
F037	101.00	10.100	10					ICP-MS
F048	101.00	10.100	10					ICP
F014	105.50	10.550	10	L				ICP-MS
F003	111.00	11.100	10					ICP-OES
F093	111.00	11.100	10					ICP
F096	118.50	11.850	10					USN -ICP
F032b	122.50	12.250	10					ICP-MS E3391A
F002	119.50	13.278	9					Atomic Absorbtion
F022	107.00	13.375	8	ELELELLEHH				ICP
F009	131.50	14.611	9					ICP-MS
F109	131.50	14.611	9					ICP-MS
F038	136.00	15.111	9					ICPMS
F138	153.00	15.300	10					ICP-MS
F133	167.00	16.700	10					ICP-MS
F012	152.50	16.944	9					ICP-MS
F094	171.00	17.100	10	EHHEH				ICP-MS
F060	156.00	17.333	9					Trace - ICP
F008	175.00	19.444	9	H				GF/ICP
F025	197.50	19.750	10	HH				ICP-AES
F063	170.50	21.313	8	HHEL				ICP-AES
F019	193.00	21.444	9	EHHH				ICAP
F026	217.00	21.700	10					I.C.P.
F015	220.00	22.000	10					GFAA/ICP
F032	220.50	22.050	10					ICP-AES E3386A
F010	226.50	22.650	10	EHEH				ICP
F134	236.00	23.600	10					GFAA
F036	219.00	24.333	9	H				
F024	260.50	26.050	10	EH	BIASED HIGH*	3.45	4.7154	ICP-AES
F031	215.00	26.875	8	HEH	BIASED HIGH	6.59	1.8234	ICP
F080	217.50	27.188	8	HEH	BIASED HIGH*	1.83	7.3450	ICP dig. conc.

* 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 16.383

PARAMETER: 23095 Vanadium ug/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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= 0.0600

SAMPLE	1 = TMHUMB-95		2 = TM-27.2		3 = TM-28.2		4 = TM-FSCal		5 = TM-23.2		6 = TM-24.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.2	2.50	2.5	14.50	2.5	9.50	0.1	2.00	2.2	15.00	6.6	7.00
F003	0.1	1.00	2.5	14.50	2.4	6.50	0.1	2.00	2.1	11.50	7.	14.50
F008	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	7.	14.50
F009	<1.	0.00	2.	5.00	3.	16.50	<1.	0.00	2.	5.50	7.	14.50
F010	<1.	0.00	2.	5.00	3.	16.50	2. H	7.00	2.	5.50	7.	14.50
F011	0.2	2.50	2.4	11.00	2.4	6.50	0.1	2.00	1.9	1.00	6.3	4.00
F012	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	8.	22.50
F014	<1.0	0.00	2.6	16.50	2.5	9.50	<1.0	0.00	2.3	17.00	7.4	21.00
F015	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	10. EH	25.00
F019	5. VH	9.00	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	8.	22.50
F022	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	7.	14.50
F024	<1.	0.00	1. EL	1.00	2.	3.00	<1.	0.00	2.	5.50	6.	2.50
F025	1.	7.00	2.	5.00	1. EL	1.00	<1.	0.00	3.	18.00	6.	2.50
F032		0.00	2.4	11.00	2.6	13.00		0.00	2.1	11.50	7.1	20.00
F032b	0.213	4.00	2.49	13.00	2.54	12.00	0.19	4.00	2.25	16.00	6.74	8.00
F038	<1.	0.00	2.	5.00	3.	16.50	<1.	0.00	2.	5.50	7.	14.50
F046	<1.	0.00	2.3	9.00	2.3	5.00	<1.	0.00	2.0	5.50	6.4	5.00
F048	<1.	0.00	2.6	16.50	2.5	9.50	<1.	0.00	2.1	11.50	6.8	9.50
F060	<1.	0.00	2.	5.00	2.	3.00	<1.	0.00	2.	5.50	7.	14.50
F063	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00
F080	<2.5	0.00	<2.5	0.00	<2.5	0.00	<2.5	0.00	<2.5	0.00	<2.5 EL	0.00
F093	1.9 H	8.00	3.6 EH	19.00	3.8	19.00	1.5	6.00	4.8 EH	19.00	9.0 H	24.00
F094	0.3	6.00	2.4	11.00	2.5	9.50	<0.1	0.00	2.1	11.50	6.8	9.50
F096	<3.	0.00	<3.	0.00	<3.	0.00	<3.	0.00	<3.	0.00	5. L	1.00
F109	<1.	0.00	2.	5.00	3.	16.50	<1.	0.00	2.	5.50	7.	14.50
F131	9. EH	10.00	13. EH	20.00	9. EH	20.00	12. EH	8.00	12. EH	20.00	15. EH	26.00
F133	<1.0	0.00	2.0	5.00	2.0	3.00	<1.0	0.00	2.0	5.50	6.5	6.00
F138	0.2702	5.00	2.6173	18.00	2.6771	14.00	0.2512	5.00	2.1845	14.00	7.0312	19.00
MEDIAN	0.2851		2.4000		2.5000		0.2206		2.1000		7.0000	
1CRIT	1.5000		1.5540		1.5600		1.5000		1.5360		1.8300	
N	8		18		18		7		18		24	
MEAN	1.1354		2.3560		2.5954		0.6059		2.2853		7.1113	
3STDEV	4.6940		1.1598		1.2998		2.2131		1.9547		2.6183	

PARAMETER: 23095 Vanadium ug/L

SAMPLE	7 = TM-26.2		8 = TMDA-54.2		9 = TMDA-52.2		10 = TMDA-53.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	12.	12.50	339.	8.00	147.	9.50	289.	12.50
F003	12.	12.50	359.	25.00	150.	18.50	308.	26.00
F008	12.	12.50	347.	14.00	147.	9.50	295.	18.00
F009	12.	12.50	348.	16.00	149.	15.50	289.	12.50
F010	11.	3.50	334.	5.00	140.	3.00	288.	10.00
F011	11.5	5.00	352.	22.50	151.	22.50	287.	9.00
F012	14.	23.50	396. EH	28.00	170. EH	28.00	330. EH	28.00
F014	12.7	21.00	348.	16.00	153.	24.00	284.	6.00
F015	20. EH	27.00	350.	18.50	150.	18.50	290.	16.00
F019	14.	23.50	338.	7.00	146.	7.00	285.	7.00
F022	13.	22.00	337.	6.00	144.	6.00	282.	5.00
F024	12.	12.50	350.	18.50	150.	18.50	300.	23.00
F025	10.	2.00	356.	24.00	148.	13.00	305.	24.50
F032	12.6	20.00	362.7	26.00	153.7	25.00	305.0	24.50
F032b	11.7	6.00	333.	4.00	148.	13.00	277.	2.00
F038	12.	12.50	363.	27.00	157.	27.00	312. H	27.00
F046	12.	12.50	340.	9.50	140.	3.00	290.	16.00
F048	11.9	7.00	346.7	13.00	146.5	8.00	285.6	8.00
F060	12.	12.50	352.	22.50	151.	22.50	297.	21.00
F063	<10.	0.00	340.	9.50	150.	18.50	280.	4.00
F080	11.	3.50	330.	3.00	140.	3.00	290.	16.00
F093	15.7 VH	25.00	344.3	12.00	150.6	21.00	296.0	20.00
F094	12.2	18.00	351.	20.50	148.	13.00	289.	12.50
F096	9. L	1.00	323. L	2.00	135. EL	1.00	278.	3.00
F109	12.	12.50	348.	16.00	149.	15.50	289.	12.50
F131	18. EH	26.00	351.	20.50	154.	26.00	299.	22.00
F133	12.0	12.50	315.0 EL	1.00	140.5	5.00	274.5	1.00
F138	12.3715	19.00	341.3567	11.00	147.8105	11.00	295.5123	19.00
MEDIAN	12.0000		347.5000		148.5000		289.5000	
1CRIT	2.1300		22.2600		10.3200		18.7800	
N	25		26		26		26	
MEAN	12.4669		345.5406		148.1196		291.7351	
3STDEV	4.6715		28.7457		13.0147		26.8066	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	93.00	9.300	10					ICP-MS
F003	132.00	13.200	10					ICP-OES
F008	68.50	13.700	5					ICP
F009	98.00	12.250	8					ICP-MS
F010	70.00	7.778	9	H				ICP
F011	86.00	8.600	10					EPA-200.8
F012	130.00	26.000	5	EHEHEH	BIASED HIGH	13.91	0.3250	ICP-MS
F014	131.00	16.375	8					ICP-MS
F015	105.00	21.000	5	EHEH	BIASED HIGH*	-1.17	4.9850	ICP
F019	76.00	12.667	6	VH				ICAP
F022	53.50	10.700	5					ICP
F024	84.50	10.562	8	EL				ICP-AES
F025	97.00	10.778	9	EL				ICP-AES
F032	151.00	18.875	8					ICP-AES E3386A
F032b	82.00	8.200	10					ICP-MS E3391A
F038	135.00	16.875	8	H				ICPMS
F046	65.50	8.188	8					ICP-MS As Recd
F048	83.00	10.375	8					ICP
F060	106.50	13.313	8					Trace - ICP
F063	32.00	10.667	3		INSUFFICIENT DATA			ICP-AES
F080	25.50	6.375	4	EL	INSUFFICIENT DATA			ICP dig. conc.
F093	173.00	17.300	10	H EH EHH VH				ICP
F094	111.50	12.389	9					ICP-MS
F096	8.00	1.600	5	L L L EL	BIASED LOW	-5.27	-2.4248	ICAP 61E Analysis
F109	98.00	12.250	8					ICP-MS
F131	198.50	19.850	10	EHEHEHEHEHEHEH	BIASED HIGH*	-0.94	8.7649	ICP
F133	39.00	4.875	8	EL	BIASED LOW	-7.65	0.6301	ICP-MS
F138	135.00	13.500	10					ICP-MS

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

OVERALL AVERAGE
RANK IS 12.409

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F096	8.00	1.600	5	LLLEL	BIASED LOW	-5.27	-2.4248	ICAP 61E Analysis
F133	39.00	4.875	8	EL	BIASED LOW	-7.65	0.6301	ICP-MS
F080	25.50	6.375	4	EL	INSUFFICIENT DATA			ICP dig. conc.
F010	70.00	7.778	9	H				ICP
F046	65.50	8.188	8					ICP-MS As Recd
F032b	82.00	8.200	10					ICP-MS E3391A
F011	86.00	8.600	10					EPA-200.8
F001	93.00	9.300	10					ICP-MS
F048	83.00	10.375	8					ICP
F024	84.50	10.562	8	EL				ICP-AES
F063	32.00	10.667	3		INSUFFICIENT DATA			ICP-AES
F022	53.50	10.700	5					ICP
F025	97.00	10.778	9	EL				ICP-AES
F009	98.00	12.250	8					ICP-MS
F109	98.00	12.250	8					ICP-MS
F094	111.50	12.389	9					ICP-MS
F019	76.00	12.667	6	VH				ICAP
F003	132.00	13.200	10					ICP-OES
F060	106.50	13.313	8					Trace - ICP
F138	135.00	13.500	10					ICP-MS
F008	68.50	13.700	5					ICP
F014	131.00	16.375	8					ICP-MS
F038	135.00	16.875	8	H				ICPMS
F093	173.00	17.300	10	HEHEHHVH				ICP
F032	151.00	18.875	8					ICP-AES E3386A
F131	198.50	19.850	10	EHEHEHEHEHEHEH	BIASED HIGH*	-0.94	8.7649	ICP
F015	105.00	21.000	5	EHEH	BIASED HIGH*	-1.17	4.9850	ICP
F012	130.00	26.000	5	EHEHEH	BIASED HIGH	13.91	0.3250	ICP-MS

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

OVERALL AVERAGE
RANK IS 12.409

PARAMETER: 24095 Chromium ug/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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= 0.0600

SAMPLE	1 = TMHUMB-95		2 = TM-27.2		3 = TM-28.2		4 = TM-FSCal		5 = TM-23.2		6 = TM-24.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.4	2.50	2.0	14.50	4.9	15.00	0.3	1.00	6.6	17.50	4.5	9.50
F003	0.3	1.00	1.7	5.00	4.5	7.50	<0.2	0.00	6.1	8.50	5.	21.50
F008	<2.	0.00	<2.	0.00	4.	2.00	<2.	0.00	5.	2.00	4.	3.50
F009	<0.5	0.00	1.9	10.00	4.8	12.50	<0.5	0.00	6.6	17.50	4.6	12.50
F010	<1.	0.00	<1.	0.00	4.	2.00	3. VH	10.00	6.	5.50	5.	21.50
F011	0.4	2.50	1.9	10.00	4.4	6.00	<0.2	0.00	6.1	8.50	4.3	6.00
F012	<5.	0.00	<5.	0.00	5.	19.00	<5.	0.00	7.	23.00	5.	21.50
F013	<50.	0.00	<50.	0.00	<50.	0.00	<50.	0.00	<50.	0.00	<50.	0.00
F014	<0.5	0.00	1.0	1.00	4.5	7.50	<0.5	0.00	5.7	3.00	4.0	3.50
F015	0.7	8.00	2.3	18.50	5.5	24.00	0.7	6.00	7.	23.00	5.2	25.00
F019	<6.	0.00	<6.	0.00	<6.	0.00	<6.	0.00	6.	5.50	<6.	0.00
F022	<5.	0.00	<5.	0.00	5.	19.00	<5.	0.00	7.	23.00	5.	21.50
F024	1.	9.00	<1.	0.00	5.	19.00	<1.	0.00	7.	23.00	5.	21.50
F025	<1.	0.00	3.	21.00	4.	2.00	1.	8.00	4. EL	1.00	4.	3.50
F031	<1.	0.00	2.	14.50	5.	19.00	<1.	0.00	6.	5.50	4.	3.50
F032		0.00	1.8	7.00	5.1	23.00		0.00	6.6	17.50	4.7	16.00
F032b	0.581	6.00	1.93	12.00	4.81	14.00	0.523	3.00	6.49	12.00	4.67	15.00
F037	<1.	0.00	1.2	2.00	4.1	4.00	<1.	0.00	6.0	5.50	3.8	1.00
F038	<0.5	0.00	2.	14.50	5.	19.00	<0.5	0.00	6.7	20.00	4.6	12.50
F046	<0.2	0.00	1.6	3.50	4.6	10.00	<0.2	0.00	6.3	10.50	4.4	7.50
F048	<1.	0.00	1.8	7.00	4.6	10.00	<1.	0.00	6.3	10.50	4.4	7.50
F060	<0.8	0.00	1.6	3.50	4.3	5.00	<0.8	0.00	6.5	14.00	4.8	17.00
F063	0.5	4.50	2.3	18.50	5.	19.00	0.6	4.00	7.	23.00	5.	21.50
F080	<2.5	0.00	<2.5	0.00	<2.5 EL	0.00	<2.5	0.00	<2.5 EL	0.00	<2.5 EL	0.00
F093	1.7	10.00	2.7	20.00	5.7	26.00	0.9	7.00	8.5 H	28.00	7.1 EH	27.00
F094	<0.4	0.00	1.8	7.00	4.6	10.00	<0.4	0.00	6.5	14.00	4.6	12.50
F096	2. H	11.00	4. EH	22.00	7. EH	28.00	2. H	9.00	8.	27.00	7. H	26.00
F109	<0.5	0.00	1.9	10.00	4.8	12.50	<0.5	0.00	6.6	17.50	4.6	12.50
F131	6. EH	12.00	6. EH	23.00	6.	27.00	7. EH	11.00	10. EH	29.00	10. EH	28.00
F133	0.5	4.50	2.0	14.50	5.0	19.00	0.5	2.00	6.5	14.00	4.5	9.50
F138	0.619	7.00	2.1467	17.00	5.5124	25.00	0.6553	5.00	7.0377	26.00	4.9752	18.00
MEDIAN OR *TARGET CONC.	*0.3000		1.9300		4.8550		*0.2000		6.5000		4.6350	
1CRIT	1.5000		1.5258		1.7013		1.5000		1.8000		1.6881	
N	10		21		27		9		27		26	
MEAN	0.8400		2.0751		4.8045		1.0976		6.5603		4.8056	
3STDEV	1.6057		1.7044		1.4997		2.4022		2.0051		2.2059	

PARAMETER: 24095 Chromium ug/L

SAMPLE	7 = TM-26.2		8 = TMDA-54.2		9 = TMDA-52.2		10 = TMDA-53.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	11.	16.50	430.	12.00	163.	8.50	312.	19.50
F003	11.	16.50	427.	10.00	167.	19.00	310.	14.00
F008	9.	2.50	450.	27.50	170.	24.00	340. H	31.00
F009	10.7	10.50	423.	5.50	164.	12.00	305.	8.50
F010	11.	16.50	425.	9.00	164.	12.00	307.	10.50
F011	10.5	7.00	435.	18.00	163.	8.50	298.	5.00
F012	12.	26.50	477. EH	31.00	183. EH	31.00	335. H	29.00
F013	<50.	0.00	418.	4.00	160.	3.00	307.	10.50
F014	10.	4.50	441.	25.50	174.	28.00	296.	3.00
F015	11.2	21.00	437.	21.00	163.	8.50	336. H	30.00
F019	7. EL	1.00	434.	15.50	165.	15.00	312.	19.50
F022	12.	26.50	460.	30.00	178. H	30.00	330.	27.50
F024	12.	26.50	450.	27.50	170.	24.00	320.	24.00
F025	9.	2.50	436.	19.00	167.	19.00	318.	22.00
F031	10.	4.50	381. EL	1.00	149. EL	1.00	287. L	1.00
F032	11.2	21.00	434.0	15.50	165.2	17.00	310.8	17.00
F032b	10.6	8.00	405. L	3.00	163.	8.50	292.	2.00
F037	10.4	6.00	431.3	13.00	162.9	6.00	310.5	16.00
F038	10.7	10.50	437.	21.00	173.	27.00	327.	26.00
F046	11.	16.50	440.	23.50	170.	24.00	310.	14.00
F048	10.8	13.00	428.6	11.00	161.3	5.00	300.0	6.00
F060	11.2	21.00	441.	25.50	170.	24.00	318.	22.00
F063	10.7	10.50	424.	7.50	167.	19.00	301.	7.00
F080	11.	16.50	440.	23.50	170.	24.00	330.	27.50
F093	14.0 EH	30.00	424.0	7.50	165.0	15.00	311.5	18.00
F094	11.3	23.00	434.	15.50	161.	4.00	308.	12.00
F096	12.	26.50	434.	15.50	165.	15.00	310.	14.00
F109	10.7	10.50	423.	5.50	164.	12.00	305.	8.50
F131	13.	29.00	437.	21.00	169.	21.00	318.	22.00
F133	11.0	16.50	400.5 L	2.00	159.0	2.00	297.5	4.00
F138	11.653	24.00	456.7297	29.00	175.7392	29.00	325.0058	25.00
MEDIAN OR *TARGET CONC.	11.0000		434.0000		165.0000		310.5000	
1CRIT	2.0700		27.4500		11.3100		20.0400	
N	28		29		29		29	
MEAN	10.9519		432.9700		166.5220		312.4243	
3STDEV	2.5191		38.2721		13.9754		34.4368	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	116.50	11.650	10					ICP-MS
F003	103.00	11.444	9					ICP-OES
F008	92.50	13.214	7	H				GF/ICP
F009	89.00	11.125	8					ICP-MS
F010	87.00	10.875	8	VH				ICP
F011	71.50	7.944	9					EPA-200.8
F012	181.00	25.857	7	EHEHH	BIASED HIGH	9.39	-0.0590	ICP-MS
F013	17.50	5.833	3		INSUFFICIENT DATA			Ext ICP DA 24311
F014	76.00	9.500	8					ICP-MS
F015	185.00	18.500	10	H				GFAA
F019	56.50	11.300	5	EL				ICAP
F022	177.50	25.357	7	H	BIASED HIGH	6.10	0.4810	ICP
F024	174.50	21.813	8					ICP-AES
F025	98.00	10.889	9	EL				ICP-AES
F031	50.00	6.250	8	ELELL	BIASED LOW	-10.82	0.8952	ICP
F032	134.00	16.750	8					ICP-AES E3386A
F032b	83.50	8.350	10	L				ICP-MS E3391A
F037	53.50	6.688	8		BIASED LOW*	-0.28	-0.6951	ICP-MS
F038	150.50	18.813	8					ICPMS
F046	109.50	13.688	8					ICP-MS As Recd
F048	70.00	8.750	8					ICP
F060	132.00	16.500	8					Trace - ICP
F063	134.50	13.450	10					GFAA / ICP-AES
F080	91.50	22.875	4	EL ELEL	INSUFFICIENT DATA			ICP dig. conc.
F093	188.50	18.850	10	H EHEH				ICP
F094	98.00	12.250	8					ICP-MS
F096	194.00	19.400	10	H EHEHH H				ICAP 61E Analysis
F109	89.00	11.125	8					ICP-MS
F131	223.00	22.300	10	EHEH EHEHEH	BIASED HIGH*	0.18	4.0566	ICP
F133	88.00	8.800	10	L				ICP-MS
F138	205.00	20.500	10					ICP-MS

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

OVERALL AVERAGE
RANK IS 14.252

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F013	17.50	5.833	3		INSUFFICIENT DATA			Ext ICP DA 24311
F031	50.00	6.250	8	ELELL	BIASED LOW	-10.82	0.8952	ICP
F037	53.50	6.688	8		BIASED LOW*	-0.28	-0.6951	ICP-MS
F011	71.50	7.944	9					EPA-200.8
F032b	83.50	8.350	10	L				ICP-MS E3391A
F048	70.00	8.750	8					ICP
F133	88.00	8.800	10	L				ICP-MS
F014	76.00	9.500	8					ICP-MS
F010	87.00	10.875	8	VH				ICP
F025	98.00	10.889	9	EL				ICP-AES
F009	89.00	11.125	8					ICP-MS
F109	89.00	11.125	8					ICP-MS
F019	56.50	11.300	5	EL				ICAP
F003	103.00	11.444	9					ICP-OES
F001	116.50	11.650	10					ICP-MS
F094	98.00	12.250	8					ICP-MS
F008	92.50	13.214	7	H				GF/ICP
F063	134.50	13.450	10					GFAA / ICP-AES
F046	109.50	13.688	8					ICP-MS As Recd
F060	132.00	16.500	8					Trace - ICP
F032	134.00	16.750	8					ICP-AES E3386A
F015	185.00	18.500	10	H				GFAA
F038	150.50	18.813	8					ICPMS
F093	188.50	18.850	10	HEHEH				ICP
F096	194.00	19.400	10	HEHEHHH				ICAP 61E Analysis
F138	205.00	20.500	10					ICP-MS
F024	174.50	21.813	8					ICP-AES
F131	223.00	22.300	10	EHEHEHEHEH	BIASED HIGH*	0.18	4.0566	ICP
F080	91.50	22.875	4	ELELEL	INSUFFICIENT DATA			ICP dig. conc.
F022	177.50	25.357	7	H	BIASED HIGH	6.10	0.4810	ICP
F012	181.00	25.857	7	EHEHH	BIASED HIGH	9.39	-0.0590	ICP-MS

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

OVERALL AVERAGE
RANK IS 14.252

PARAMETER: 25095 Manganese ug/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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= 0.0600

SAMPLE	1 = TMHUMB-95		2 = TM-27.2		3 = TM-28.2		4 = TM-FSCal		5 = TM-23.2		6 = TM-24.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	1.1	5.00	2.7	14.00	7.2	16.00	0.8	4.00	8.6	15.00	8.3	13.50
F002	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00
F003	1.1	5.00	2.5	6.50	6.9	6.50	0.8	4.00	8.1	9.00	8.5	17.00
F008	<5.	0.00	<5.	0.00	8.	26.00	<5.	0.00	9.	22.50	9.	24.50
F009	1.2	10.00	2.7	14.00	7.2	16.00	<1.0	0.00	8.5	12.50	8.4	15.50
F010	1.	1.50	3.	22.50	7.	10.00	1.	11.50	9.	22.50	8.	7.00
F011	<0.1 EL	0.00	2.6	10.00	3.7 EL	1.00	<0.1 EL	0.00	7.8	4.00	6.1 EL	2.00
F012	<5.	0.00	<5.	0.00	8.	26.00	<5.	0.00	9.	22.50	9.	24.50
F013	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00
F014	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00
F015	<1.	0.00	2.	2.00	6.	2.50	<1.	0.00	10.	30.00	7.	3.50
F019	<1.	0.00	2.	2.00	7.	10.00	<1.	0.00	7. EL	1.50	7.	3.50
F022	<5.	0.00	<5.	0.00	7.	10.00	<5.	0.00	8.	7.00	8.	7.00
F024	<1.	0.00	2.	2.00	8.	26.00	<1.	0.00	9.	22.50	9.	24.50
F025	2.	17.50	3.	22.50	6.	2.50	1.	11.50	7. EL	1.50	8.	7.00
F026	3.5 EH	19.00	2.7	14.00	7.7	22.00	3.3 EH	14.00	9.3	28.00	8.7	19.50
F031	1.0	1.50	2.4	4.50	6.8	4.50	0.8	4.00	8.	7.00	8.	7.00
F032	1.2	10.00	2.8	18.50	8.0	26.00		0.00	9.2	27.00	9.3	29.00
F032b	1.2	10.00	2.56	8.00	7.06	13.00	0.86	8.00	8.45	11.00	8.28	12.00
F036	<2.	0.00	<3.	0.00	8.	26.00	<1.	0.00	9.	22.50	10.	30.00
F038	1.24	13.00	2.58	9.00	7.34	19.00	0.83	7.00	8.84	18.00	8.14	10.00
F046	1.1	5.00	2.5	6.50	6.9	6.50	0.80	4.00	8.2	10.00	8.2	11.00
F048	1.1	5.00	2.7	14.00	7.1	14.00	<1.	0.00	7.4	3.00	5.7 EL	1.00
F060	1.2	10.00	2.7	14.00	7.5	21.00	0.8	4.00	8.7	17.00	8.7	19.50
F063	2.	17.50	4. EH	25.00	8.	26.00	<1.	0.00	9.	22.50	9.	24.50
F080	<0.1 EL	0.00	<0.1 EL	0.00	7.	10.00	<0.1 EL	0.00	8.	7.00	9.	24.50
F093	1.4	15.00	2.7	14.00	7.4	20.00	1.0	11.50	8.6	15.00	8.7	19.50
F094	1.6	16.00	2.8	18.50	7.3	18.00	1.0	11.50	8.6	15.00	8.7	19.50
F096	<2.	0.00	3.	22.50	7.	10.00	<2.	0.00	9.	22.50	9.	24.50
F109	1.2	10.00	2.7	14.00	7.2	16.00	<1.0	0.00	8.5	12.50	8.4	15.50
F131	<2.	0.00	3.	22.50	8.	26.00	<2.	0.00	9.	22.50	8.	7.00
F133	1.1	5.00	2.4	4.50	6.8	4.50	0.7	1.00	7.9	5.00	8.3	13.50
F134		0.00		0.00		0.00		0.00		0.00		0.00
F138	1.327	14.00	2.896	20.00	8.0697	30.00	0.8854	9.00	9.4026	29.00	9.2544	28.00
MEDIAN	1.2000		2.7000		7.2000		0.8450		8.6000		8.4000	
1CRIT	1.5000		1.5720		1.8420		1.5000		1.9260		1.9140	
N	16		24		28		12		27		28	
MEAN	1.3167		2.6223		7.2643		0.8813		8.5960		8.3562	
3STDEV	0.8649		0.8763		1.6416		0.2634		1.5214		2.1340	

PARAMETER: 25095 Manganese ug/L

SAMPLE	7 = TM-26.2		8 = TMDA-54.2		9 = TMDA-52.2		10 = TMDA-53.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	16.	8.00	341.	11.50	199.	8.50	363.	17.00
F002	17.	21.00	347.	18.50	206.	23.00	365.	18.50
F003	16.9	17.00	344.	15.50	204.	21.00	366.	20.00
F008	17.	21.00	349.	20.50	204.	21.00	367.	21.00
F009	16.5	14.50	334.	7.50	199.	8.50	359.	11.00
F010	17.	21.00	340.	9.50	199.	8.50	360.	13.50
F011	8.1 EL	2.00	326.	6.00	192.	4.00	333. L	2.00
F012	18.	29.50	365.	30.00	213.	30.00	377.	26.00
F013	16.	8.00	355.	25.50	208.	24.50	376.	24.50
F014	14. L	3.50	355.	25.50	210.	27.50	346.	6.00
F015	16.	8.00	353.	23.00	209.	26.00	378.	27.00
F019	16.	8.00	347.	18.50	203.	19.00	365.	18.50
F022	19.	32.50	414. EH	34.00	235. EH	34.00	411. VH	34.00
F024	18.	29.50	370. H	31.00	210.	27.50	390. H	30.00
F025	14. L	3.50	356.	27.50	204.	21.00	376.	24.50
F026	16.1	12.50	320.8 L	4.00	199.5	12.00	348.5	7.00
F031	16.	8.00	310. VL	3.00	183. L	2.00	335. L	3.00
F032	18.8	31.00	378.2 H	32.00	220.6 H	32.00	394.3 H	31.00
F032b	16.	8.00	325.	5.00	199.	8.50	337. L	4.00
F036	19.	32.50	390. VH	33.00	225. VH	33.00	402. VH	33.00
F038	16.6	16.00	360.	29.00	217. H	31.00	395. H	32.00
F046	16.	8.00	350.	22.00	200.	14.00	370.	22.00
F048	7.7 EL	1.00	353.1	24.00	200.0	14.00	359.0	11.00
F060	17.2	27.00	356.	27.50	208.	24.50	372.	23.00
F063	17.	21.00	342.	13.50	199.	8.50	360.	13.50
F080	17.	21.00	340.	9.50	200.	14.00	380.	28.00
F093	17.1	25.50	341.0	11.50	200.7	16.00	362.8	16.00
F094	17.1	25.50	344.	15.50	201.	17.00	356.	8.00
F096	17.	21.00	342.	13.50	197.	5.00	358.	9.00
F109	16.5	14.50	334.	7.50	199.	8.50	359.	11.00
F131	17.	21.00	349.	20.50	202.	18.00	362.	15.00
F133	16.1	12.50	295.5 VL	1.00	185.0 L	3.00	319.3 VL	1.00
F134		0.00	300. VL	2.00	170. EL	1.00	340. L	5.00
F138	17.9425	28.00	345.1089	17.00	211.8368	29.00	386.4228	29.00
MEDIAN	16.9000		346.0544		201.5000		364.0000	
1CRIT	2.4240		22.1733		13.5000		23.2500	
N	30		32		32		32	
MEAN	16.3314		345.6940		203.3637		365.5632	
3STDEV	5.4574		52.8710		25.9049		51.2325	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	112.50	11.250	10					ICP-MS
F002	81.00	20.250	4		INSUFFICIENT DATA			Atomic Absorbtion
F003	121.50	12.150	10					ICP-OES
F008	156.50	22.357	7					ICP
F009	109.50	12.167	9					ICP-MS
F010	127.50	12.750	10					ICP
F011	31.00	3.875	8	EL ELEL ELEL L	BIASED LOW	-6.28	-2.0079	EPA-200.8
F012	188.50	26.929	7		BIASED HIGH*	4.48	0.5256	ICP-MS
F013	82.50	20.625	4		INSUFFICIENT DATA			Ext ICP DA 25311
F014	62.50	15.625	4	L	INSUFFICIENT DATA			ICP-MS
F015	122.00	15.250	8					ICP
F019	81.00	10.125	8	EL				ICAP
F022	158.50	22.643	7	EHEHVH				ICP
F024	193.00	24.125	8	H H				ICP-AES
F025	139.00	13.900	10	EL L				ICP-AES
F026	152.00	15.200	10	EH EH L				I.C.P.
F031	44.50	4.450	10	VLL L	BIASED LOW	-9.18	0.1499	ICP
F032	236.50	26.278	9	H H H	BIASED HIGH	8.83	0.1514	ICP-AES E3386A
F032b	87.50	8.750	10	L				ICP-MS E3391A
F036	210.00	30.000	7	VHVHVH	BIASED HIGH	11.50	0.1196	
F038	184.00	18.400	10	H H				ICPMS
F046	109.00	10.900	10					ICP-MS As Recd
F048	87.00	9.667	9	ELEL				ICP
F060	187.50	18.750	10					Trace - ICP
F063	172.00	19.111	9	EH				ICP-AES
F080	114.00	16.286	7	ELEL EL				ICP dig. conc.
F093	164.00	16.400	10					ICP
F094	164.50	16.450	10					ICP-MS
F096	128.00	16.000	8					ICAP 61E Analysis
F109	109.50	12.167	9					ICP-MS
F131	152.50	19.063	8					ICP
F133	51.00	5.100	10	VLL VL	BIASED LOW	-12.98	0.9938	ICP-MS
F134	8.00	2.667	3	VLELL	INSUFFICIENT DATA			FAA
F138	233.00	23.300	10					ICP-MS

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

OVERALL AVERAGE
RANK IS 15.410

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F134	8.00	2.667	3	VLELL	INSUFFICIENT DATA			FAA
F011	31.00	3.875	8	ELELELELELL	BIASED LOW	-6.28	-2.0079	EPA-200.8
F031	44.50	4.450	10	VLLL	BIASED LOW	-9.18	0.1499	ICP
F133	51.00	5.100	10	VLLVL	BIASED LOW	-12.98	0.9938	ICP-MS
F032b	87.50	8.750	10	L				ICP-MS E3391A
F048	87.00	9.667	9	ELEL				ICP
F019	81.00	10.125	8	EL				ICAP
F046	109.00	10.900	10					ICP-MS As Recd
F001	112.50	11.250	10					ICP-MS
F003	121.50	12.150	10					ICP-OES
F009	109.50	12.167	9					ICP-MS
F109	109.50	12.167	9					ICP-MS
F010	127.50	12.750	10					ICP
F025	139.00	13.900	10	ELL				ICP-AES
F026	152.00	15.200	10	EHEHL				I.C.P.
F015	122.00	15.250	8					ICP
F014	62.50	15.625	4	L	INSUFFICIENT DATA			ICP-MS
F096	128.00	16.000	8					ICAP 61E Analysis
F080	114.00	16.286	7	ELELEL				ICP dig. conc.
F093	164.00	16.400	10					ICP
F094	164.50	16.450	10					ICP-MS
F038	184.00	18.400	10	HH				ICPMS
F060	187.50	18.750	10					Trace - ICP
F131	152.50	19.063	8					ICP
F063	172.00	19.111	9	EH				ICP-AES
F002	81.00	20.250	4		INSUFFICIENT DATA			Atomic Absorbtion
F013	82.50	20.625	4		INSUFFICIENT DATA			Ext ICP DA 25311
F008	156.50	22.357	7					ICP
F022	158.50	22.643	7	EHEHVH				ICP
F138	233.00	23.300	10					ICP-MS
F024	193.00	24.125	8	HH				ICP-AES
F032	236.50	26.278	9	HHH	BIASED HIGH	8.83	0.1514	ICP-AES E3386A
F012	188.50	26.929	7		BIASED HIGH*	4.48	0.5256	ICP-MS
F036	210.00	30.000	7	VHVHVH	BIASED HIGH	11.50	0.1196	

* 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 15.410

Manganese

PARAMETER: 26095 Iron ug/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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= 0.0800

SAMPLE	1 = TMHUMB-95		2 = TM-27.2		3 = TM-28.2		4 = TM-FSCal		5 = TM-23.2		6 = TM-24.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001		0.00		0.00		0.00		0.00		0.00		0.00
F002	6.3	3.00	11.2	8.00	16.7	10.00	6.3 L	4.00	12.5	10.00	10.8	8.00
F003	6.6	5.00	12.4	12.00	17.2	14.00	8.1	8.00	12.	7.50	14. H	14.00
F008	<10.	0.00	<10.	0.00	<10. EL	0.00	<10.	0.00	<10. L	0.00	<10.	0.00
F009	190. EH	16.50	41. EH	19.50	52. EH	23.50	220. EH	15.50	46. EH	22.50	38. EH	19.50
F010	7.	7.50	10.	3.00	17.	12.00	7.	6.50	11. L	5.00	10.	5.00
F011	<12.	0.00	14.	14.50	21. H	19.00	<12.	0.00	16.	17.50	17. EH	15.50
F013	<100.	0.00	<100.	0.00	<100.	0.00	<100.	0.00	<100.	0.00	<100.	0.00
F014	<10.	0.00	<10.	0.00	10. EL	2.50	<10.	0.00	<10. L	0.00	<10.	0.00
F015	<5.	0.00	6. EL	1.00	<5. EL	0.00	<5. EL	0.00	7. EL	1.00	9.	2.50
F019	5.	1.00	11.	6.00	16.	7.00	10.	9.00	14.	13.00	10.	5.00
F022	7.	7.50	14.	14.50	17.	12.00	19. EH	12.00	14.	13.00	10.	5.00
F024	7.	7.50	12.	10.00	19.	17.50	6. L	2.50	15.	15.50	11.	10.00
F025	136. EH	15.00	77. EH	21.00	39. EH	22.00	70. EH	13.00	31. EH	21.00	58. EH	21.00
F026	<5.	0.00	10.2	4.00	14.0	4.00	<5. EL	0.00	11.4	6.00	8.7	1.00
F031	7.	7.50	11.	6.00	16.	7.00	6. L	2.50	12.	7.50	11.	10.00
F032	6.4	4.00	12.1	11.00	18.9	16.00	6.8	5.00	13.6	11.00	11.9	12.00
F032b	15.3 EH	12.00	17.6 EH	17.00	24.8 VH	20.00	15.4 EH	11.00	21. VH	20.00	19.3 EH	17.00
F036	<2. EL	0.00	<8. L	0.00	16.	7.00	<4. EL	0.00	10. L	3.00	<8. L	0.00
F038	<30.	0.00	<30.	0.00	<30.	0.00	<30.	0.00	<30.	0.00	<30.	0.00
F046	<15.	0.00	<15.	0.00	18.	15.00	<15.	0.00	15.	15.50	<15.	0.00
F048	<100.	0.00	<100.	0.00	<100.	0.00	<100.	0.00	<100.	0.00	<100.	0.00
F060	6.	2.00	9. L	2.00	15.	5.00	<3. EL	0.00	10. L	3.00	9.	2.50
F063	<10.	0.00	<10.	0.00	10. EL	2.50	<10.	0.00	10. L	3.00	<10.	0.00
F080	<2.5 EL	0.00	11.	6.00	17.	12.00	<2.5 EL	0.00	<2.5 EL	0.00	11.	10.00
F093	36.2 EH	13.00	11.3	9.00	16.2E	9.00	5.4 L	1.00	12.1	9.00	10.5	7.00
F094	<10.	0.00	<10.	0.00	<10. VL	0.00	<10.	0.00	<10. L	0.00	<10.	0.00
F096	9.	10.00	13.	13.00	19.	17.50	7.	6.50	14.	13.00	12.	13.00
F109	190. EH	16.50	41. EH	19.50	52. EH	23.50	220. EH	15.50	46. EH	22.50	38. EH	19.50
F131	11. EH	11.00	16. H	16.00	8. EL	1.00	11.	10.00	16.	17.50	17. EH	15.50
F133	90.0 EH	14.00	20.0 EH	18.00	35.0 EH	21.00	105.0 EH	14.00	20.0 EH	19.00	20.0 EH	18.00
F134		0.00		0.00		0.00		0.00		0.00		0.00
MEDIAN	7.0000		12.1000		17.0000		9.0500		14.0000		11.0000	
1CRIT	2.4000		2.8080		3.2000		2.5640		2.9600		2.7200	
N	14		19		21		13		20		19	
MEAN	25.0571		15.6737		18.7048		21.3538		14.5300		15.2368	
3STDEV	113.1302		27.2400		20.1904		87.8114		14.3273		25.3899	

Note: Many of the flagged results are 'EH' or 'EL'. It appears that these flagged results are laboratory related as the problem is but for this element.

PARAMETER: 26095 Iron ug/L

SAMPLE	7 = TM-26.2		8 = TMDA-54.2		9 = TMDA-52.2		10 = TMDA-53.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	21.	8.50	378.	10.00	416.	9.00	326.	6.00
F002	23.7	14.00	385.	14.00	428.	13.00	336.	12.50
F003	25.	19.00	389.	15.50	431.	18.00	344.	22.00
F008	10. EL	1.00	390.	18.50	440.	25.00	340.	17.00
F009	44. EH	25.50	410.	28.50	450.	29.00	350.	25.50
F010	21.	8.50	371.	7.50	410.	6.00	329.	8.00
F011	25.	19.00	35. EL	1.00	402.	4.00	318.	5.00
F013	<100.	0.00	384.	13.00	432.	19.50	341.	19.50
F014	16. EL	3.00	409.	27.00	448.	27.00	351.	28.00
F015	15. EL	2.00	371.	7.50	422.	11.00	336.	12.50
F019	23.	13.00	390.	18.50	434.	21.00	341.	19.50
F022	24.	16.00	403.	26.00	460.	31.00	352.	29.50
F024	25.	19.00	400.	24.00	450.	29.00	350.	25.50
F025	67. EH	27.00	296. EL	2.00	356. EL	1.00	252. EL	1.00
F026	19.6 L	5.00	357.7	5.00	415.6	8.00	327.9	7.00
F031	22.	11.50	361.	6.00	410.	6.00	317.	4.00
F032	25.3	21.00	422.3	32.00	467.9 H	32.00	365.8	32.00
F032b	32.1 EH	24.00	411.	30.00	432.	19.50	339.	15.00
F036	20.	6.50	396.	22.00	440.	25.00	352.	29.50
F038	<30.	0.00	390.	18.50	420.	10.00	330.	9.00
F046	24.	16.00	400.	24.00	430.	16.00	340.	17.00
F048	<100.	0.00	416.3	31.00	429.4	14.00	346.8	23.00
F060	19. L	4.00	390.	18.50	437.	22.00	343.	21.00
F063	20.	6.50	340. L	3.00	380. L	2.00	310. L	2.50
F080	22.	11.50	380.	11.50	430.	16.00	350.	25.50
F093	21.7	10.00	373.2	9.00	425.3	12.00	334.6	10.00
F094	<10. EL	0.00	350. L	4.00	400.	3.00	310. L	2.50
F096	24.	16.00	389.	15.50	430.	16.00	338.	14.00
F109	44. EH	25.50	410.	28.50	450.	29.00	350.	25.50
F131	26.	22.00	393.	21.00	438.	23.00	340.	17.00
F133	30.0 EH	23.00	380.0	11.50	410.0	6.00	335.0	11.00
F134		0.00	400.	24.00	440.	25.00	360.	31.00
MEDIAN	23.7000		389.5000		430.0000		340.0000	
1CRIT	3.7360		33.0000		36.2400		29.0400	
N	25		30		30		30	
MEAN	24.4960		383.7733		428.0100		337.9100	
3STDEV	20.4167		73.2297		51.1514		37.2234	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	33.50	8.375	4		INSUFFICIENT DATA			ICP-MS
F002	96.50	9.650	10	L				Atomic Absorbtion
F003	135.00	13.500	10	H				ICP-OES
F008	61.50	15.375	4	EL L EL	INSUFFICIENT DATA			ICP
F009	225.50	22.550	10	EHEHEHEHEHEHEH	BIASED HIGH	-16.29	79.1807	ICP-MS
F010	69.00	6.900	10	L	BIASED LOW*	-4.09	-0.9032	ICP
F011	95.50	11.938	8	H EH EL				
F013	52.00	17.333	3		INSUFFICIENT DATA			Ext ICP DA 26311
F014	87.50	17.500	5	EL L EL				ICP-OES
F015	37.50	5.357	7	ELELELEL ELL	BIASED LOW*	-1.22	-5.6263	ICP
F019	113.00	11.300	10					ICAP
F022	166.50	16.650	10	EH				ICP
F024	160.50	16.050	10	L				ICP-AES
F025	144.00	14.400	10	EHEHEHVHEHEHEHELELEL				ICP-AES
F026	40.00	5.000	8	EL L	BIASED LOW*	-4.49	-2.0881	I.C.P.
F031	68.00	6.800	10	L	BIASED LOW	-5.93	-0.6069	ICP
F032	176.00	17.600	10	E H				ICP-AES E3386A
F032b	185.50	18.550	10	EHEHVHEHEHEHEH				ICP-MS E3391A
F036	93.00	15.500	6	ELL ELL L				
F038	37.50	12.500	3		INSUFFICIENT DATA			ICPMS
F046	103.50	17.250	6					ICP-MS As Recd
F048	68.00	22.667	3		INSUFFICIENT DATA			ICP
F060	80.00	8.889	9	L ELL L				Trace - ICP
F063	19.50	3.250	6	EL L L L L	BIASED LOW	-10.63	-2.5219	ICP-AES
F080	92.50	13.214	7	EL ELEL				ICP dig. conc.
F093	89.00	8.900	10	EH L				ICP
F094	9.50	3.167	3	EL L ELL L	INSUFFICIENT DATA			ICP-MS
F096	134.50	13.450	10					ICAP 61E Analysis
F109	225.50	22.550	10	EHVHEHEHEHVHVH	BIASED HIGH	-16.29	79.1807	ICP-MS
F131	154.00	15.400	10	VHH VL VH				ICP
F133	155.50	15.550	10	VHVHVHVHVHVHVH				ICP-MS
F134	80.00	26.667	3		INSUFFICIENT DATA			FAA

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

OVERALL AVERAGE
RANK IS 13.424

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F094	9.50	3.167	3	ELLELLL	INSUFFICIENT DATA			ICP-MS
F063	19.50	3.250	6	ELLLLL	BIASED LOW	-10.63	-2.5219	ICP-AES
F026	40.00	5.000	8	ELL	BIASED LOW*	-4.49	-2.0881	I.C.P.
F015	37.50	5.357	7	ELELELELEL	BIASED LOW*	-1.22	-5.6263	ICP
F031	68.00	6.800	10	L	BIASED LOW	-5.93	-0.6069	ICP
F010	69.00	6.900	10	L	BIASED LOW*	-4.09	-0.9032	ICP
F001	33.50	8.375	4		INSUFFICIENT DATA			ICP-MS
F060	80.00	8.889	9	LVLLL				Trace - ICP
F093	89.00	8.900	10	EHL				ICP
F002	96.50	9.650	10	L				Atomic Absorbtion
F019	113.00	11.300	10					ICAP
F011	95.50	11.938	8	HEHEL				
F038	37.50	12.500	3		INSUFFICIENT DATA			ICPMS
F080	92.50	13.214	7	ELELEL				ICP dig. conc.
F096	134.50	13.450	10					ICAP 61E Analysis
F003	135.00	13.500	10	H				ICP-OES
F025	144.00	14.400	10	EHEHEHVHEHEHEHELELEL				ICP-AES
F008	61.50	15.375	4	ELLEL	INSUFFICIENT DATA			ICP
F131	154.00	15.400	10	EHHVLEH				ICP
F036	93.00	15.500	6	ELLELLL				
F133	155.50	15.550	10	EHEHEHEHEHEHEH				ICP-MS
F024	160.50	16.050	10	L				ICP-AES
F022	166.50	16.650	10	EH				ICP
F046	103.50	17.250	6					ICP-MS As Recd
F013	52.00	17.333	3		INSUFFICIENT DATA			Ext ICP DA 26311
F014	87.50	17.500	5	ELLEL				ICP-OES
F032	176.00	17.600	10	H				ICP-AES E3386A
F032b	185.50	18.550	10	EHEHEHEHEHEHEH				ICP-MS E3391A
F109	225.50	22.550	10	EHEHEHEHEHEHEH	BIASED HIGH	-16.29	79.1807	ICP-MS
F009	225.50	22.550	10	EHEHEHEHEHEHEH	BIASED HIGH	-16.29	79.1807	ICP-MS
F048	68.00	22.667	3		INSUFFICIENT DATA			ICP
F134	80.00	26.667	3		INSUFFICIENT DATA			FAA

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

OVERALL AVERAGE
RANK IS 13.424

PARAMETER: 27095 Cobalt ug/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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= 0.0600

SAMPLE	1 = TMHUMB-95		2 = TM-27.2		3 = TM-28.2		4 = TM-FSCal		5 = TM-23.2		6 = TM-24.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	<0.01	0.00	2.5	13.50	3.7	11.00	<0.01	0.00	8.0	18.50	6.0	10.50
F003	<0.1	0.00	2.2	5.00	3.4	5.00	<0.1	0.00	7.2	8.50	6.	10.50
F008	<2.	0.00	2.	2.50	4.	17.50	<2.	0.00	8.	18.50	6.	10.50
F009	<1.	0.00	2.5	13.50	3.8	14.50	<1.	0.00	6.0	2.50	6.3	17.00
F010	<1.	0.00	1. EL	1.00	4.	17.50	<1.	0.00	7.	6.00	7.	22.00
F011	0.1	3.00	2.6	17.00	3.7	11.00	0.1	2.00	7.8	14.00	6.1	15.00
F012	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	8.	18.50	7.	22.00
F015	<5.	0.00	<5.	0.00	5. EH	21.00	<5.	0.00	7.	6.00	9. EH	25.00
F019	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	9.	24.00	7.	22.00
F022	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	6.	2.50	5.	2.00
F024	<1.	0.00	2.	2.50	3.	2.00	<1.	0.00	8.	18.50	6.	10.50
F025	<3.	0.00	4. EH	20.00	3.	2.00	<3.	0.00	7.	6.00	5.	2.00
F032		0.00	2.5	13.50	3.9	16.00		0.00	8.0	18.50	6.3	17.00
F032b		0.00	2.38	10.00	3.75	13.00		0.00	7.91	15.00	6.09	14.00
F038	<0.1	0.00	2.3	8.00	3.7	11.00	<0.1	0.00	8.	18.50	5.8	6.50
F046	<0.2	0.00	2.2	5.00	3.4	5.00	<0.2	0.00	7.5	12.50	5.7	4.50
F048	<1.	0.00	2.2	5.00	3.5	7.00	<1.	0.00	7.4	10.50	5.7	4.50
F060	<0.7	0.00	2.3	8.00	3.4	5.00	<0.7	0.00	8.2	22.00	6.4	19.00
F063	<1.0	0.00	2.5	13.50	3.0	2.00	<1.0	0.00	7.2	8.50	5.0	2.00
F080	<2.5	0.00	<2.5	0.00	<2.5	0.00	<2.5	0.00	<2.5 EL	0.00	<2.5 EL	0.00
F093	1.0	4.00	3.4 EH	19.00	4.8	20.00	0.8	3.00	10.0 EH	25.00	8.7 EH	24.00
F094	<0.1	0.00	2.3	8.00	3.6	8.50	<0.1	0.00	7.5	12.50	5.8	6.50
F096	<3.	0.00	<3.	0.00	<3.	0.00	<3.	0.00	6.	2.50	6.	10.50
F109	<1.	0.00	2.5	13.50	3.8	14.50	<1.	0.00	6.0	2.50	6.3	17.00
F131	<8.	0.00	<8.	0.00	<8.	0.00	<8.	0.00	<8.	0.00	<8.	0.00
F133	0.03	1.00	2.5	13.50	3.6	8.50	<0.02	0.00	7.4	10.50	6.0	10.50
F134		0.00		0.00		0.00		0.00		0.00		0.00
F138	0.0592	2.00	2.6381	18.00	4.0687	19.00	0.0748	1.00	8.4908	23.00	6.507	20.00
MEDIAN OR *TARGET CONC.	*0.1000		2.4400		3.7000		*0.1000		7.5000		6.0000	
1CRIT	1.5000		1.5564		1.6320		1.5000		1.8600		1.7700	
N	2		18		20		1		24		24	
MEAN	0.0796		2.4177		3.6559		0.1000		7.4417		6.1540	
3STDEV	-		0.9004		1.2277		-		2.3991		2.2654	

PARAMETER: 27095 Cobalt ug/L

SAMPLE	7 = TM-26.2		8 = TMDA-54.2		9 = TMDA-52.2		10 = TMDA-53.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	8.3	15.00	279.	16.00	142.	16.50	254.	15.00
F003	8.	8.00	272.	10.00	142.	16.50	255.	16.00
F008	8.	8.00	290.	24.50	150. H	22.50	270.	24.00
F009	8.4	16.50	284.	21.50	151. H	25.00	261.	20.50
F010	9.	22.00	270.	8.00	140.	14.00	249.	7.50
F011	8.1	12.00	261.	3.00	133.	3.00	229. L	2.00
F012	9.	22.00	301. H	27.00	155. VH	28.00	273. H	26.00
F015	<5. EL	0.00	282.	19.50	122. VL	2.00	250.	10.50
F019	9.	22.00	282.	19.50	143.	18.00	258.	18.00
F022	7. EL	1.50	280.	17.50	139.	11.50	250.	10.50
F024	8.	8.00	280.	17.50	140.	14.00	260.	19.00
F025	7. EL	1.50	275.	13.50	139.	11.50	250.	10.50
F032	8.7	19.50	297.0 H	26.00	152.0 H	27.00	271.9 H	25.00
F032b	8.11	14.00	270.	8.00	138.	9.00	244.	5.50
F038	8.1	12.00	290.	24.50	151. H	25.00	279. VH	27.00
F046	7.8	4.50	270.	8.00	140.	14.00	250.	10.50
F048	7.8	4.50	276.3	15.00	138.2	10.00	241.7	3.00
F060	8.7	19.50	287.	23.00	148.	21.00	263.	22.00
F063	7.5	3.00	266.	5.50	137.	7.00	253.	14.00
F080	<2.5 EL	0.00	261.	3.00	135.	4.00	249.	7.50
F093	11.2 EH	24.00	274.1	12.00	143.6	19.00	255.8	17.00
F094	8.0	8.00	266.	5.50	137.	7.00	243.	4.00
F096	8.	8.00	275.	13.50	137.	7.00	251.	13.00
F109	8.4	16.50	284.	21.50	151. H	25.00	261.	20.50
F131	<8.	0.00	169. EL	1.00	91. EL	1.00	121. EL	1.00
F133	8.1	12.00	261.0	3.00	136.5	5.00	244.0	5.50
F134		0.00	310. EH	28.00	150. H	22.50	280. VH	28.00
F138	8.6943	18.00	272.0265	11.00	146.498	20.00	263.7426	23.00
MEDIAN OR *TARGET CONC.	8.1000		275.6500		140.0000		253.5000	
1CRIT	1.8960		17.9490		9.8100		16.6200	
N	21		26		26		26	
MEAN	8.2716		277.1318		141.6076		254.9670	
3STDEV	1.2583		31.1713		20.5708		32.7020	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	116.00	14.500	8					ICP-MS
F003	79.50	9.938	8					ICP-OES
F008	128.00	16.000	8	H				GF/ICP
F009	131.00	16.375	8	H				ICP-MS
F010	98.00	12.250	8	EL				ICP
F011	82.00	8.200	10	L				EPA-200.8
F012	143.50	23.917	6	H VHH	BIASED HIGH	8.55	0.5312	ICP-MS
F015	84.00	14.000	6	EH EHEL VL				ICP
F019	123.50	20.583	6		BIASED HIGH*	1.68	0.9442	ICAP
F022	45.50	7.583	6	EL				ICP
F024	92.00	11.500	8					ICP-AES
F025	67.00	8.375	8	EH EL				ICP-AES
F032	162.50	20.313	8	H H H	BIASED HIGH	7.64	0.0205	ICP-AES E3386A
F032b	88.50	11.063	8					ICP-MS E3391A
F038	132.50	16.563	8	H VH				ICPMS
F046	64.00	8.000	8					ICP-MS As Recd
F048	59.50	7.438	8					ICP
F060	139.50	17.438	8					Trace - ICP
F063	55.50	6.938	8					GFAA / ICP-AES
F080	14.50	4.833	3	ELELEL	INSUFFICIENT DATA			ICP dig. conc.
F093	167.00	16.700	10	EH EHEHEH				ICP
F094	60.00	7.500	8					ICP-MS
F096	54.50	9.083	6					ICAP 61E Analysis
F109	131.00	16.375	8	H				ICP-MS
F131	3.00	1.000	3	ELELEL	INSUFFICIENT DATA			ICP
F133	69.50	7.722	9					ICP-MS
F134	78.50	26.167	3	EHH VH	INSUFFICIENT DATA			FAA
F138	155.00	15.500	10					ICP-MS

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

OVERALL AVERAGE
RANK IS 12.743

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F131	3.00	1.000	3	ELELEL	INSUFFICIENT DATA			ICP
F080	14.50	4.833	3	ELELEL	INSUFFICIENT DATA			ICP dig. conc.
F063	55.50	6.938	8					GFAA / ICP-AES
F048	59.50	7.438	8					ICP
F094	60.00	7.500	8					ICP-MS
F022	45.50	7.583	6	EL				ICP
F133	69.50	7.722	9					ICP-MS
F046	64.00	8.000	8					ICP-MS As Recd
F011	82.00	8.200	10	L				EPA-200.8
F025	67.00	8.375	8	EHEL				ICP-AES
F096	54.50	9.083	6					ICAP 61E Analysis
F003	79.50	9.938	8					ICP-OES
F032b	88.50	11.063	8					ICP-MS E3391A
F024	92.00	11.500	8					ICP-AES
F010	98.00	12.250	8	EL				ICP
F015	84.00	14.000	6	EHEHELVL				ICP
F001	116.00	14.500	8					ICP-MS
F138	155.00	15.500	10					ICP-MS
F008	128.00	16.000	8	H				GF/ICP
F109	131.00	16.375	8	H				ICP-MS
F009	131.00	16.375	8	H				ICP-MS
F038	132.50	16.563	8	HVH				ICPMS
F093	167.00	16.700	10	EHEHEHEH				ICP
F060	139.50	17.438	8					Trace - ICP
F032	162.50	20.313	8	HHH	BIASED HIGH	7.64	0.0205	ICP-AES E3386A
F019	123.50	20.583	6		BIASED HIGH*	1.68	0.9442	ICAP
F012	143.50	23.917	6	HVHH	BIASED HIGH	8.55	0.5312	ICP-MS
F134	78.50	26.167	3	EHHVH	INSUFFICIENT DATA			FAA

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

OVERALL AVERAGE
RANK IS 12.743

Cobalt

PARAMETER: 28095 Nickel ug/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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= 0.0600

SAMPLE	1 = TMHUMB-95		2 = TM-27.2		3 = TM-28.2		4 = TM-FSCal		5 = TM-23.2		6 = TM-24.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.6	2.00	2.8	13.00	11.	8.50	<0.06	0.00	5.6	15.00	4.9	4.00
F002	<2.	0.00	2.7	11.00	11.3	12.00	<2.0	0.00	5.3	10.00	5.1	14.50
F003	0.7	3.00	2.5	5.50	10.6	4.00	0.2	2.00	5.1	7.00	5.	9.50
F008	<2.	0.00	3.	18.00	11.	8.50	<2.	0.00	5.	4.50	5.	9.50
F009	1.0	7.50	2.9	16.00	12.	17.50	<1.	0.00	5.9	17.50	5.3	18.00
F010	<1.	0.00	1. EL	1.00	10.	1.50	<1.	0.00	4. EL	1.00	5.	9.50
F011	1.3	10.00	2.6	8.50	10.6	4.00	0.6	5.00	5.2	8.50	4.6	2.00
F012	<5.	0.00	<5.	0.00	12.	17.50	<5.	0.00	<5.	0.00	<5.	0.00
F013	<50.	0.00	<50.	0.00	<50.	0.00	<50.	0.00	<50.	0.00	<50.	0.00
F014	<10.	0.00	<10.	0.00	14. EH	24.00	<10.	0.00	<10.	0.00	<10.	0.00
F015	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00
F019	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	10. EH	22.00
F022	<5.	0.00	<5.	0.00	10.	1.50	<5.	0.00	5.	4.50	5.	9.50
F024	<1.	0.00	2.	2.50	11.	8.50	<1.	0.00	5.	4.50	5.	9.50
F025	1.	7.50	6. EH	20.00	12.	17.50	3. VH	9.00	6.	19.50	3. EL	1.00
F026	<15.	0.00	<15.	0.00	<15.	0.00	16.1 EH	10.00	<15.	0.00	<15.	0.00
F032		0.00	2.9	16.00	12.1	22.00		0.00	5.4	12.00	5.8	20.00
F032b	0.834	5.00	2.51	7.00	11.4	13.00		0.00	5.47	14.00	4.99	5.00
F038	1.	7.50	2.8	13.00	11.5	14.00	0.3	3.00	6.	19.50	5.	9.50
F046	9.0 EH	14.00	2.5	5.50	11.	8.50	0.32	4.00	5.2	8.50	4.8	3.00
F048	1.9	12.00	2.8	13.00	11.2	11.00	1.3	7.00	5.4	12.00	5.1	14.50
F060	<1.	0.00	2.	2.50	12.	17.50	<1.	0.00	5.	4.50	5.	9.50
F063	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00
F080	<12.	0.00	<12.	0.00	<12.	0.00	<12.	0.00	<12.	0.00	<12.	0.00
F093	1.7	11.00	4.0 EH	19.00	12.5	23.00	0.9	6.00	7.2 EH	21.00	7.4 EH	21.00
F094	0.8	4.00	2.4	4.00	10.6	4.00	<0.1	0.00	4.9	2.00	5.3	18.00
F096	<8.	0.00	<8.	0.00	12.	17.50	<8.	0.00	<8.	0.00	<8.	0.00
F109	1.0	7.50	2.9	16.00	12.	17.50	<1.	0.00	5.9	17.50	5.3	18.00
F133	2.0	13.00	2.6	8.50	10.9	6.00	1.6	8.00	5.4	12.00	5.0	9.50
F134		0.00		0.00		0.00		0.00		0.00		0.00
F138	0.5338	1.00	2.6967	10.00	12.0803	21.00	-0.4438	1.00	5.6603	16.00	5.2323	16.00
MEDIAN OR *TARGET CONC.	*0.8000		2.6983		11.3500		*0.2000		5.4000		5.0000	
1CRIT	1.5000		1.5719		2.0910		1.5000		1.7340		1.7100	
N	12		18		21		8		19		20	
MEAN	1.1528		2.7004		11.4657		1.0275		5.3911		5.1911	
3STDEV	1.3492		1.2522		1.7446		2.6424		1.0665		1.6735	

PARAMETER: 28095 Nickel ug/L

SAMPLE	7 = TM-26.2		8 = TMDA-54.2		9 = TMDA-52.2		10 = TMDA-53.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	10.	12.50	320.	7.50	265.	10.00	316.	10.50
F002	10.4	19.50	328.	17.00	270.	16.00	323.	17.00
F003	10.	12.50	326.	16.00	271.	19.00	324.	18.00
F008	9.	2.00	340.	22.50	270.	16.00	330.	21.00
F009	10.7	21.50	349. H	28.50	295. H	30.50	342.	29.50
F010	9.	2.00	322.	11.50	263.	8.50	316.	10.50
F011	9.5	4.50	339.	21.00	277.	21.00	311.	7.00
F012	10.	12.50	359. VH	31.00	294. H	29.00	347. H	31.00
F013	<50.	0.00	324.	13.50	269.	13.00	326.	19.00
F014	10.	12.50	331.	20.00	280.	23.50	308.	3.00
F015	<20.	0.00	320.	7.50	290. H	28.00	330.	21.00
F019	<10.	0.00	345.	25.00	285.	26.00	340.	27.00
F022	10.	12.50	319.	5.00	260.	5.00	320.	13.50
F024	10.	12.50	340.	22.50	280.	23.50	340.	27.00
F025	9.	2.00	343.	24.00	279.	22.00	331.	23.50
F026	<15.	0.00	297.3 L	1.00	250.9 L	2.00	292.3 L	1.00
F032	10.4	19.50	345.1	26.00	283.7	25.00	336.6	25.00
F032b	16.9 EH	24.00	321.	10.00	263.	8.50	309.	4.00
F038	10.1	17.00	329.	18.00	272.	20.00	331.	23.50
F046	9.5	4.50	320.	7.50	270.	16.00	310.	5.50
F048	9.8	8.00	325.5	15.00	262.7	7.00	311.1	8.00
F060	10.	12.50	347. H	27.00	287.	27.00	340.	27.00
F063	<10.	0.00	330.	19.00	270.	16.00	310.	5.50
F080	<12.	0.00	320.	7.50	270.	16.00	330.	21.00
F093	12.4 EH	23.00	324.0	13.50	268.9	12.00	321.6	15.00
F094	9.7	6.50	313.	4.00	256.	3.00	302.	2.00
F096	10.	12.50	322.	11.50	262.	6.00	319.	12.00
F109	10.7	21.50	349. H	28.50	295. H	30.50	342.	29.50
F133	9.7	6.50	301.5 L	2.00	258.0	4.00	315.0	9.00
F134		0.00	350. H	30.00	250. L	1.00	320.	13.50
F138	10.2474	18.00	312.4254	3.00	266.176	11.00	322.7339	16.00
MEDIAN OR *TARGET CONC.	10.0000		326.0000		270.0000		322.7339	
1CRIT	2.0100		20.9700		17.6100		20.7740	
N	23		29		28		29	
MEAN	10.0064		329.5009		271.1920		323.3460	
3STDEV	2.0605		37.6217		31.2344		34.0642	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	83.00	9.222	9					ICP-MS
F002	117.00	14.625	8					Atomic Absorbtion
F003	96.50	9.650	10					ICP-OES
F008	102.00	12.750	8					GF/ICP
F009	186.50	20.722	9	H H	BIASED HIGH	7.18	0.1211	ICP-MS
F010	45.50	5.688	8	EL EL	BIASED LOW*	-1.55	-1.0462	ICP
F011	91.50	9.150	10					EPA-200.8
F012	121.00	24.200	5	VHH H	BIASED HIGH	9.06	-0.6481	ICP-MS
F013	45.50	15.167	3		INSUFFICIENT DATA			Ext ICP DA 28311
F014	83.00	16.600	5	EH				ICP-MS
F015	56.50	18.833	3	H	INSUFFICIENT DATA			ICP
F019	100.00	25.000	4	EH	INSUFFICIENT DATA			ICAP
F022	51.50	7.357	7					ICP
F024	110.50	13.813	8					ICP-AES
F025	146.00	14.600	10	EH VH EL				ICP-AES
F026	14.00	3.500	4	EH L L L	INSUFFICIENT DATA			I.C.P.
F032	165.50	20.688	8		BIASED HIGH	5.06	0.0758	ICP-AES E3386A
F032b	90.50	10.056	9	EH				ICP-MS E3391A
F038	145.00	14.500	10					ICPMS
F046	77.00	7.700	10	EH				ICP-MS As Recd
F048	107.50	10.750	10					ICP
F060	127.50	15.938	8	H				Trace - ICP
F063	40.50	13.500	3		INSUFFICIENT DATA			ICP-AES
F080	44.50	14.833	3		INSUFFICIENT DATA			ICP dig. conc.
F093	164.50	16.450	10	EH EHEHEH				ICP
F094	47.50	5.278	9		BIASED LOW	-5.19	0.0087	ICP-MS
F096	59.50	11.900	5					ICAP 61E Analysis
F109	186.50	20.722	9	H H	BIASED HIGH	7.18	0.1211	ICP-MS
F133	78.50	7.850	10	L				ICP-MS
F134	44.50	14.833	3	H L	INSUFFICIENT DATA			FAA
F138	113.00	11.300	10					ICP-MS

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

OVERALL AVERAGE
RANK IS 12.904

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F026	14.00	3.500	4	EHLLL	INSUFFICIENT DATA			I.C.P.
F094	47.50	5.278	9		BIASED LOW	-5.19	0.0087	ICP-MS
F010	45.50	5.688	8	ELEL	BIASED LOW*	-1.55	-1.0462	ICP
F022	51.50	7.357	7					ICP
F046	77.00	7.700	10	EH				ICP-MS As Recd
F133	78.50	7.850	10	L				ICP-MS
F011	91.50	9.150	10					EPA-200.8
F001	83.00	9.222	9					ICP-MS
F003	96.50	9.650	10					ICP-OES
F032b	90.50	10.056	9	EH				ICP-MS E3391A
F048	107.50	10.750	10					ICP
F138	113.00	11.300	10					ICP-MS
F096	59.50	11.900	5					ICAP 61E Analysis
F008	102.00	12.750	8					GF/ICP
F063	40.50	13.500	3		INSUFFICIENT DATA			ICP-AES
F024	110.50	13.813	8					ICP-AES
F038	145.00	14.500	10					ICPMS
F025	146.00	14.600	10	EHVHEL				ICP-AES
F002	117.00	14.625	8					Atomic Absorbtion
F080	44.50	14.833	3		INSUFFICIENT DATA			ICP dig. conc.
F134	44.50	14.833	3	HL	INSUFFICIENT DATA			FAA
F013	45.50	15.167	3		INSUFFICIENT DATA			Ext ICP DA 28311
F060	127.50	15.938	8	H				Trace - ICP
F093	164.50	16.450	10	EHEHEHEH				ICP
F014	83.00	16.600	5	EH				ICP-MS
F015	56.50	18.833	3	H	INSUFFICIENT DATA			ICP
F032	165.50	20.688	8		BIASED HIGH	5.06	0.0758	ICP-AES E3386A
F109	186.50	20.722	9	HH	BIASED HIGH	7.18	0.1211	ICP-MS
F009	186.50	20.722	9	HH	BIASED HIGH	7.18	0.1211	ICP-MS
F012	121.00	24.200	5	VHHH	BIASED HIGH	9.06	-0.6481	ICP-MS
F019	100.00	25.000	4	EH	INSUFFICIENT DATA			ICAP

* 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 12.904

PARAMETER: 29095 Copper ug/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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= 0.0600

SAMPLE	1 = TMHUMB-95		2 = TM-27.2		3 = TM-28.2		4 = TM-FSCal		5 = TM-23.2		6 = TM-24.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	1.3	7.50	4.9	20.50	6.4	18.00	3.7	11.00	10.	20.00	7.4	14.00
F002	<2.	0.00	4.5	15.00	6.4	18.00	4.1	19.00	9.7	16.50	7.5	16.50
F003	1.2	4.50	4.7	17.00	6.2	15.00	3.8	12.00	9.5	14.50	7.	9.00
F008	<5.	0.00	6.	27.00	8. H	29.50	<5.	0.00	12. H	30.00	10. H	30.00
F009	<5.	0.00	5.8	25.50	7.2	27.00	4.2	22.00	11.	28.50	8.5	27.50
F010	1.3	7.50	4.	6.00	6.	10.50	4.	16.00	10.	20.00	8.	22.00
F011	1.4	11.00	4.4	12.50	5.7	6.00	3.3	6.00	8.9	8.00	6.8	6.50
F012	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	8.	4.50	9.	29.00
F013	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00
F014	<0.5	0.00	1.8 EL	1.50	3.2 EL	2.00	3.5	8.50	6.5 VL	2.00	4.8 L	2.00
F015	1.4	11.00	4.5	15.00	5.9	7.00	4.2	22.00	9.4	11.50	7.4	14.00
F019	<5.	0.00	<5.	0.00	6.	10.50	6. H	26.00	7. L	3.00	7.	9.00
F022	<5.	0.00	8. EH	28.00	7.	23.00	<5.	0.00	10.	20.00	8.	22.00
F024	2.	16.50	4.	6.00	7.	23.00	3.	4.00	10.	20.00	8.	22.00
F025	1.	2.50	4.	6.00	5.	3.50	4.	16.00	9.	9.50	6.	4.00
F026	5.4 EH	20.00	5.4	23.00	7.2	27.00	8.1 EH	28.00	10.5	24.50	7.7	18.00
F031	<3.	0.00	4.	6.00	5.	3.50	4.	16.00	8.	4.50	5. L	3.00
F032		0.00	4.2	10.00	6.2	15.00	3.5	8.50	9.4	11.50	7.9	19.00
F032b	1.29	6.00	4.33	11.00	5.92	8.00	3.45	7.00	9.41	13.00	8.44	26.00
F037	2.6	18.00	4.8	18.50	6.1	13.00	3.6	10.00	10.8	27.00	7.4	14.00
F038	1.4	11.00	4.9	20.50	6.5	20.50	4.	16.00	10.5	24.50	7.3	11.50
F046	1.4	11.00	4.5	15.00	6.0	10.50	3.9	13.00	9.5	14.50	7.3	11.50
F048	<1.	0.00	4.	6.00	5.6	5.00	3.0	4.00	8.8	7.00	6.8	6.50
F060	1.	2.50	4.	6.00	6.	10.50	3.	4.00	9.	9.50	7.	9.00
F063	0.2	1.00	1.8 EL	1.50	2.5 EL	1.00	1.3 EL	1.00	3.8 EL	1.00	2.8 EL	1.00
F080	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	<5. EL	0.00	<5. L	0.00
F093	1.2	4.50	4.4	12.50	6.2	15.00	2.7	2.00	8.6	6.00	6.5	5.00
F094	1.8	15.00	5.7	24.00	6.4	18.00	4.3	24.00	9.7	16.50	8.0	22.00
F096	2.	16.50	4.	6.00	7.	23.00	4.	16.00	10.	20.00	8.	22.00
F109	<5.	0.00	5.8	25.50	7.2	27.00	4.2	22.00	11.	28.50	8.5	27.50
F131	5. EH	19.00	10. EH	29.00	8. H	29.50	7. EH	27.00	13. VH	31.00	12. EH	31.00
F133	1.4	11.00	4.8	18.50	6.5	20.50	4.6	25.00	10.3	23.00	7.5	16.50
F134		0.00		0.00		0.00		0.00		0.00		0.00
F138	1.567	14.00	5.2326	22.00	7.0247	25.00	4.1135	20.00	10.6159	26.00	8.1338	25.00
MEDIAN	1.4000		4.5000		6.2000		4.0000		9.7000		7.5000	
1CRIT	1.5000		1.6800		1.7820		1.6500		1.9920		1.8600	
N	18		26		27		26		29		29	
MEAN	1.6809		4.8024		6.1794		3.9678		9.5561		7.4784	
3STDEV	2.6757		2.6780		2.4978		2.6212		3.5013		3.1440	

PARAMETER: 29095 Copper ug/L

SAMPLE	7 = TM-26.2		8 = TMDA-54.2		9 = TMDA-52.2		10 = TMDA-53.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	14.	14.00	458.	13.00	212.	13.50	313.	13.00
F002	14.5	18.00	477.	25.50	217.	20.00	321.	24.00
F003	15.	23.50	464.	16.00	212.	13.50	317.	17.00
F008	18. VH	31.00	477.	25.50	222.	28.00	327.	26.00
F009	16.	29.00	504. H	32.50	242. VH	32.50	344. H	31.50
F010	14.	14.00	453.	10.00	206.	7.50	311.	11.50
F011	13.5	7.50	480.	27.50	223.	29.00	311.	11.50
F012	14.	14.00	530. VH	34.00	243. VH	34.00	356. VH	34.00
F013	14.	14.00	468.	18.50	217.	20.00	319.	21.50
F014	1.2 EL	1.00	473.	22.50	218.	23.00	306.	7.00
F015	14.6	19.00	466.	17.00	216.	17.00	318.	19.50
F019	13.	5.00	473.	22.50	217.	20.00	316.	14.50
F022	16.	29.00	498. H	30.00	228.	31.00	330.	28.00
F024	15.	23.50	480.	27.50	220.	26.00	330.	28.00
F025	12.	4.00	476.	24.00	219.	24.00	324.	25.00
F026	13.5	7.50	421.9 VL	3.00	194.2 VL	3.00	290.2 L	3.00
F031	10. VL	3.00	294. EL	1.00	155. EL	1.00	266. EL	1.00
F032	13.9	10.00	491.0	29.00	223.4	30.00	333.6	30.00
F032b	18.2 VH	32.00	422. VL	4.00	192. VL	2.00	281. VL	2.00
F037	13.5	7.50	429.3 L	5.00	198.7 L	4.00	296.2 L	4.00
F038	14.7	20.50	499. H	31.00	217.	20.00	349. VH	33.00
F046	15.	23.50	460.	14.50	210.	10.50	310.	10.00
F048	14.0	14.00	456.1	12.00	205.3	6.00	301.8	5.00
F060	14.	14.00	448.	6.00	206.	7.50	302.	6.00
F063	5.5 EL	2.00	452.	9.00	202. L	5.00	316.	14.50
F080	14.	14.00	460.	14.50	220.	26.00	330.	28.00
F093	13.5	7.50	448.8	8.00	206.8	9.00	306.1	8.00
F094	14.7	20.50	455.	11.00	210.	10.50	309.	9.00
F096	15.	23.50	468.	18.50	213.	15.00	318.	19.50
F109	16.	29.00	504. H	32.50	242. VH	32.50	344. H	31.50
F131	20. VH	33.00	470.	20.50	217.	20.00	319.	21.50
F133	15.2	26.00	448.5	7.00	215.7	16.00	316.6	16.00
F134		0.00	470.	20.50	220.	26.00	320.	23.00
F138	15.3832	27.00	421.5959 VL	2.00	211.3614	12.00	317.049	18.00
MEDIAN	14.0000		467.0000		216.5000		317.0245	
1CRIT	2.2500		29.4300		14.4000		20.4315	
N	31		32		32		32	
MEAN	14.1833		464.7561		214.7957		317.0797	
3STDEV	6.5506		65.5950		32.4136		43.7136	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	144.50	14.450	10					ICP-MS
F002	172.50	19.167	9					Atomic Absorbtion
F003	142.00	14.200	10					ICP-OES
F008	227.00	28.375	8	H H H VH	BIASED HIGH*	1.84	2.2941	ICP
F009	256.00	28.444	9	H VHH	BIASED HIGH	8.28	1.0714	ICP-MS
F010	125.00	12.500	10					ICP
F011	125.50	12.550	10					EPA-200.8
F012	149.50	24.917	6	VHVHVH				ICP-MS
F013	74.00	18.500	4		INSUFFICIENT DATA			Ext ICP DA 29311
F014	69.50	7.722	9	ELEL VLL EL				ICP-MS
F015	153.00	15.300	10					GFAA
F019	110.50	13.813	8	H L				ICAP
F022	211.00	26.375	8	EH H	BIASED HIGH	5.64	0.4685	ICP
F024	196.50	19.650	10					ICP-AES
F025	118.50	11.850	10					ICP-AES
F026	157.00	15.700	10	EH EH VLVLL				I.C.P.
F031	39.00	4.333	9	L VLELELEL	BIASED LOW	-31.13	3.3737	ICP
F032	163.00	18.111	9					ICP-AES E3386A
F032b	111.00	11.100	10	VHVLVLVL				ICP-MS E3391A
F037	121.00	12.100	10	L L L				ICP-MS
F038	208.50	20.850	10	H VH				ICPMS
F046	134.00	13.400	10					ICP-MS As Recd
F048	65.50	7.278	9		BIASED LOW*	-3.11	-0.9421	ICP
F060	75.00	7.500	10		BIASED LOW*	-4.26	-0.3158	Trace - ICP
F063	37.00	3.700	10	ELELELELELEL L	BIASED LOW*	-1.74	-4.1721	GFAA / ICP-AES
F080	82.50	20.625	4	ELL	INSUFFICIENT DATA			ICP dig. conc.
F093	77.50	7.750	10		BIASED LOW*	-3.74	-0.3804	ICP
F094	170.50	17.050	10					ICP-MS
F096	180.00	18.000	10					ICAP 61E Analysis
F109	256.00	28.444	9	H VHH	BIASED HIGH	8.28	1.0714	ICP-MS
F131	261.50	26.150	10	EHEHH EHVHEHVH	BIASED HIGH*	-0.44	3.7832	ICP
F133	179.50	17.950	10					ICP-MS
F134	69.50	23.167	3		INSUFFICIENT DATA			FAA
F138	191.00	19.100	10	VL				ICP-MS

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

OVERALL AVERAGE
RANK IS 15.967

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F063	37.00	3.700	10	ELELELELELELL	BIASED LOW*	-1.74	-4.1721	GFAA / ICP-AES
F031	39.00	4.333	9	LVLELELEL	BIASED LOW	-31.13	3.3737	ICP
F048	65.50	7.278	9		BIASED LOW*	-3.11	-0.9421	ICP
F060	75.00	7.500	10		BIASED LOW*	-4.26	-0.3158	Trace - ICP
F014	69.50	7.722	9	ELELVLLEL				ICP-MS
F093	77.50	7.750	10		BIASED LOW*	-3.74	-0.3804	ICP
F032b	111.00	11.100	10	VHVLVLVL				ICP-MS E3391A
F025	118.50	11.850	10					ICP-AES
F037	121.00	12.100	10	LLL				ICP-MS
F010	125.00	12.500	10					ICP
F011	125.50	12.550	10					EPA-200.8
F046	134.00	13.400	10					ICP-MS As Recd
F019	110.50	13.813	8	HL				ICAP
F003	142.00	14.200	10					ICP-OES
F001	144.50	14.450	10					ICP-MS
F015	153.00	15.300	10					GFAA
F026	157.00	15.700	10	EHEHVLVLL				I.C.P.
F094	170.50	17.050	10					ICP-MS
F133	179.50	17.950	10					ICP-MS
F096	180.00	18.000	10					ICAP 61E Analysis
F032	163.00	18.111	9					ICP-AES E3386A
F013	74.00	18.500	4		INSUFFICIENT DATA			Ext ICP DA 29311
F138	191.00	19.100	10	VL				ICP-MS
F002	172.50	19.167	9					Atomic Absorbtion
F024	196.50	19.650	10					ICP-AES
F080	82.50	20.625	4	ELL	INSUFFICIENT DATA			ICP dig. conc.
F038	208.50	20.850	10	HVH				ICPMS
F134	69.50	23.167	3		INSUFFICIENT DATA			FAA
F012	149.50	24.917	6	VHVHVH				ICP-MS
F131	261.50	26.150	10	EHEHHEHVHEHVH	BIASED HIGH*	-0.44	3.7832	ICP
F022	211.00	26.375	8	EHH	BIASED HIGH	5.64	0.4685	ICP
F008	227.00	28.375	8	HHHVH	BIASED HIGH*	1.84	2.2941	ICP
F009	256.00	28.444	9	HVHH	BIASED HIGH	8.28	1.0714	ICP-MS
F109	256.00	28.444	9	HVHH	BIASED HIGH	8.28	1.0714	ICP-MS

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

OVERALL AVERAGE
RANK IS 15.967

PARAMETER: 30095 Zinc ug/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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= 0.0800

SAMPLE	1 = TMHUMB-95		2 = TM-27.2		3 = TM-28.2		4 = TM-FSCal		5 = TM-23.2		6 = TM-24.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	2.2	9.00	11.	15.00	13.	15.50	5.0	4.50	14.	24.00	18.	11.50
F002	<10.	0.00	10.	6.50	13.	15.50	<10.	0.00	11.	10.50	18.	11.50
F003	2.1	8.00	11.	15.00	12.7	12.00	5.3	9.00	11.9	13.50	18.	11.50
F008	110. EH	20.00	30. EH	31.00	40. EH	32.00	130. EH	26.00	30. EH	31.00	40. EH	34.00
F009	3.	14.00	20. VH	29.50	17. H	29.50	7.	18.00	18. VH	28.50	24. H	32.00
F010	2.	6.50	11.	15.00	12.	9.00	5.	4.50	14.	24.00	18.	11.50
F011	1.1	1.00	9.1	3.00	11.9	5.50	3.7	1.00	9.8	2.00	16.3	3.50
F012	<5.	0.00	10.	6.50	12.	9.00	<5.	0.00	9. L	1.00	17.	6.00
F013	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00	19.	17.50
F014	<10.	0.00	<10.	0.00	10. L	1.50	<10.	0.00	<10.	0.00	16.	2.00
F015	<2.	0.00	6. VL	1.00	11.	3.50	6.	13.50	11.	10.50	19.	17.50
F019	<5.	0.00	15. H	26.50	15.	27.50	7.	18.00	12.	16.50	22.	28.00
F022	<5.	0.00	10.	6.50	12.	9.00	5.	4.50	10.	4.00	18.	11.50
F024	<5.	0.00	11.	15.00	13.	15.50	5.	4.50	14.	24.00	19.	17.50
F025	3.	14.00	15. H	26.50	13.	15.50	8.	21.50	13.	20.50	17.	6.00
F026	<5.	0.00	10.7	11.00	13.0	15.50	5.7	11.00	11.0	10.50	16.3	3.50
F031	<5.	0.00	10.	6.50	12.	9.00	8.	21.50	10.	4.00	17.	6.00
F032	1.9	5.00	11.7	19.00	14.3	25.00	8.9 H	23.00	11.9	13.50	22.2	30.00
F032b	1.33	2.00	10.3	10.00	11.9	5.50	5.	4.50	10.7	8.00	19.7	21.00
F037	5.4 VH	17.00	12.6	23.00	13.3	20.00	6.5	15.00	20.5 VH	30.00	19.9	22.00
F038	2.	6.50	12.	21.50	14.	23.00	6.	13.50	17. VH	27.00	19.	17.50
F046	2.3	11.00	12.	21.50	14.	23.00	9.6 VH	24.00	12.	16.50	20.	24.00
F048	1.4	3.00	10.0	6.50	12.0	9.00	5.5	10.00	10.2	6.00	17.9	8.00
F060	23. EH	19.00	11.8	20.00	13.8	21.00	5.8	12.00	13.1	22.00	20.1	26.00
F063	<10.	0.00	10.	6.50	10. L	1.50	<10.	0.00	10.	4.00	20.	24.00
F080	<2.5	0.00	11.	15.00	13.	15.50	<2.5 VL	0.00	16. H	26.00	19.	17.50
F093	1.7	4.00	11.0	15.00	13.2	19.00	5.2	8.00	10.6	7.00	19.0	17.50
F094	10. VH	18.00	19. VH	28.00	18. VH	31.00	19. EH	25.00	13.	20.50	24. H	32.00
F096	3.	14.00	11.	15.00	15.	27.50	5.	4.50	12.	16.50	20.	24.00
F109	3.	14.00	20. VH	29.50	17. H	29.50	7.	18.00	18. VH	28.50	24. H	32.00
F131	<8.	0.00	9.	2.00	11.	3.50	<8.	0.00	11.	10.50	18.	11.50
F133	3.0	14.00	13.3	25.00	14.0	23.00	7.8	20.00	12.0	16.50	21.8	27.00
F134		0.00		0.00		0.00		0.00		0.00	10. EL	1.00
F138	2.253	10.00	12.7108	24.00	14.8832	26.00	6.6738	16.00	12.439	19.00	22.1936	29.00
MEDIAN	2.2765		11.0000		13.0000		6.0000		12.0000		19.0000	
1CRIT	2.0221		2.7200		2.8800		2.3200		2.8000		3.3600	
N	18		29		29		24		29		32	
MEAN	4.0324		12.1107		13.4477		6.8739		12.7634		19.3561	
3STDEV	14.9720		8.8139		5.0968		8.5402		8.1018		6.6349	

PARAMETER: 30095 Zinc ug/L

SAMPLE	7 = TM-26.2		8 = TMDA-54.2		9 = TMDA-52.2		10 = TMDA-53.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	28.	7.00	524.	7.00	243.	5.00	364.	10.00
F002	30.	14.50	538.	11.00	267.	19.50	372.	14.50
F003	29.	10.00	544.	15.50	253.	8.00	372.	14.50
F008	50. VH	32.00	590.	31.00	280.	29.00	410. H	32.00
F009	38. VH	29.50	684. EH	33.50	329. EH	33.50	474. EH	33.50
F010	28.	7.00	525.	8.00	241. L	3.00	362.	9.00
F011	31.8	23.00	556.	24.00	275.	26.00	365.	11.50
F012	28.	7.00	551.	20.50	257.	9.00	384.	23.00
F013	30.	14.50	551.	20.50	270.	23.00	379.	20.00
F014	27.	3.50	515.	5.00	242.	4.00	342. L	1.50
F015	31.	19.50	544.	15.50	277.	28.00	374.	16.00
F019	31.	19.50	571.	28.00	266.	18.00	391.	27.00
F022	32.	24.00	534.	9.50	268.	21.00	360.	7.50
F024	30.	14.50	570.	27.00	260.	13.50	390.	25.50
F025	29.	10.00	545.	17.00	285.	30.00	375.	17.00
F026	27.0	3.50	501.6	2.00	274.4	25.00	355.5	6.00
F031	27.	3.50	505.	4.00	238. L	1.00	345.	3.00
F032	33.2	26.00	584.1	30.00	290.8 H	31.00	394.9	28.00
F032b	38.6 VH	31.00	502.	3.00	249.	6.00	342. L	1.50
F037	29.9	12.00	552.0	22.00	258.9	10.00	399.1	29.00
F038	31.	19.50	576.	29.00	270.	23.00	402.	30.00
F046	33.	25.00	560.	25.00	260.	13.50	390.	25.50
F048	102.0 EH	34.00	554.1	23.00	317.5 EH	32.00	350.9	5.00
F060	31.5	22.00	561.	26.00	262.	17.00	386.	24.00
F063	30.	14.50	520.	6.00	260.	13.50	360.	7.50
F080	29.	10.00	540.	12.00	270.	23.00	380.	21.50
F093	30.2	17.00	542.0	13.50	261.4	16.00	376.8	19.00
F094	66. EH	33.00	534.	9.50	267.	19.50	368.	13.00
F096	31.	19.50	542.	13.50	251.	7.00	365.	11.50
F109	38. VH	29.50	684. EH	33.50	329. EH	33.50	474. EH	33.50
F131	27.	3.50	547.	18.00	259.	11.00	376.	18.00
F133	34.0	28.00	550.0	19.00	260.0	13.50	380.0	21.50
F134	20. VL	1.00	500. L	1.00	240. L	2.00	350.	4.00
F138	33.5248	27.00	593.796 H	32.00	275.971	27.00	405.2555	31.00
MEDIAN	30.6000		546.0000		264.0000		375.5000	
1CRIT	4.2880		45.5200		22.9600		31.8800	
N	32		31		31		30	
MEAN	32.5851		545.8902		264.8700		376.0818	
3STDEV	22.4769		70.3402		47.1621		49.8496	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	108.50	10.850	10					ICP-MS
F002	103.50	12.938	8					Atomic Absorbtion
F003	117.00	11.700	10					ICP-OES
F008	298.00	29.800	10	EHEHEHEHEHEHVH H	BIASED HIGH*	-3.21	47.1679	ICP
F009	281.50	28.150	10	VHH VHH VHEHEHEH	BIASED HIGH	25.15	1.2899	ICP-MS
F010	97.50	9.750	10	L				ICP
F011	100.50	10.050	10					EPA-200.8
F012	82.00	10.250	8	L				ICP-MS
F013	95.50	19.100	5					Ext ICP DA 30311
F014	17.50	2.917	6	L L	BIASED LOW	-6.20	-3.1291	ICP-MS
F015	125.00	13.889	9	VL				ICP
F019	209.00	23.222	9	H				ICAP
F022	97.50	10.833	9					ICP
F024	157.00	17.444	9					ICP-AES
F025	178.00	17.800	10	H				ICP-AES
F026	88.00	9.778	9					I.C.P.
F031	58.50	6.500	9	L	BIASED LOW	-7.89	-0.4876	ICP
F032	230.50	23.050	10	H H				ICP-AES E3386A
F032b	92.50	9.250	10	VH L				ICP-MS E3391A
F037	200.00	20.000	10	VH VH				ICP-MS
F038	210.50	21.050	10	VH				ICPMS
F046	209.00	20.900	10	VH				ICP-MS As Recd
F048	136.50	13.650	10	EH EH				ICP
F060	209.00	20.900	10	EH				Trace - ICP
F063	77.50	9.688	8	L				ICP-AES
F080	140.50	17.563	8	VLH				ICP dig. conc.
F093	136.00	13.600	10					ICP
F094	229.50	22.950	10	VHVHVHEH H EH				ICP-MS
F096	153.00	15.300	10					ICAP 61E Analysis
F109	281.50	28.150	10	VHH VHH VHEHEHEH	BIASED HIGH	25.15	1.2899	ICP-MS
F131	78.00	9.750	8					ICP
F133	207.50	20.750	10					ICP-MS
F134	9.00	1.800	5	ELVLL L	BIASED LOW	-6.39	-7.2473	FAA
F138	241.00	24.100	10	H				ICP-MS

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

OVERALL AVERAGE
RANK IS 16.310

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F134	9.00	1.800	5	ELVLLL	BIASED LOW	-6.39	-7.2473	FAA
F014	17.50	2.917	6	LL	BIASED LOW	-6.20	-3.1291	ICP-MS
F031	58.50	6.500	9	L	BIASED LOW	-7.89	-0.4876	ICP
F032b	92.50	9.250	10	VHL				ICP-MS E3391A
F063	77.50	9.688	8	L				ICP-AES
F010	97.50	9.750	10	L				ICP
F131	78.00	9.750	8					ICP
F026	88.00	9.778	9					I.C.P.
F011	100.50	10.050	10					EPA-200.8
F012	82.00	10.250	8	L				ICP-MS
F022	97.50	10.833	9					ICP
F001	108.50	10.850	10					ICP-MS
F003	117.00	11.700	10					ICP-OES
F002	103.50	12.938	8					Atomic Absorbtion
F093	136.00	13.600	10					ICP
F048	136.50	13.650	10	EHEH				ICP
F015	125.00	13.889	9	VL				ICP
F096	153.00	15.300	10					ICAP 61E Analysis
F024	157.00	17.444	9					ICP-AES
F080	140.50	17.563	8	VLH				ICP dig. conc.
F025	178.00	17.800	10	H				ICP-AES
F013	95.50	19.100	5					Ext ICP DA 30311
F037	200.00	20.000	10	VHVH				ICP-MS
F133	207.50	20.750	10					ICP-MS
F046	209.00	20.900	10	VH				ICP-MS As Recd
F060	209.00	20.900	10	EH				Trace - ICP
F038	210.50	21.050	10	VH				ICPMS
F094	229.50	22.950	10	VHVHVHEHHEH				ICP-MS
F032	230.50	23.050	10	HH				ICP-AES E3386A
F019	209.00	23.222	9	H				ICAP
F138	241.00	24.100	10	H				ICP-MS
F109	281.50	28.150	10	VHHVHHVHEHEHEH	BIASED HIGH	25.15	1.2899	ICP-MS
F009	281.50	28.150	10	VHHVHHVHEHEHEH	BIASED HIGH	25.15	1.2899	ICP-MS
F008	298.00	29.800	10	EHEHEHEHEHEHVHH	BIASED HIGH*	-3.21	47.1679	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 16.310

PARAMETER: 38095 Strontium ug/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 2.5000 BASIC ACCEPTABLE ERROR= 2.5000 CONCENTRATION ERROR INCREMENT= 0.0600

SAMPLE	1 = TMHUMB-95		2 = TM-27.2		3 = TM-28.2		4 = TM-FSCal		5 = TM-23.2		6 = TM-24.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	171.	6.00	56.	13.00	51.	10.00	181.	3.50	60.	11.00	68.	6.50
F003	169.	3.50	52.7	4.00	48.9	2.00	187.	7.00	56.9	3.00	70.2	9.00
F009	177.	12.00	57.	14.50	52.	14.50	191.	12.50	62.	15.50	72.	13.50
F010	158. L	1.00	48. EL	1.00	45. EL	1.00	170. EL	1.00	53. EL	1.00	63. L	2.00
F011	169.	3.50	60.6	21.00	55.	19.00	182.	5.00	61.	13.50	73.5	17.00
F015	183.	17.00	58.	17.00	54.	17.50	199.	19.00	63.	19.00	74.	18.50
F022	186.	19.00	60.	19.50	54.	17.50	195.	16.00	60.	11.00	74.	18.50
F024	190. H	21.00	60.	19.50	56.	21.00	210. EH	21.00	64.	20.00	76.	21.00
F025	187.	20.00	55.	9.00	53.	16.00	202.	20.00	61.	13.50	73.	16.00
F032	179.6	16.00	59.0	18.00	55.4	20.00	193.7	15.00	62.8	18.00	74.6	20.00
F032b	177.	12.00	55.	9.00	51.5	11.00	190.	10.50	62.5	17.00	70.3	10.00
F038	184.	18.00	57.2	16.00	50.5	9.00	198.	17.00	64.1	21.00	72.5	15.00
F046	170.	5.00	52.	2.50	50.	6.00	190.	10.50	59.	6.00	68.	6.50
F048	173.8	9.00	55.3	11.00	51.6	12.50	189.9	9.00	60.0	11.00	70.8	12.00
F060	178.	14.00	55.5	12.00	51.6	12.50	193.	14.00	59.7	9.00	70.5	11.00
F063	174.	10.00	54.	6.00	50.	6.00	189.	8.00	59.	6.00	69.	8.00
F080	172.	7.50	55.	9.00	50.	6.00	185.	6.00	59.	6.00	10. EL	1.00
F094	172.	7.50	53.6	5.00	49.6	4.00	181.	3.50	57.7	4.00	67.5	4.00
F096	165.	2.00	52.	2.50	49.	3.00	179.	2.00	56.	2.00	66.	3.00
F109	177.	12.00	57.	14.50	52.	14.50	191.	12.50	62.	15.50	72.	13.50
F133	179.5	15.00	54.2	7.00	50.2	8.00	198.5	18.00	59.4	8.00	67.9	5.00
MEDIAN	177.0000		55.3000		51.5000		190.0000		60.0000		70.5000	
1CRIT	12.9700		5.6680		5.4400		13.7500		5.9500		6.5800	
N	19		19		19		19		19		19	
MEAN	175.9948		55.7105		51.5421		190.2684		60.2632		70.3579	
3STDEV	18.0390		7.1020		5.7176		19.3643		6.2370		9.0241	

PARAMETER: 38095 Strontium ug/L

SAMPLE	7 = TM-26.2		8 = TMDA-54.2		9 = TMDA-52.2		10 = TMDA-53.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	95.	2.00	591.	10.00	290.	8.50	374.	6.00
F003	100.	9.00	595.	11.00	294.	12.00	385.	12.00
F009	101.	11.00	580.	6.50	296.	14.50	381.	8.50
F010	90. EL	1.00	537. VL	2.00	258. EL	1.00	345. VL	2.00
F011	106.	19.00	551. L	3.00	276.	2.00	353. L	3.00
F015	104.	16.50	611.	16.00	303.	18.00	399.	20.00
F022	103.	15.00	610.	15.00	300.	16.00	390.	14.00
F024	110. H	21.00	650. H	21.00	320. EH	21.00	420. H	21.00
F025	104.	16.50	621.	20.00	304.	19.00	398.	18.50
F032	108.3	20.00	620.4	19.00	305.1	20.00	396.0	17.00
F032b	102.	13.50	598.	12.50	295.	13.00	390.	14.00
F038	105.	18.00	616.	18.00	301.	17.00	398.	18.50
F046	97.	4.50	600.	14.00	290.	8.50	390.	14.00
F048	102.0	13.50	612.2	17.00	289.1	7.00	373.3	5.00
F060	101.	11.00	598.	12.50	293.	11.00	383.	10.00
F063	99.	7.50	587.	9.00	287.	6.00	375.	7.00
F080	99.	7.50	585.	8.00	291.	10.00	392.	16.00
F094	97.0	4.50	523. EL	1.00	278.	4.00	339. VL	1.00
F096	96.	3.00	570.	5.00	277.	3.00	366.	4.00
F109	101.	11.00	580.	6.50	296.	14.50	381.	8.50
F133	97.3	6.00	565.5	4.00	282.0	5.00	384.5	11.00
MEDIAN	101.0000		595.0000		293.0000		384.5000	
1CRIT	8.4100		38.0500		19.9300		25.4200	
N	19		19		19		19	
MEAN	100.9263		590.9526		291.9579		381.7789	
3STDEV	10.5242		67.7682		26.1776		43.3153	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	76.50	7.650	10					ICP-MS
F003	72.50	7.250	10					ICP-OES
F009	123.00	12.300	10					ICP-MS
F010	13.00	1.300	10	L ELELELELL ELVLELVL	BIASED LOW	-9.78	-1.7296	ICP
F011	106.00	10.600	10	L L				EPA-200.8
F015	178.50	17.850	10		BIASED HIGH*	2.75	1.5890	ICP
F022	161.50	16.150	10					ICP
F024	207.50	20.750	10	H EH H H EHH	BIASED HIGH	9.42	-0.8097	ICP-AES
F025	168.50	16.850	10		BIASED HIGH*	4.39	-0.6684	ICP-AES
F032	183.00	18.300	10		BIASED HIGH*	3.67	0.4461	ICP-AES E3386A
F032b	122.50	12.250	10					ICP-MS E3391A
F038	167.50	16.750	10		BIASED HIGH*	3.50	-0.0650	ICPMS
F046	77.50	7.750	10					ICP-MS As Recd
F048	107.00	10.700	10					ICP
F060	117.00	11.700	10					Trace - ICP
F063	73.50	7.350	10					ICP-AES
F080	77.00	7.700	10	EL				ICP dig. conc.
F094	38.50	3.850	10	EL VL	BIASED LOW	-12.74	9.2536	ICP-MS
F096	29.50	2.950	10		BIASED LOW*	-4.21	-1.8632	ICAP 61E Analysis
F109	123.00	12.300	10					ICP-MS
F133	87.00	8.700	10					ICP-MS

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F010	13.00	1.300	10	LELELELELLELVLELVL	BIASED LOW	-9.78	-1.7296	ICP
F096	29.50	2.950	10		BIASED LOW*	-4.21	-1.8632	ICAP 61E Analysis
F094	38.50	3.850	10	ELVL	BIASED LOW	-12.74	9.2536	ICP-MS
F003	72.50	7.250	10					ICP-OES
F063	73.50	7.350	10					ICP-AES
F001	76.50	7.650	10					ICP-MS
F080	77.00	7.700	10	EL				ICP dig. conc.
F046	77.50	7.750	10					ICP-MS As Recd
F133	87.00	8.700	10					ICP-MS
F011	106.00	10.600	10	LL				EPA-200.8
F048	107.00	10.700	10					ICP
F060	117.00	11.700	10					Trace - ICP
F032b	122.50	12.250	10					ICP-MS E3391A
F009	123.00	12.300	10					ICP-MS
F109	123.00	12.300	10					ICP-MS
F022	161.50	16.150	10					ICP
F038	167.50	16.750	10		BIASED HIGH*	3.50	-0.0650	ICPMS
F025	168.50	16.850	10		BIASED HIGH*	4.39	-0.6684	ICP-AES
F015	178.50	17.850	10		BIASED HIGH*	2.75	1.5890	ICP
F032	183.00	18.300	10		BIASED HIGH*	3.67	0.4461	ICP-AES E3386A
F024	207.50	20.750	10	HEHHHEHH	BIASED HIGH	9.42	-0.8097	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 11.000

Strontium

PARAMETER: 42095 Molybdenum ug/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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= 0.0600

SAMPLE	1 = TMHUMB-95		2 = TM-27.2		3 = TM-28.2		4 = TM-FSCal		5 = TM-23.2		6 = TM-24.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	1.3	9.00	2.5	10.50	4.2	11.00	0.7	1.50	5.2	12.00	5.6	11.00
F003	1.2	5.50	2.4	7.50	4.1	9.00	0.7	1.50	5.	8.00	6.	15.50
F009	<1.	0.00	1.5 EL	1.50	2.8 EL	1.50	<1.	0.00	3.2 EL	1.50	3.7 EL	1.50
F010	6. EH	15.00	4. EH	17.00	4.	6.50	2. EH	11.00	4.	3.50	5.	5.50
F011	1.3	9.00	2.4	7.50	4.2	11.00	<0.1 EL	0.00	5.3	14.50	5.5	8.00
F012	7. EH	16.00	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00
F015	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00
F019	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00
F022	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	9. EH	19.00	<10.	0.00
F024	<1.	0.00	<1. EL	0.00	<1. EL	0.00	<1.	0.00	<1. EL	0.00	<1. EL	0.00
F025	1.	1.50	2.	3.50	3.	3.00	<1.	0.00	4.	3.50	4.	3.00
F032	1.2	5.50	2.6	13.50	4.2	11.00		0.00	5.2	12.00	5.6	11.00
F032b	1.63	13.00	2.67	15.00	4.5	16.50	0.957	8.00	5.45	17.00	5.91	14.00
F038	1.12	4.00	2.27	6.00	4.	6.50	0.73	3.50	4.98	6.00	5.29	7.00
F046	1.1	3.00	2.1	5.00	3.6	4.00	0.73	3.50	4.4	5.00	4.9	4.00
F048	1.6	12.00	2.8	16.00	4.7	18.00	1.2	10.00	5.5	18.00	6.5	18.00
F060	1.	1.50	2.	3.50	4.	6.50	<1.	0.00	5.	8.00	5.	5.50
F080	<12.	0.00	<12.	0.00	<12.	0.00	<12.	0.00	<12.	0.00	<12.	0.00
F093	1.7	14.00	2.6	13.50	4.5	16.50	1.0	9.00	5.3	14.50	5.7	13.00
F094	1.32	11.00	2.57	12.00	4.48	15.00	0.88	6.00	5.38	16.00	6.01	17.00
F096	<4.	0.00	<4.	0.00	4.	6.50	<4.	0.00	5.	8.00	6.	15.50
F109	<1.	0.00	1.5 EL	1.50	2.8 EL	1.50	<1.	0.00	3.2 EL	1.50	3.7 EL	1.50
F133	1.3	9.00	2.5	10.50	4.3	14.00	0.9	7.00	5.2	12.00	5.6	11.00
F138	1.28	7.00	2.4499	9.00	4.2104	13.00	0.779	5.00	5.1689	10.00	5.5695	9.00
MEDIAN	1.3000		2.4499		4.1500		0.8800		5.1689		5.5848	
1CRIT	1.5000		1.5570		1.6590		1.5000		1.7201		1.7451	
N	13		14		15		8		16		15	
MEAN	1.6962		2.4186		4.0860		0.8970		5.0049		5.4453	
3STDEV	3.7674		0.7110		1.1073		0.4450		1.3594		1.5708	

PARAMETER: 42095 Molybdenum ug/L

SAMPLE	7 = TM-26.2		8 = TMDA-54.2		9 = TMDA-52.2		10 = TMDA-53.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	8.6	12.00	301.	14.50	201.	10.00	209.	7.00
F003	9.	16.50	303.	17.00	215.	22.00	217.	15.00
F009	5.5 VL	2.50	255. EL	1.50	176. EL	1.50	187. EL	1.50
F010	8.	9.00	285.	4.00	206.	15.50	218.	16.00
F011	8.8	14.00	301.	14.50	198.	6.00	203.	4.00
F012	5. VL	1.00	286.	6.00	203.	11.50	212.	13.00
F015	<10.	0.00	310.	20.00	220. H	24.00	230. H	24.00
F019	7.	5.50	317.	22.00	214.	21.00	223.	21.50
F022	10.	21.00	300.	11.50	206.	15.50	210.	9.00
F024	7.	5.50	300.	11.50	200.	8.50	210.	9.00
F025	7.	5.50	290.	7.50	200.	8.50	206.	6.00
F032	9.2	19.00	321.7 H	24.00	215.7	23.00	226.8 H	23.00
F032b	8.81	15.00	305.	18.00	211.	18.50	223.	21.50
F038	8.06	10.00	297.	9.00	199.	7.00	211.	11.00
F046	7.5	8.00	290.	7.50	190.	3.00	210.	9.00
F048	9.1	18.00	306.0	19.00	204.0	13.50	211.5	12.00
F060	9.	16.50	312.	21.00	212.	20.00	222.	19.50
F080	<12.	0.00	300.	11.50	210.	17.00	220.	17.50
F093	26.3 EH	22.00	300.0	11.50	204.0	13.50	214.3	14.00
F094	9.64	20.00	318.	23.00	211.	18.50	222.	19.50
F096	7.	5.50	284.	3.00	197.	5.00	202.	3.00
F109	5.5 VL	2.50	255. EL	1.50	176. EL	1.50	187. EL	1.50
F133	8.7	13.00	302.0	16.00	203.0	11.50	220.0	17.50
F138	8.493	11.00	285.485	5.00	195.9055	4.00	205.0389	5.00
MEDIAN	8.5465		300.0000		203.5000		211.7500	
1CRIT	1.9228		19.4100		13.6200		14.1150	
N	20		21		21		21	
MEAN	8.0951		299.6422		204.5526		214.0780	
3STDEV	3.6926		29.4727		20.4100		21.2372	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	98.50	9.850	10					ICP-MS
F003	117.50	11.750	10					ICP-OES
F009	13.00	1.625	8	ELEL ELELVLELELEL	BIASED LOW	-13.49	-0.8125	ICP-MS
F010	103.00	10.300	10	EHEH EH				ICP
F011	88.50	9.833	9	EL				EPA-200.8
F012	47.50	9.500	5	EH VL				ICP-MS
F015	68.00	22.667	3	H H	INSUFFICIENT DATA			ICP
F019	70.00	17.500	4		INSUFFICIENT DATA			ICAP
F022	76.00	15.200	5	EH				ICP
F024	34.50	8.625	4	ELEL ELEL	INSUFFICIENT DATA			ICP-AES
F025	42.00	4.667	9		BIASED LOW*	-2.49	-0.7756	ICP-AES
F032	142.00	15.778	9	H H				ICP-AES E3386A
F032b	156.50	15.650	10					ICP-MS E3391A
F038	70.00	7.000	10					ICPMS
F046	52.00	5.200	10		BIASED LOW*	-3.29	-0.4566	ICP-MS As Recd
F048	154.50	15.450	10					ICP
F060	102.00	11.333	9					Trace - ICP
F080	46.00	15.333	3		INSUFFICIENT DATA			ICP dig. conc.
F093	141.50	14.150	10	EH				ICP
F094	158.00	15.800	10					ICP-MS
F096	46.50	6.643	7					ICAP 61E Analysis
F109	13.00	1.625	8	ELEL ELELVLELELEL	BIASED LOW	-13.49	-0.8125	ICP-MS
F133	121.50	12.150	10					ICP-MS
F138	78.00	7.800	10					ICP-MS

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

OVERALL AVERAGE
RANK IS 10.570

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F009	13.00	1.625	8	ELELELELVLELELEL	BIASED LOW	-13.49	-0.8125	ICP-MS
F109	13.00	1.625	8	ELELELELVLELELEL	BIASED LOW	-13.49	-0.8125	ICP-MS
F025	42.00	4.667	9		BIASED LOW*	-2.49	-0.7756	ICP-AES
F046	52.00	5.200	10		BIASED LOW*	-3.29	-0.4566	ICP-MS As Recd
F096	46.50	6.643	7					ICAP 61E Analysis
F038	70.00	7.000	10					ICPMS
F138	78.00	7.800	10					ICP-MS
F024	34.50	8.625	4	ELELELEL	INSUFFICIENT DATA			ICP-AES
F012	47.50	9.500	5	EHVL				ICP-MS
F011	88.50	9.833	9	EL				EPA-200.8
F001	98.50	9.850	10					ICP-MS
F010	103.00	10.300	10	EHEHEH				ICP
F060	102.00	11.333	9					Trace - ICP
F003	117.50	11.750	10					ICP-OES
F133	121.50	12.150	10					ICP-MS
F093	141.50	14.150	10	EH				ICP
F022	76.00	15.200	5	EH				ICP
F080	46.00	15.333	3		INSUFFICIENT DATA			ICP dig. conc.
F048	154.50	15.450	10					ICP
F032b	156.50	15.650	10					ICP-MS E3391A
F032	142.00	15.778	9	HH				ICP-AES E3386A
F094	158.00	15.800	10					ICP-MS
F019	70.00	17.500	4		INSUFFICIENT DATA			ICAP
F015	68.00	22.667	3	HH	INSUFFICIENT DATA			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 10.570

PARAMETER: 48095 Cadmium ug/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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= 0.0600

SAMPLE	1 = TMHUMB-95		2 = TM-27.2		3 = TM-28.2		4 = TM-FSCal		5 = TM-23.2		6 = TM-24.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.03	2.00	1.2	9.00	1.3	9.00	0.01	1.00	2.8	19.50	4.2	20.00
F002	<1.0	0.00	1.3	17.00	1.3	9.00	<1.0	0.00	2.6	8.50	4.2	20.00
F003	<0.1	0.00	1.2	9.00	1.2	3.00	<0.1	0.00	2.4	5.00	4.	7.50
F008	<0.5	0.00	1.2	9.00	1.4	18.00	<0.5	0.00	2.7	12.50	4.2	20.00
F009	<0.5	0.00	1.4	22.50	1.4	18.00	<0.5	0.00	2.8	19.50	4.3	25.00
F010	<0.3	0.00	1.4	22.50	1.5	24.00	<0.3	0.00	3.9 EH	28.00	4.	7.50
F011	<0.1	0.00	1.2	9.00	1.3	9.00	<0.1	0.00	2.6	8.50	4.	7.50
F012	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00
F013	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	4.	7.50
F014	0.1	6.00	1.4	22.50	1.4	18.00	<0.1	0.00	2.8	19.50	4.2	20.00
F015	<0.2	0.00	1.2	9.00	1.3	9.00	<2.	0.00	2.6	8.50	4.2	20.00
F019	<4.	0.00	<4.	0.00	<4.	0.00	<4.	0.00	<4.	0.00	4.	7.50
F022	<2.	0.00	<2.	0.00	2. EH	25.00	<2.	0.00	3.	25.00	4.	7.50
F024	<1.	0.00	<1.	0.00	<1. EL	0.00	<1.	0.00	2.	1.50	4.	7.50
F025	<1.	0.00	1.	3.00	<1. EL	0.00	<1.	0.00	3.	25.00	4.	7.50
F026	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	4.1	14.50
F031	<1.	0.00	<1.	0.00	<1. EL	0.00	<1.	0.00	2.	1.50	3. EL	1.00
F032		0.00	1.3	17.00	1.4	18.00		0.00	2.6	8.50	4.5	30.50
F032b	0.0484	4.00	1.18	5.00	1.28	5.00	0.0246	3.00	2.72	14.00	4.3	25.00
F037	<0.1	0.00	1.3	17.00	1.3	9.00	<0.1	0.00	3.0	25.00	4.1	14.50
F038	<0.05	0.00	1.24	13.00	1.32	13.00	<0.05	0.00	3.06	27.00	4.07	12.00
F046	<0.1	0.00	1.3	17.00	1.4	18.00	<0.1	0.00	2.8	19.50	4.4	28.50
F048	<1.	0.00	1.2	9.00	1.3	9.00	<1.	0.00	2.7	12.50	4.1	14.50
F060	<0.5	0.00	1.2	9.00	1.2	3.00	<0.5	0.00	2.8	19.50	4.2	20.00
F063	<0.2	0.00	1.0	3.00	1.2	3.00	<0.2	0.00	2.1	4.00	3.5	3.00
F080	<2.5	0.00	<2.5	0.00	<2.5	0.00	<2.5	0.00	<2.5	0.00	<2.5 EL	0.00
F093	0.1	6.00	1.4	22.50	1.4	18.00	0.1	4.00	2.8	19.50	4.4	28.50
F094	0.3 EH	8.00	1.4	22.50	1.3	9.00	<0.1	0.00	2.6	8.50	4.1	14.50
F096	<0.1	0.00	1.	3.00	1.4	18.00	<0.1	0.00	2.6	8.50	4.2	20.00
F109	<0.5	0.00	1.4	22.50	1.4	18.00	<0.5	0.00	2.8	19.50	4.3	25.00
F131	0.02	1.00	0.77 EL	1.00	0.99 EL	1.00	<0.002	0.00	2.06	3.00	3.39 EL	2.00
F133	0.1	6.00	1.3	17.00	1.4	18.00	<0.1	0.00	2.8	19.50	4.5	30.50
F134		0.00		0.00		0.00		0.00		0.00		0.00
F138	0.0397	3.00	1.2952	14.00	1.4259	23.00	0.0196	2.00	2.7489	15.00	4.3661	27.00
MEDIAN OR *TARGET CONC.	*0.0200		1.2400		1.3200		0.0221		2.7344		4.1000	
1CRIT	1.0000		1.0144		1.0192		1.0000		1.1041		1.1860	
N	6		24		23		2		25		28	
MEAN	0.0697		1.2506		1.3403		0.0221		2.6996		4.1009	
3STDEV	0.0923		0.3672		0.2335		-		0.7104		0.6674	

PARAMETER: 48095 Cadmium ug/L

SAMPLE	7 = TM-26.2		8 = TMDA-54.2		9 = TMDA-52.2		10 = TMDA-53.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	7.1	25.50	161.	9.00	87.	6.00	119.	12.00
F002	7.0	19.50	163.	14.00	91.	13.50	119.	12.00
F003	7.	19.50	165.	20.00	91.	13.50	121.	17.00
F008	6.9	13.00	171.	30.50	94.	28.50	126.	29.00
F009	7.0	19.50	164.	17.00	92.	16.00	124.	24.00
F010	6.	6.00	158.	4.00	88.	7.00	117.	9.00
F011	7.	19.50	162.	11.50	88.9	8.00	114.	5.00
F012	7.	19.50	166.	23.50	93.	24.00	122.	19.50
F013	6.	6.00	156.	3.00	83. L	4.00	112. L	4.00
F014	7.1	25.50	165.	20.00	94.	28.50	117.	9.00
F015	7.	19.50	163.	14.00	89.	9.50	117.	9.00
F019	6.	6.00	171.	30.50	93.	24.00	125.	28.00
F022	7.	19.50	180. H	33.00	99. H	34.00	131. H	33.50
F024	7.	19.50	170.	28.00	95.	30.00	130. H	31.50
F025	5. EL	1.50	170.	28.00	93.	24.00	124.	24.00
F026	6.6	9.00	158.8	5.00	85.4 L	5.00	115.9	6.00
F031	5. EL	1.50	125. EL	1.00	74. EL	1.00	97. EL	1.00
F032	7.3	30.00	177.0 H	32.00	97.7	32.00	128.1	30.00
F032b	8.68 EH	32.00	161.	9.00	90.4	11.00	119.	12.00
F037	6.8	11.00	166.0	23.50	92.4	19.00	124.9	27.00
F038	6.56	8.00	163.	14.00	90.6	12.00	120.	15.00
F046	7.2	27.00	170.	28.00	96.	31.00	130. H	31.50
F048	6.9	13.00	169.4	26.00	92.5	20.00	121.4	18.00
F060	7.0	19.50	168.	25.00	93.0	24.00	123.	22.00
F063	5.3 EL	3.00	161.	9.00	93.	24.00	120.	15.00
F080	<2.5 EL	0.00	160.	6.50	92.	16.00	120.	15.00
F093	7.3	30.00	165.0	20.00	92.2	18.00	122.9	21.00
F094	6.7	10.00	162.	11.50	89.0	9.50	116.	7.00
F096	6.9	13.00	164.	17.00	92.8	21.00	122.	19.50
F109	7.0	19.50	164.	17.00	92.	16.00	124.	24.00
F131	5.89	4.00	139.2 EL	2.00	82.4 VL	3.00	103.7 VL	2.00
F133	7.3	30.00	180.8 VH	34.00	98.4	33.00	131.0 H	33.50
F134		0.00	160.	6.50	80. VL	2.00	110. L	3.00
F138	7.2071	28.00	165.5643	22.00	93.698	27.00	124.5024	26.00
MEDIAN OR *TARGET CONC.	7.0000		164.0000		92.1000		121.2000	
1CRIT	1.3600		10.7800		6.4660		8.2120	
N	29		32		32		31	
MEAN	6.7951		164.3426		91.1062		120.4001	
3STDEV	1.4517		20.5268		12.1601		16.7883	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	113.00	11.300	10					ICP-MS
F002	113.50	14.188	8					Atomic Absorbtion
F003	94.50	11.813	8					ICP-OES
F008	160.50	20.063	8					GF/ICP
F009	161.50	20.188	8					ICP-MS
F010	108.00	13.500	8	EH				TM1-TM4, GFAA
F011	78.00	9.750	8					EPA-200.8
F012	86.50	21.625	4		INSUFFICIENT DATA			ICP-MS
F013	24.50	4.900	5	L L	BIASED LOW	-5.73	-1.0279	Ext ICP DA 48311
F014	169.00	18.778	9					ICP-MS
F015	98.50	12.313	8					GFAA
F019	96.00	19.200	5					ICAP
F022	177.50	25.357	7	EH H H H	BIASED HIGH	9.12	-0.3236	ICP
F024	118.00	19.667	6	EL H				ICP-AES
F025	113.00	16.143	7	EL EL				ICP-AES
F026	39.50	7.900	5	L				I.C.P.
F031	7.00	1.167	6	EL ELELELELEL	BIASED LOW	-22.18	0.2720	ICP
F032	198.00	24.750	8	H	BIASED HIGH	7.14	-0.2396	ICP-AES E3386A
F032b	120.00	12.000	10	EH				ICP-MS E3391A
F037	146.00	18.250	8					ICP-MS
F038	114.00	14.250	8					ICPMS
F046	200.50	25.063	8	H	BIASED HIGH*	4.74	0.0942	ICP-MS As Recd
F048	122.00	15.250	8					ICP
F060	142.00	17.750	8					Trace - ICP
F063	64.00	8.000	8	EL				GFAA / ICP-AES
F080	37.50	12.500	3	ELEL	INSUFFICIENT DATA			ICP dig. conc.
F093	187.50	18.750	10					ICP
F094	100.50	11.167	9	EH				ICP-MS
F096	120.00	15.000	8					HGA Analysis-LL
F109	161.50	20.188	8					ICP-MS
F131	19.00	2.111	9	ELEL EL ELVLVL	BIASED LOW	-14.20	0.0621	GFAA
F133	221.50	24.611	9	VH H	BIASED HIGH	9.26	-0.2911	ICP-MS
F134	11.50	3.833	3	VLL	INSUFFICIENT DATA			FAA
F138	187.00	18.700	10					ICP-MS

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

OVERALL AVERAGE
RANK IS 15.337

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F031	7.00	1.167	6	ELELELELELEL	BIASED LOW	-22.18	0.2720	ICP
F131	19.00	2.111	9	ELELELELVLVL	BIASED LOW	-14.20	0.0621	GFAA
F134	11.50	3.833	3	VLL	INSUFFICIENT DATA			FAA
F013	24.50	4.900	5	LL	BIASED LOW	-5.73	-1.0279	Ext ICP DA 48311
F026	39.50	7.900	5	L				I.C.P.
F063	64.00	8.000	8	EL				GFAA / ICP-AES
F011	78.00	9.750	8					EPA-200.8
F094	100.50	11.167	9	EH				ICP-MS
F001	113.00	11.300	10					ICP-MS
F003	94.50	11.813	8					ICP-OES
F032b	120.00	12.000	10	EH				ICP-MS E3391A
F015	98.50	12.313	8					GFAA
F080	37.50	12.500	3	ELEL	INSUFFICIENT DATA			ICP dig. conc.
F010	108.00	13.500	8	EH				TM1-TM4, GFAA
F002	113.50	14.188	8					Atomic Absorbtion
F038	114.00	14.250	8					ICPMS
F096	120.00	15.000	8					HGA Analysis-LL
F048	122.00	15.250	8					ICP
F025	113.00	16.143	7	ELEL				ICP-AES
F060	142.00	17.750	8					Trace - ICP
F037	146.00	18.250	8					ICP-MS
F138	187.00	18.700	10					ICP-MS
F093	187.50	18.750	10					ICP
F014	169.00	18.778	9					ICP-MS
F019	96.00	19.200	5					ICAP
F024	118.00	19.667	6	ELH				ICP-AES
F008	160.50	20.063	8					GF/ICP
F109	161.50	20.188	8					ICP-MS
F009	161.50	20.188	8					ICP-MS
F012	86.50	21.625	4		INSUFFICIENT DATA			ICP-MS
F133	221.50	24.611	9	VHH	BIASED HIGH	9.26	-0.2911	ICP-MS
F032	198.00	24.750	8	H	BIASED HIGH	7.14	-0.2396	ICP-AES E3386A
F046	200.50	25.063	8	H	BIASED HIGH*	4.74	0.0942	ICP-MS As Recd
F022	177.50	25.357	7	EHHHH	BIASED HIGH	9.12	-0.3236	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 15.337

PARAMETER: 56095 Barium ug/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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= 0.0600

SAMPLE	1 = TMHUMB-95		2 = TM-27.2		3 = TM-28.2		4 = TM-FSCal		5 = TM-23.2		6 = TM-24.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	21.	8.50	5.2	16.50	15.	5.50	37.	20.50	15.	16.00	8.6	10.00
F003	21.3	12.00	5.	8.00	15.3	8.00	36.	15.00	14.4	8.00	9.	17.50
F008	22.	18.00	5.	8.00	16.	16.00	37.	20.50	15.	16.00	9.	17.50
F009	23.	25.00	6.	25.50	16.	16.00	38.	24.00	16.	27.00	9.	17.50
F010	22.	18.00	5.	8.00	16.	16.00	36.	15.00	14.	5.50	9.	17.50
F011	20.7	5.00	5.2	16.50	15.1	7.00	35.1	7.50	14.6	9.00	8.5	8.00
F012	23.	25.00	5.	8.00	16.	16.00	37.	20.50	15.	16.00	8.	4.00
F014	21.	8.50	<10.	0.00	16.	16.00	35.	5.00	15.	16.00	<10.	0.00
F015	21.	8.50	4.	2.00	14.	1.50	33.	1.50	13.	1.50	7.	1.00
F019	23.	25.00	5.	8.00	16.	16.00	39.	27.00	16.	27.00	10.	26.00
F022	25. EH	29.00	6.	25.50	18.	28.00	40. H	29.00	16.	27.00	10.	26.00
F024	22.	18.00	5.	8.00	16.	16.00	37.	20.50	15.	16.00	9.	17.50
F025	19. L	1.00	5.	8.00	14.	1.50	33.	1.50	13.	1.50	8.	4.00
F031	23.	25.00	6.	25.50	17.	27.00	36.	15.00	16.	27.00	10.	26.00
F032	21.8	15.00	5.4	22.00	16.7	25.00	35.9	11.50	15.2	20.50	9.2	22.50
F032b	22.9	22.00	5.3	20.00	16.3	24.00	38.	24.00	15.7	22.50	8.93	13.00
F037	20.6	4.00	5.2	16.50	14.9	4.00	33.7	3.00	15.7	22.50	8.4	7.00
F038	21.4	13.00	5.06	13.00	15.5	9.00	35.5	10.00	14.9	12.00	8.55	9.00
F046	20.	2.00	4.8	3.00	15.	5.50	35.	5.00	14.	5.50	8.2	6.00
F048	20.4	3.00	3.5 EL	1.00	14.4	3.00	35.1	7.50	13.3	3.00	7.2	2.00
F060	22.1	20.00	5.2	16.50	159. EH	29.00	36.4	18.00	14.8	11.00	8.8	12.00
F063	21.	8.50	5.	8.00	16.	16.00	36.	15.00	14.	5.50	8.	4.00
F080	21.	8.50	<2.5 EL	0.00	16.	16.00	35.	5.00	15.	16.00	<2.5 EL	0.00
F093	21.8	15.00	5.3	20.00	16.1	22.50	35.9	11.50	15.0	16.00	9.2	22.50
F094	21.8	15.00	5.3	20.00	15.9	10.00	35.4	9.00	14.7	10.00	8.7	11.00
F096	21.	8.50	5.	8.00	16.	16.00	36.	15.00	14.	5.50	9.	17.50
F109	23.	25.00	6.	25.50	16.	16.00	38.	24.00	16.	27.00	9.	17.50
F133	22.5	21.00	5.1	14.00	16.1	22.50	39.2	28.00	15.2	20.50	9.0	17.50
F138	23.5724	28.00	5.5057	23.00	16.9821	26.00	38.3142	26.00	15.711	24.00	9.2034	24.00
MEDIAN	21.8000		5.1000		16.0000		36.0000		15.0000		9.0000	
1CRIT	2.7180		1.7160		2.3700		3.5700		2.3100		1.9500	
N	27		26		26		26		27		26	
MEAN	21.7730		5.2141		15.9339		36.4044		15.0078		8.8263	
3STDEV	2.8481		1.2766		2.1841		4.0355		2.1689		1.8904	

PARAMETER: 56095 Barium ug/L

SAMPLE	7 = TM-26.2		8 = TMDA-54.2		9 = TMDA-52.2		10 = TMDA-53.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	25.	12.50	258.	6.00	145.	3.50	279.	4.00
F003	25.1	17.00	265.	12.00	152.	14.00	291.	14.00
F008	26.	22.50	269.	18.00	153.	17.50	293.	19.00
F009	26.	22.50	270.	20.00	156.	22.50	298.	22.50
F010	25.	12.50	262.	9.00	147.	6.00	287.	11.00
F011	24.7	7.50	250. L	2.50	145.	3.50	274.	2.00
F012	25.	12.50	278.	27.00	157.	25.00	303.	26.50
F014	26.	22.50	274.	25.50	157.	25.00	284.	8.00
F015	24.	6.00	256.	5.00	153.	17.50	295.	21.00
F019	26.	22.50	268.	16.00	154.	19.50	294.	20.00
F022	28. EH	29.00	287. H	28.00	164. H	29.00	313. H	29.00
F024	26.	22.50	270.	20.00	160.	28.00	300.	24.50
F025	22. EL	1.00	268.	16.00	152.	14.00	292.	16.50
F031	26.	22.50	272.	23.50	149.	11.00	289.	12.00
F032	26.1	27.00	272.0	23.50	154.2	21.00	292.3	18.00
F032b	26.	22.50	266.	13.00	154.	19.50	292.	16.50
F037	23.1	3.00	240.7 EL	1.00	137.4 L	1.00	270.7 L	1.00
F038	23.7	5.00	274.	25.50	157.	25.00	303.	26.50
F046	23.	2.00	250. L	2.50	140. L	2.00	280.	5.00
F048	23.5	4.00	306.1 EH	29.00	147.2	7.00	275.4	3.00
F060	25.0	12.50	268.	16.00	152.	14.00	291.	14.00
F063	25.	12.50	262.	9.00	148.	9.00	286.	10.00
F080	25.	12.50	260.	7.00	150.	12.00	300.	24.50
F093	25.0	12.50	255.5	4.00	146.6	5.00	281.7	6.00
F094	24.7	7.50	262.	9.00	148.	9.00	283.	7.00
F096	25.	12.50	263.	11.00	148.	9.00	285.	9.00
F109	26.	22.50	270.	20.00	156.	22.50	298.	22.50
F133	25.8	18.00	267.0	14.00	152.8	16.00	291.0	14.00
F138	26.291	28.00	270.067	22.00	159.0373	27.00	305.5459	28.00
MEDIAN	25.0000		268.0000		152.0000		291.0000	
1CRIT	2.9100		17.4900		10.5300		18.8700	
N	27		27		27		27	
MEAN	25.1108		266.1692		151.5866		290.4795	
3STDEV	2.8241		24.1577		14.2783		24.9185	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	103.00	10.300	10					ICP-MS
F003	125.50	12.550	10					ICP-OES
F008	173.00	17.300	10					ICP
F009	222.50	22.250	10					ICP-MS
F010	118.50	11.850	10					ICP
F011	68.50	6.850	10	L	BIASED LOW	-6.30	0.6810	EPA-200.8
F012	180.50	18.050	10					ICP-MS
F014	126.50	15.813	8					ICP-MS
F015	65.50	6.550	10		BIASED LOW*	-0.49	-1.4785	ICP
F019	207.00	20.700	10					ICAP
F022	279.50	27.950	10	EH H EHH H H	BIASED HIGH	7.09	0.8635	ICP
F024	191.00	19.100	10					ICP-AES
F025	65.00	6.500	10	L EL	BIASED LOW*	0.94	-2.0807	ICP-AES
F031	214.50	21.450	10					ICP
F032	206.00	20.600	10					ICP-AES E3386A
F032b	197.00	19.700	10					ICP-MS E3391A
F037	63.00	6.300	10	ELL L	BIASED LOW	-8.79	0.5246	ICP-MS
F038	148.00	14.800	10					ICPMS
F046	38.50	3.850	10	L L	BIASED LOW	-5.27	-0.4706	ICP-MS As Recd
F048	62.50	6.250	10	EL EH	BIASED LOW*	3.71	-2.3911	ICP
F060	163.00	16.300	10	EH				Trace - ICP
F063	97.50	9.750	10					ICP-AES
F080	101.50	12.688	8	EL EL				ICP dig. conc.
F093	135.00	13.500	10					ICP
F094	107.50	10.750	10					ICP-MS
F096	112.00	11.200	10					ICAP 61E Analysis
F109	222.50	22.250	10					ICP-MS
F133	185.50	18.550	10					ICP-MS
F138	256.00	25.600	10		BIASED HIGH*	3.04	0.5818	ICP-MS

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

OVERALL AVERAGE
RANK IS 14.811

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F046	38.50	3.850	10	LL	BIASED LOW	-5.27	-0.4706	ICP-MS As Recd
F048	62.50	6.250	10	ELEH	BIASED LOW*	3.71	-2.3911	ICP
F037	63.00	6.300	10	ELLL	BIASED LOW	-8.79	0.5246	ICP-MS
F025	65.00	6.500	10	LEL	BIASED LOW*	0.94	-2.0807	ICP-AES
F015	65.50	6.550	10		BIASED LOW*	-0.49	-1.4785	ICP
F011	68.50	6.850	10	L	BIASED LOW	-6.30	0.6810	EPA-200.8
F063	97.50	9.750	10					ICP-AES
F001	103.00	10.300	10					ICP-MS
F094	107.50	10.750	10					ICP-MS
F096	112.00	11.200	10					ICAP 61E Analysis
F010	118.50	11.850	10					ICP
F003	125.50	12.550	10					ICP-OES
F080	101.50	12.688	8	ELEL				ICP dig. conc.
F093	135.00	13.500	10					ICP
F038	148.00	14.800	10					ICPMS
F014	126.50	15.813	8					ICP-MS
F060	163.00	16.300	10	EH				Trace - ICP
F008	173.00	17.300	10					ICP
F012	180.50	18.050	10					ICP-MS
F133	185.50	18.550	10					ICP-MS
F024	191.00	19.100	10					ICP-AES
F032b	197.00	19.700	10					ICP-MS E3391A
F032	206.00	20.600	10					ICP-AES E3386A
F019	207.00	20.700	10					ICAP
F031	214.50	21.450	10					ICP
F109	222.50	22.250	10					ICP-MS
F009	222.50	22.250	10					ICP-MS
F138	256.00	25.600	10		BIASED HIGH*	3.04	0.5818	ICP-MS
F022	279.50	27.950	10	EHHEHHHH	BIASED HIGH	7.09	0.8635	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 14.811

Barium

PARAMETER: 82095 Lead ug/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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= 0.0600

SAMPLE	1 = TMHUMB-95		2 = TM-27.2		3 = TM-28.2		4 = TM-FSCal		5 = TM-23.2		6 = TM-24.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.4	6.50	3.2	19.00	4.2	20.50	0.1	2.00	3.9	16.50	6.1	18.50
F002	<2.	0.00	3.2	19.00	4.0	13.00	<2.0	0.00	3.7	9.00	6.7	25.00
F003	<0.2	0.00	3.	10.00	4.	13.00	0.3	9.00	3.5	7.00	6.	12.50
F008	<1.	0.00	3.	10.00	4.	13.00	<1.	0.00	4.	20.50	6.	12.50
F009	<1.	0.00	3.	10.00	4.	13.00	<1.	0.00	4.	20.50	6.	12.50
F010	0.3	2.50	2.9	5.00	3.9	5.50	0.1	2.00	3.9	16.50	6.3	21.00
F011	0.3	2.50	3.2	19.00	4.2	20.50	<0.2	0.00	3.8	12.00	6.	12.50
F012	<2.	0.00	3.	10.00	4.	13.00	<2.	0.00	4.	20.50	6.	12.50
F013	<2.	0.00	2.8	3.00	3.5	2.00	<2.	0.00	3.5	7.00	5.9	7.50
F014	1.0	13.50	2.9	5.00	3.7	3.00	<1.0	0.00	3.4	4.50	5.7	3.50
F015	<0.5	0.00	3.4	23.50	4.6	24.00	0.6	10.00	4.3	25.00	6.9	26.00
F019	<30.	0.00	<30.	0.00	<30.	0.00	<30.	0.00	<30.	0.00	<30.	0.00
F022	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	5. EH	28.50	8. EH	29.00
F024	1.	13.50	3.	10.00	5.	26.50	<1.	0.00	5. EH	28.50	7.	27.50
F025	2. EH	15.00	1. EL	1.00	5.	26.50	<1.	0.00	4.	20.50	4. EL	1.00
F026	<50.	0.00	<50.	0.00	<50.	0.00	<50.	0.00	<50.	0.00	<50.	0.00
F031	<1.	0.00	4.	27.00	5.	26.50	<1.	0.00	4.	20.50	7.	27.50
F032		0.00		0.00		0.00		0.00		0.00		0.00
F032b	0.407	8.00	3.27	21.00	3.94	7.00	0.285	8.00	3.87	14.50	6.03	17.00
F037	0.4	6.50	3.3	22.00	3.9	5.50	<0.1	0.00	4.5	27.00	5.9	7.50
F038	0.34	5.00	3.08	14.00	3.97	8.00	0.12	4.00	3.87	14.50	5.74	5.00
F046	0.43	10.00	3.1	15.50	3.8	4.00	0.62	11.00	3.8	12.00	5.7	3.50
F048	<1.	0.00	3.1	15.50	4.1	19.00	<1.	0.00	3.8	12.00	6.1	18.50
F060	<2.	0.00	2. EL	2.00	4.	13.00	<2.	0.00	3.	2.00	5.	2.00
F063	0.2	1.00	3.4	23.50	4.0	13.00	0.1	2.00	3.5	7.00	6.5	23.00
F080	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00
F093	0.7	12.00	2.9	5.00	3.3	1.00	0.7	12.00	3.4	4.50	5.8	6.00
F094	0.59	11.00	3.46	25.00	4.08	18.00	0.17	6.00	3.74	10.00	6.17	20.00
F096	<1.	0.00	5. EH	28.00	5.	26.50	<1.	0.00	3.	2.00	6.	12.50
F109	<1.	0.00	3.	10.00	4.	13.00	<1.	0.00	4.	20.50	6.	12.50
F131	0.42	9.00	3.14	17.00	4.51	23.00	0.19	7.00	4.44	26.00	6.35	22.00
F133	<2.	0.00	3.	10.00	4.	13.00	<2.	0.00	3.	2.00	6.	12.50
F134		0.00		0.00		0.00		0.00		0.00		0.00
F138	0.3245	4.00	3.5746	26.00	4.3766	22.00	0.1372	5.00	4.0033	24.00	6.6524	24.00
MEDIAN	0.4070		3.0900		4.0000		0.1800		3.8700		6.0000	
1CRIT	1.5000		1.5954		1.6500		1.5000		1.6422		1.7700	
N	13		26		27		11		27		27	
MEAN	0.5086		3.1125		4.1769		0.2475		3.7749		6.1312	
3STDEV	0.7077		1.0074		1.2135		0.5503		1.1500		1.3014	

PARAMETER: 82095 Lead ug/L

SAMPLE	7 = TM-26.2		8 = TMDA-54.2		9 = TMDA-52.2		10 = TMDA-53.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	10.	19.00	518.	12.00	369.	15.50	353.	9.00
F002	10.2	24.00	533.	20.00	370.	18.00	358.	14.00
F003	9.	4.00	523.	17.00	369.	15.50	365.	21.00
F008	10.	19.00	540.	23.00	370.	18.00	370.	24.50
F009	10.	19.00	517.	10.50	367.	12.00	356.	11.50
F010	9.7	10.00	543.	24.00	384.	26.00	374.	26.00
F011	9.8	11.50	496.	3.00	343. L	3.00	322. VL	3.00
F012	10.	19.00	552.	29.00	390.	28.00	381.	28.00
F013	8.9	1.50	522.	16.00	367.	12.00	359.	15.50
F014	9.6	9.00	478. L	2.00	339. L	2.00	316. VL	1.00
F015	11.4	29.00	510.	6.50	350.	4.00	410. VH	32.50
F019	<30.	0.00	560. H	31.00	380.	23.00	370.	24.50
F022	10.	19.00	546.	26.00	383.	25.00	363.	19.50
F024	11.	27.50	550.	27.50	390.	28.00	380.	27.00
F025	11.	27.50	538.	22.00	368.	14.00	367.	22.00
F026	<50.	0.00	504.7	4.00	363.3	8.00	334.9 L	4.00
F031	10.	19.00	510.	6.50	485. EH	34.00	400. VH	31.00
F032	11.8 EH	30.00	582.5 VH	33.00	409.2 VH	32.00	398.0 VH	30.00
F032b	9.99	14.00	474. VL	1.00	327. VL	1.00	319. VL	2.00
F037	9.5	8.00	520.5	15.00	370.9	20.00	369.1	23.00
F038	9.33	7.00	550.	27.50	381.	24.00	382.	29.00
F046	8.9	1.50	510.	6.50	390.	28.00	360.	17.50
F048	10.0	19.00	531.6	19.00	357.5	6.00	353.9	10.00
F060	9.	4.00	534.	21.00	374.	22.00	363.	19.50
F063	9.8	11.50	557. H	30.00	412. VH	33.00	432. EH	34.00
F080	<20.	0.00	520.	13.00	370.	18.00	360.	17.50
F093	9.3	6.00	520.4	14.00	364.3	10.00	357.4	13.00
F094	9.82	13.00	510.	6.50	356.	5.00	345.	5.50
F096	10.	19.00	525.	18.00	372.	21.00	359.	15.50
F109	10.	19.00	517.	10.50	367.	12.00	356.	11.50
F131	10.47	26.00	543.3	25.00	363.4	9.00	346.5	7.00
F133	9.	4.00	516.	9.00	408. VH	31.00	345.	5.50
F134		0.00	570. H	32.00	400. H	30.00	410. VH	32.50
F138	10.3101	25.00	601.2226 EH	34.00	362.8688	7.00	348.5504	8.00
MEDIAN	10.0000		524.0000		370.0000		360.0000	
1CRIT	2.0100		32.8500		23.6100		23.0100	
N	27		32		32		32	
MEAN	9.9341		529.6250		373.7647		363.6047	
3STDEV	1.7079		65.5060		52.0818		63.1360	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	138.50	13.850	10					ICP-MS
F002	142.00	17.750	8					Atomic Absorbtion
F003	109.00	12.111	9					ICP-OES
F008	140.50	17.563	8					GF/ICP
F009	109.00	13.625	8					ICP-MS
F010	138.50	13.850	10					TM1-TM7, GFAA
F011	87.00	9.667	9	L VL				EPA-200.8
F012	160.00	20.000	8					ICP-MS
F013	64.50	8.062	8					ICP82311/GFAA82309
F014	43.50	4.833	9	L L VL	BIASED LOW	-9.49	-0.0549	ICP-MS
F015	180.50	20.056	9	VH				GFAA
F019	78.50	26.167	3	H	INSUFFICIENT DATA			ICAP
F022	147.00	24.500	6	EHEH	BIASED HIGH*	3.21	0.0318	ICP
F024	216.00	24.000	9	EH	BIASED HIGH	5.07	0.6298	ICP-AES
F025	149.50	16.611	9	EHEL EL				ICP-AES
F026	16.00	5.333	3	L	INSUFFICIENT DATA			I.C.P.
F031	192.00	24.000	8	EHVH	BIASED HIGH	7.90	5.3516	GFAAS
F032	125.00	31.250	4	EHVHVHVH	INSUFFICIENT DATA			ICP-AES E3386A
F032b	93.50	9.350	10	VLVLVL				ICP-MS E3391A
F037	134.50	14.944	9					ICP-MS
F038	138.00	13.800	10					ICPMS
F046	109.50	10.950	10					ICP-MS As Recd
F048	119.00	14.875	8					ICP
F060	85.50	10.688	8	EL				Trace - ICP
F063	178.00	17.800	10	H VHEH				GFAA / ICP-AES
F080	48.50	16.167	3		INSUFFICIENT DATA			ICP dig. conc.
F093	83.50	8.350	10					ICP
F094	120.00	12.000	10					ICP-MS
F096	142.50	17.813	8	EH				USN -ICP
F109	109.00	13.625	8					ICP-MS
F131	171.00	17.100	10					GFAA
F133	87.00	10.875	8	VH				ICP-MS
F134	94.50	31.500	3	H H VH	INSUFFICIENT DATA			FAA
F138	179.00	17.900	10	EH				ICP-MS

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

OVERALL AVERAGE
RANK IS 15.128

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F014	43.50	4.833	9	LLVL	BIASED LOW	-9.49	-0.0549	ICP-MS
F026	16.00	5.333	3	L	INSUFFICIENT DATA			I.C.P.
F013	64.50	8.062	8					ICP82311/GFAA82309
F093	83.50	8.350	10					ICP
F032b	93.50	9.350	10	VLVLVL				ICP-MS E3391A
F011	87.00	9.667	9	LVL				EPA-200.8
F060	85.50	10.688	8	EL				Trace - ICP
F133	87.00	10.875	8	VH				ICP-MS
F046	109.50	10.950	10					ICP-MS As Recd
F094	120.00	12.000	10					ICP-MS
F003	109.00	12.111	9					ICP-OES
F009	109.00	13.625	8					ICP-MS
F109	109.00	13.625	8					ICP-MS
F038	138.00	13.800	10					ICPMS
F010	138.50	13.850	10					TM1-TM7, GFAA
F001	138.50	13.850	10					ICP-MS
F048	119.00	14.875	8					ICP
F037	134.50	14.944	9					ICP-MS
F080	48.50	16.167	3		INSUFFICIENT DATA			ICP dig. conc.
F025	149.50	16.611	9	EHELEL				ICP-AES
F131	171.00	17.100	10					GFAA
F008	140.50	17.563	8					GF/ICP
F002	142.00	17.750	8					Atomic Absorbtion
F063	178.00	17.800	10	HVHEH				GFAA / ICP-AES
F096	142.50	17.813	8	EH				USN -ICP
F138	179.00	17.900	10	EH				ICP-MS
F012	160.00	20.000	8					ICP-MS
F015	180.50	20.056	9	VH				GFAA
F024	216.00	24.000	9	EH	BIASED HIGH	5.07	0.6298	ICP-AES
F031	192.00	24.000	8	EHVH	BIASED HIGH	7.90	5.3516	GFAAS
F022	147.00	24.500	6	EHEH	BIASED HIGH*	3.21	0.0318	ICP
F019	78.50	26.167	3	H	INSUFFICIENT DATA			ICAP
F032	125.00	31.250	4	EHVHVHVH	INSUFFICIENT DATA			ICP-AES E3386A
F134	94.50	31.500	3	HHVH	INSUFFICIENT DATA			FAA

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

OVERALL AVERAGE
RANK IS 15.128

Lead

PARAMETER: 33095 Arsenic ug/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.5000 BASIC ACCEPTABLE ERROR= 0.5000 CONCENTRATION ERROR INCREMENT= 0.0800

SAMPLE	1 = TMHUMB-95		2 = TM-27.2		3 = TM-28.2		4 = TM-FSCal		5 = TM-23.2		6 = TM-24.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	1.0	13.50	2.5	13.00	5.9	11.50	0.27	6.00	8.2	12.00	4.9	10.50
F003	0.7	5.00	2.2	6.00	5.5	6.00	0.3	7.50	7.5	3.50	4.5	6.00
F008	<1.	0.00	3.	22.00	6.	14.50	<1.	0.00	9.	21.50	5.	13.50
F009	1.0	13.50	2.7	18.50	6.5	21.00	0.4	10.50	9.3	25.50	5.6	21.50
F010	1.2	16.00	2.5	13.00	6.5	21.00	0.2	4.00	8.9	19.00	5.6	21.50
F011	0.8	6.00	2.5	13.00	6.	14.50	<0.2	0.00	8.2	12.00	5.5	18.50
F012	<3.	0.00	3.	22.00	6.	14.50	<3.	0.00	7. L	2.00	4. L	2.50
F014	1.3	18.00	4.1 EH	24.00	6.6	23.50	<1.0	0.00	9.0	21.50	5.5	18.50
F015	0.9	8.00	2.5	13.00	6.2	19.00	<0.5	0.00	8.2	12.00	5.0	13.50
F022	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	9.	21.50	<10.	0.00
F025	0.5	2.00	2.1	4.50	5.7	8.50	0.2	4.00	8.7	16.50	4.7	7.50
F031	<2.	0.00	<2.	0.00	5. L	4.00	<2.	0.00	8.	9.00	4. L	2.50
F037	0.6674	4.00	2.030	3.00	4.932 L	3.00	0.1848	2.00	7.761	5.00	4.188	4.00
F038	0.9	8.00	2.4	9.50	5.9	11.50	0.3	7.50	8.5	14.50	4.9	10.50
F046	1.0	13.50	2.6	17.00	6.1	17.00	0.47	12.00	8.7	16.50	5.2	16.00
F048	<1.0	0.00	1.9	2.00	5.7	8.50	<1.0	0.00	8.0	9.00	4.4	5.00
F060	0.5	2.00	2.5	13.00	6.6	23.50	<0.2	0.00	8.5	14.50	6.0 H	24.00
F063	0.5	2.00	2.1	4.50	5.3	5.00	0.2	4.00	7.8	6.00	4.7	7.50
F080	<2.	0.00	<2.	0.00	<2. EL	0.00	<2.	0.00	7.5	3.50	5.6	21.50
F093	<1.0	0.00	2.3	7.00	5.7	8.50	<1.0	0.00	8.0	9.00	5.0	13.50
F094	0.9	8.00	2.4	9.50	5.7	8.50	<0.4	0.00	7.9	7.00	4.8	9.00
F096	<0.5	0.00	1.3 EL	1.00	3.8 EL	2.00	<0.5	0.00	5. EL	1.00	3.3 VL	1.00
F109	1.0	13.50	2.7	18.50	6.5	21.00	0.4	10.50	9.3	25.50	5.6	21.50
F131	0.93	10.00	2.31	8.00	3.76 EL	1.00	1.89 EH	13.00	9.21	24.00	6.37 VH	25.00
F133	<1.0	0.00	3.0	22.00	6.0	14.50	<1.0	0.00	9.0	21.50	5.0	13.50
F134	1.25	17.00	2.72	20.00	7.47 VH	25.00	0.04	1.00	10.55 EH	27.00	6.82 VH	26.00
F138	0.944	11.00	2.5092	16.00	6.1871	18.00	0.3046	9.00	8.7015	18.00	5.2851	17.00
MEDIAN	0.9150		2.5000		6.0000		0.3000		8.5000		5.0000	
1CRIT	0.5332		0.6600		0.9400		0.5000		1.1400		0.8600	
N	17		22		23		11		25		24	
MEAN	0.8642		2.4759		5.8400		0.2936		8.3949		5.0560	
3STDEV	0.6579		0.8961		1.8835		0.2753		1.8449		1.7719	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	123.00	12.300	10					ICP-MS
F003	56.50	5.650	10	L	BIASED LOW	-5.22	-0.2587	HYRDRIDE/ICP-OES
F008	100.00	12.500	8	VL				Hydride
F009	204.00	20.400	10		BIASED HIGH	8.11	0.0215	ICP-MS
F010	182.50	18.250	10	VH				Hydride AA
F011	139.00	15.444	9	H H				
F012	93.00	11.625	8	L L				ICP-MS
F014	182.00	20.222	9	EH	BIASED HIGH*	0.13	0.7661	ICP-MS
F015	101.00	11.222	9					GFAA
F022	38.50	9.625	4	ELL	INSUFFICIENT DATA			ICP
F025	96.00	9.600	10					AA Hydride
F031	46.50	6.643	7	L L				ICP
F037	27.00	2.700	10	L VLVLVLEL	BIASED LOW	-16.44	-0.0328	ICP-MS
F038	100.50	10.050	10					ICPMS
F046	160.50	16.050	10					ICP-MS As Recd
F048	77.50	9.688	8					ICP
F060	161.50	17.944	9	H VH H				Hydride - AA
F063	59.00	5.900	10		BIASED LOW*	-3.24	-0.3092	HYDRIDE-AA
F080	86.00	14.333	6	EL				Hydride Gen. ICP
F093	94.00	11.750	8					ICP - Hydride
F094	66.50	7.389	9					ICP-MS
F096	46.50	5.812	8	ELEL ELVLEL	BIASED LOW	7.10	-2.6518	Autoclave/Hyd AA
F109	204.00	20.400	10		BIASED HIGH	8.11	0.0215	ICP-MS
F131	128.00	12.800	10	ELEH VH VL				HydrPSA/AtomFluor
F133	156.00	19.500	8					ICP-MS
F134	207.00	20.700	10	VH EHVHEHVHH	BIASED HIGH*	4.22	1.0248	AA FIAS
F138	165.00	16.500	10	VH				ICP-MS

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

OVERALL AVERAGE
RANK IS 12.921

PARAMETER: 33095 Arsenic ug/L

SAMPLE	7 = TM-26.2		8 = TMDA-54.2		9 = TMDA-52.2		10 = TMDA-53.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	7.6	10.00	24.7	9.00	26.2	15.00	36.1	22.50
F003	7.2	5.50	22.5 L	3.00	24.5	7.00	32.7	7.00
F008	8.	15.50	21. VL	2.00	25.	8.00	32.	3.00
F009	8.4	21.50	27.	23.00	28.	23.00	37.	26.00
F010	9.6 VH	24.00	26.	21.00	28.	23.00	35.	20.00
F011	9.2 H	23.00	23.4	4.00	29.2 H	27.00	35.2	21.00
F012	7.	3.50	25.	14.00	27.	19.00	34.	15.50
F014	8.3	19.50	27.1	25.00	27.6	21.00	33.5	11.00
F015	7.2	5.50	25.1	16.50	25.1	9.00	32.2	4.50
F022	<10.	0.00	25.	14.00	20. EL	1.00	30. L	2.00
F025	8.3	19.50	25.0	14.00	24.0	4.00	34.0	15.50
F031	7.	3.50	24.	6.50	26.	13.00	33.	8.00
F037	6.278 VL	2.00	20.78 VL	1.00	21.25 VL	2.00	28.75 EL	1.00
F038	7.4	9.00	24.8	11.00	25.3	10.00	33.3	9.00
F046	8.0	15.50	25.4	19.00	26.3	16.00	34.7	18.00
F048	7.7	11.00	25.3	18.00	26.1	14.00	33.4	10.00
F060	10.3 VH	25.00	24.8	11.00	29.0 H	26.00	36.1	22.50
F063	7.3	7.50	23.5	5.00	25.5	11.50	32.5	6.00
F080	8.0	15.50	25.1	16.50	26.8	17.00	33.6	12.00
F093	8.2	18.00	24.8	11.00	25.5	11.50	34.0	15.50
F094	7.3	7.50	24.0	6.50	24.4	6.00	32.2	4.50
F096	4.9 EL	1.00	25.6	20.00	24.1	5.00	34.	15.50
F109	8.4	21.50	27.	23.00	28.	23.00	37.	26.00
F131	7.89	12.00	24.26	8.00	22.26 VL	3.00	36.77	24.00
F133	8.0	15.50	27.0	23.00	27.5	20.00	37.0	26.00
F134	10.59 EH	26.00	29.17 VH	27.00	28.84 H	25.00	33.96	13.00
F138	7.8901	13.00	29.1362 VH	26.00	26.9266	18.00	34.8004	19.00
MEDIAN	7.9451		25.0000		26.1000		34.0000	
1CRIT	1.0956		2.4600		2.5480		3.1800	
N	24		25		25		26	
MEAN	7.9358		25.0598		25.9671		34.1550	
3STDEV	2.5684		4.8327		5.6365		5.2334	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F037	27.00	2.700	10	LVLVLVLEL	BIASED LOW	-16.44	-0.0328	ICP-MS
F003	56.50	5.650	10	L	BIASED LOW	-5.22	-0.2587	HYRDRIDE/ICP-OES
F096	46.50	5.812	8	ELELELVLEL	BIASED LOW	7.10	-2.6518	Autoclave/Hyd AA
F063	59.00	5.900	10		BIASED LOW*	-3.24	-0.3092	HYDRIDE-AA
F031	46.50	6.643	7	LL				ICP
F094	66.50	7.389	9					ICP-MS
F025	96.00	9.600	10					AA Hydride
F022	38.50	9.625	4	ELL	INSUFFICIENT DATA			ICP
F048	77.50	9.688	8					ICP
F038	100.50	10.050	10					ICPMS
F015	101.00	11.222	9					GFAA
F012	93.00	11.625	8	LL				ICP-MS
F093	94.00	11.750	8					ICP - Hydride
F001	123.00	12.300	10					ICP-MS
F008	100.00	12.500	8	VL				Hydride
F131	128.00	12.800	10	ELEHVHVL				HydrPSA/AtomFluor
F080	86.00	14.333	6	EL				Hydride Gen. ICP
F011	139.00	15.444	9	HH				
F046	160.50	16.050	10					ICP-MS As Recd
F138	165.00	16.500	10	VH				ICP-MS
F060	161.50	17.944	9	HVHH				Hydride - AA
F010	182.50	18.250	10	VH				Hydride AA
F133	156.00	19.500	8					ICP-MS
F014	182.00	20.222	9	EH	BIASED HIGH*	0.13	0.7661	ICP-MS
F109	204.00	20.400	10		BIASED HIGH	8.11	0.0215	ICP-MS
F009	204.00	20.400	10		BIASED HIGH	8.11	0.0215	ICP-MS
F134	207.00	20.700	10	VHEHVHEHVHH	BIASED HIGH*	4.22	1.0248	AA FIAS

* 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 12.921

PARAMETER: 34095 Selenium ug/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.5000 BASIC ACCEPTABLE ERROR= 0.5000 CONCENTRATION ERROR INCREMENT= 0.0800

SAMPLE	1 = TMHUMB-95		2 = TM-27.2		3 = TM-28.2		4 = TM-FSCal		5 = TM-23.2		6 = TM-24.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.39	6.00	1.7	12.50	4.1	5.50	0.41	5.00	3.8	3.50	3.2	8.50
F003	0.2	2.50	1.3	4.00	3.8	1.50	0.4	4.00	3.6 L	1.50	2.8	2.00
F008	<1.	0.00	1. L	2.50	4.	3.50	<1.	0.00	4.	6.00	3.	5.00
F009	0.6	7.50	1.8	14.50	4.8	17.50	1.0 H	7.50	4.7	17.00	3.5	14.50
F010	0.2	2.50	1.4	6.00	4.6	15.00	0.3	3.00	4.6	13.50	3.2	8.50
F011	<1.	0.00	1.35	5.00	4.29	10.00	1.01 H	9.00	4.24	9.00	3.48	12.00
F014	1.6 EH	11.00	6.2 EH	22.00	5.6 EH	23.00	<1.0	0.00	5.1	22.00	4.0	21.00
F015	<1.	0.00	1.5	8.50	4.3	11.00	<1.	0.00	4.0	6.00	3.0	5.00
F025	<0.2	0.00	1.5	8.50	3.8	1.50	<0.2	0.00	4.3	10.00	2.9	3.00
F031	<3.	0.00	<3.	0.00	5.	21.50	<3.	0.00	5.	21.00	5. EH	24.00
F037	<1.0	0.00	1.870	16.00	4.111	7.00	1.120 H	11.00	4.515	12.00	3.239	10.00
F038	<1.	0.00	2.	20.00	4.	3.50	<1.	0.00	4.	6.00	3.	5.00
F046	0.78	9.00	1.9	18.00	4.8	17.50	1.1 H	10.00	4.7	17.00	3.6	17.50
F048	<1.0	0.00	1.9	18.00	4.2	8.00	<1.0	0.00	4.4	11.00	4.2	22.00
F060	0.3	5.00	1.9	18.00	4.4	12.00	0.2	1.50	4.2	8.00	3.4	11.00
F063	0.1	1.00	1.7	12.50	4.5	13.50	0.2	1.50	4.6	13.50	3.5	14.50
F080	<3.	0.00	<3.	0.00	<3. EL	0.00	<3.	0.00	3.8	3.50	3.6	17.50
F093	<2.0	0.00	2.5 H	21.00	4.5	13.50	<2.0	0.00	5.2	23.00	4.6 VH	23.00
F094	<0.4	0.00	1.5	8.50	4.1	5.50	<0.4	0.00	3.6 L	1.50	3.1	7.00
F096	<0.5	0.00	1.5	8.50	4.8	17.50	<0.5	0.00	4.8	20.00	3.7	20.00
F109	0.6	7.50	1.8	14.50	4.8	17.50	1.0 H	7.50	4.7	17.00	3.5	14.50
F131	1.07 H	10.00	0.77 VL	1.00	4.26	9.00	1.79 EH	12.00	4.75	19.00	2.22 VL	1.00
F133	<1.0	0.00	1.0 L	2.50	5.0	21.50	<1.0	0.00	5.5 H	24.00	3.5	14.50
F138	0.2597	4.00	1.6859	11.00	4.8267	20.00	0.6657	6.00	4.6155	15.00	3.6776	19.00
MEDIAN OR *TARGET CONC.	0.3900		1.6930		4.4000		*0.4000		4.5575		3.4900	
1CRIT	0.5000		0.5954		0.8120		0.5266		0.8246		0.7392	
N	9		20		20		9		21		22	
MEAN	0.4889		1.6403		4.4694		0.7784		4.4772		3.4408	
3STDEV	0.8438		1.0262		0.9884		0.9447		1.1951		1.2765	

PARAMETER: 34095 Selenium ug/L

SAMPLE	7 = TM-26.2		8 = TMDA-54.2		9 = TMDA-52.2		10 = TMDA-53.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	4.8	7.50	14.8	10.00	20.4	11.00	22.7	15.00
F003	4.6	4.00	13.6	6.00	19.7	8.50	21.2	11.00
F008	5.	10.50	15.	11.50	23.	20.50	23.	17.50
F009	5.7	19.50	17. H	19.50	23.	20.50	25. VH	23.00
F010	5.3	14.00	14.	7.50	19.	6.50	21.	10.00
F011	5.14	12.00	15.8	14.00	19.9	10.00	20.6	8.00
F014	5.6	17.50	17.9 VH	22.00	21.0	12.50	20.8	9.00
F015	5.2	13.00	12.1 VL	2.00	17.7 VL	1.00	19.3 L	2.00
F025	4.8	7.50	17.0 H	19.50	23.0	20.50	24.0 H	20.00
F031	7. EH	24.00	13. L	4.00	18. L	2.00	17. VL	1.00
F037	4.615	5.00	12.90 L	3.00	18.06 L	3.00	19.32 L	3.00
F038	5.	10.50	16.	15.00	21.	12.50	22.	14.00
F046	5.6	17.50	17.0 H	19.50	22.7	18.00	23.9 H	19.00
F048	5.4	15.00	16.4	16.00	21.4	14.00	21.5	12.00
F060	4.5	3.00	14.7	9.00	19.7	8.50	20.3	7.00
F063	5.5	16.00	15.0	11.50	22.0	16.00	23.0	17.50
F080	4.9	9.00	13.5 L	5.00	18.4 L	4.00	20.1	6.00
F093	5.8	21.00	16.8	17.00	22.1	17.00	24.1 H	21.00
F094	4.7	6.00	14.0	7.50	19.0	6.50	20.0	5.00
F096	4.2 L	2.00	15.4	13.00	21.9	15.00	21.7	13.00
F109	5.7	19.50	17. H	19.50	23.	20.50	25. VH	23.00
F131	3.75 VL	1.00	11.51 VL	1.00	18.46 L	5.00	19.95	4.00
F133	6.5 VH	23.00	18.0 VH	23.00	23.5 H	24.00	25.0 VH	23.00
F138	5.8518	22.00	19.3024 VH	24.00	23.1617 H	23.00	22.8244	16.00
MEDIAN OR *TARGET CONC.	5.1700		15.2000		21.0000		21.6000	
1CRIT	0.8736		1.6760		2.1400		2.1880	
N	22		22		22		23	
MEAN	5.2003		15.3136		20.8128		22.0128	
3STDEV	1.6144		5.0121		5.3427		5.4798	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	84.50	8.450	10					ICP-MS
F003	45.00	4.500	10	L	BIASED LOW*	-2.94	-0.4834	HYRDRIDE/ICP-OES
F008	77.00	9.625	8	L				Hydride
F009	161.00	16.100	10	H H VH				ICP-MS
F010	86.50	8.650	10					Hydride AA
F011	89.00	9.889	9	H				
F014	160.00	17.778	9	EHEHEH VH				ICP-MS
F015	48.50	6.062	8	VLVLL				GFAA
F025	90.50	11.313	8	H H				AA Hydride
F031	97.50	13.929	7	EHEHL L VL				ICP
F037	70.00	7.778	9	H L L L				ICP-MS
F038	86.50	10.813	8					ICPMS
F046	163.00	16.300	10	H H H				ICP-MS As Recd
F048	116.00	14.500	8					ICP
F060	83.00	8.300	10					Hydride - AA
F063	117.50	11.750	10					HYDRIDE-AA
F080	45.00	7.500	6	EL L L				Hydride Gen. ICP
F093	156.50	19.563	8	H VH H	BIASED HIGH	6.59	0.4259	ICP - Hydride
F094	47.50	5.938	8	L				ICP-MS
F096	109.00	13.625	8	L				Autoclave/Hyd AA
F109	161.00	16.100	10	H H VH				ICP-MS
F131	63.00	6.300	10	H VL EH VLVLVLL				HydrPSA/AtomFluor
F133	155.50	19.438	8	L H VHVHH VH	BIASED HIGH	15.97	-0.1780	ICP-MS
F138	160.00	16.000	10	VHH				ICP-MS

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

OVERALL AVERAGE
RANK IS 11.665

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	45.00	4.500	10	L	BIASED LOW*	-2.94	-0.4834	HYRDRIDE/ICP-OES
F094	47.50	5.938	8	L				ICP-MS
F015	48.50	6.062	8	VLVLL				GFAA
F131	63.00	6.300	10	HVLEHVLVLVLL				HydrPSA/AtomFluor
F080	45.00	7.500	6	ELLL				Hydride Gen. ICP
F037	70.00	7.778	9	HLLL				ICP-MS
F060	83.00	8.300	10					Hydride - AA
F001	84.50	8.450	10					ICP-MS
F010	86.50	8.650	10					Hydride AA
F008	77.00	9.625	8	L				Hydride
F011	89.00	9.889	9	H				
F038	86.50	10.813	8					ICPMS
F025	90.50	11.313	8	HH				AA Hydride
F063	117.50	11.750	10					HYDRIDE-AA
F096	109.00	13.625	8	L				Autoclave/Hyd AA
F031	97.50	13.929	7	EHEHLLVL				ICP
F048	116.00	14.500	8					ICP
F138	160.00	16.000	10	VHH				ICP-MS
F109	161.00	16.100	10	HHVH				ICP-MS
F009	161.00	16.100	10	HHVH				ICP-MS
F046	163.00	16.300	10	HHH				ICP-MS As Recd
F014	160.00	17.778	9	EHEHEHVH				ICP-MS
F133	155.50	19.438	8	LHVHVHHVH	BIASED HIGH	15.97	-0.1780	ICP-MS
F093	156.50	19.563	8	HVHH	BIASED HIGH	6.59	0.4259	ICP - Hydride

* 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 11.665

PARAMETER: 47095 Silver ug/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.5000 BASIC ACCEPTABLE ERROR= 0.5000 CONCENTRATION ERROR INCREMENT= 0.0800

SAMPLE	1 = TMHUMB-95		2 = TM-27.2		3 = TM-28.2		4 = TM-FSCal		5 = TM-23.2		6 = TM-24.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.006	2.00	2.3	12.00	5.1	12.50	0.01	1.00	3.9	5.00	4.0	12.50
F003	<0.1	0.00	2.2	8.50	4.9	5.50	<0.1	0.00	4.	9.50	4.	12.50
F010	0.1	3.00	2.4	15.00	5.5	16.00	<0.1	0.00	4.4	17.00	4.3	17.00
F011	<0.1	0.00	2.1	3.50	4.8	2.00	<0.1	0.00	3.7	2.00	3.6	2.00
F012	<2.	0.00	3. H	18.00	5.	10.00	<2.	0.00	4.	9.50	4.	12.50
F015	<0.5	0.00	2.5	16.00	4.9	5.50	<0.5	0.00	3.9	5.00	3.8	5.00
F022	<5.	0.00	7. EH	20.00	10. EH	20.00	<5.	0.00	7. EH	19.00	6. EH	19.00
F025	<0.2	0.00	2.1	3.50	4.0 EL	1.00	0.3	4.00	3.3	1.00	3.5	1.00
F032		0.00	2.3852	14.00	5.5502	17.00		0.00	4.2838	15.00	4.1528	16.00
F037	<0.2	0.00	2.177	6.00	4.948	8.00	<0.2	0.00	4.331	16.00	3.872	6.00
F038	<0.01	0.00	2.15	5.00	4.83	3.00	<0.01	0.00	4.04	12.00	3.69	3.00
F046	<0.1	0.00	2.2	8.50	4.9	5.50	<0.1	0.00	3.9	5.00	3.7	4.00
F048	<1.0	0.00	2.3	12.00	5.0	10.00	4.0 EH	6.00	4.0	9.50	3.9	7.50
F060	<1.	0.00	2.	2.00	5.	10.00	<1.	0.00	4.	9.50	4.	12.50
F080	<3.	0.00	5. EH	19.00	6. H	18.00	<3.	0.00	6. VH	18.00	5. H	18.00
F093	1.5 EH	4.00	2.7	17.00	6.1 H	19.00	1.0 VH	5.00	7.1 EH	20.00	7.1 EH	20.00
F094	<0.2	0.00	2.2	8.50	5.1	12.50	<0.2	0.00	3.9	5.00	4.0	12.50
F096	<0.1	0.00	2.3	12.00	4.9	5.50	<0.1	0.00	3.9	5.00	3.9	7.50
F133	<0.05	0.00	2.20	8.50	5.25	15.00	0.08	3.00	4.08	13.00	4.00	12.50
F138	-0.0216	1.00	1.9436	1.00	5.1763	14.00	0.065	2.00	4.0853	14.00	3.9138	9.00
MEDIAN OR *TARGET CONC.	*0.1000		2.2500		5.0000		*0.1000		4.0000		4.0000	
1CRIT	0.5000		0.6400		0.8600		0.5000		0.7800		0.7800	
N	2		18		18		4		18		18	
MEAN	0.0530		2.4562		5.1641		0.3612		4.3011		4.1016	
3STDEV	-		1.9755		1.1187		-		2.4365		1.6367	

PARAMETER: 47095 Silver ug/L

SAMPLE	7 = TM-26.2		8 = TMDA-54.2		9 = TMDA-52.2		10 = TMDA-53.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	7.3	11.00	14.9	9.50	19.8	13.00	18.9	9.00
F003	8.	16.50	16.	17.50	21.	17.50	20.	15.50
F010	8.1	18.00	16.	17.50	19.	8.00	19.	12.00
F011	7.	5.00	14.6	7.00	18.	4.00	19.	12.00
F012	8.	16.50	16.	17.50	21.	17.50	22. VH	19.00
F015	7.	5.00	14.	4.00	19.	8.00	19.	12.00
F022	9. VH	19.00	16.	17.50	23. VH	20.00	20.	15.50
F025	6.5	2.00	12.0 VL	3.00	17.5	3.00	17.7	4.00
F032	7.7258	15.00	15.9790	15.00	20.5460	16.00	20.2095	17.00
F037	7.181	8.00	14.84	8.00	19.41	11.00	19.41	14.00
F038	6.86	3.00	14.3	5.50	18.2	5.00	18.3	6.50
F046	7.1	7.00	14.3	5.50	18.5	6.00	18.3	6.50
F048	7.3	11.00	15.3	13.00	20.1	14.00	17.3	3.00
F060	7.	5.00	15.	11.00	19.	8.00	18.	5.00
F080	6. L	1.00	7. EL	2.00	9. EL	2.00	8. EL	2.00
F093	12.1 EH	20.00	18.3 VH	20.00	22.9 VH	19.00	23.5 VH	20.00
F094	7.3	11.00	15.1	12.00	19.3	10.00	18.9	9.00
F096	7.2	9.00	14.9	9.50	19.5	12.00	18.9	9.00
F133	7.68	14.00	15.90	14.00	20.40	15.00	21.35 H	18.00
F138	7.5548	13.00	0.6388 EL	1.00	2.5774 EL	1.00	4.2993 EL	1.00
MEDIAN OR *TARGET CONC.	7.3000		14.9500		19.3550		18.9500	
1CRIT	1.0440		1.6560		2.0084		1.9760	
N	18		18		18		18	
MEAN	7.4334		14.5622		19.0087		18.5705	
3STDEV	1.6953		6.2291		8.1871		8.4387	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	87.50	8.750	10					ICP-MS
F003	103.00	12.875	8					ICP-OES
F010	123.50	13.722	9					GFAA
F011	37.50	4.688	8		BIASED LOW*	-2.36	-0.1519	EPA-200.8
F012	120.50	15.063	8	H VH				ICP-MS
F015	60.50	7.562	8					GFAA
F022	150.00	18.750	8	EHEH EHEHVH VH	BIASED HIGH	-10.18	3.7391	ICP
F025	22.50	2.500	9	EL VL	BIASED LOW	-9.94	-0.1708	ICP-MS
F032	125.00	15.625	8		BIASED HIGH	6.37	0.0246	ICP-AES E3386A
F037	77.00	9.625	8					ICP-MS
F038	43.00	5.375	8					ICPMS
F046	48.00	6.000	8					ICP-MS As Recd
F048	86.00	9.556	9	EH				ICP
F060	63.00	7.875	8					Trace - ICP
F080	80.00	10.000	8	EHH VHH L ELELEL				FAA dig. conc.
F093	164.00	16.400	10	EH H VHEHEHEHVHVHVH	BIASED HIGH	14.54	1.5196	ICP
F094	80.50	10.062	8					ICP-MS
F096	69.50	8.688	8					HGA Analysis-LL
F133	113.00	12.556	9	H				ICP-MS
F138	57.00	5.700	10	ELELEL				ICP-MS

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

OVERALL AVERAGE
RANK IS 10.065

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F025	22.50	2.500	9	ELVL	BIASED LOW	-9.94	-0.1708	ICP-MS
F011	37.50	4.688	8		BIASED LOW*	-2.36	-0.1519	EPA-200.8
F038	43.00	5.375	8					ICPMS
F138	57.00	5.700	10	ELELEL				ICP-MS
F046	48.00	6.000	8					ICP-MS As Recd
F015	60.50	7.562	8					GFAA
F060	63.00	7.875	8					Trace - ICP
F096	69.50	8.688	8					HGA Analysis-LL
F001	87.50	8.750	10					ICP-MS
F048	86.00	9.556	9	EH				ICP
F037	77.00	9.625	8					ICP-MS
F080	80.00	10.000	8	EHHVHHLELELEL				FAA dig. conc.
F094	80.50	10.062	8					ICP-MS
F133	113.00	12.556	9	H				ICP-MS
F003	103.00	12.875	8					ICP-OES
F010	123.50	13.722	9					GFAA
F012	120.50	15.063	8	HVH				ICP-MS
F032	125.00	15.625	8		BIASED HIGH	6.37	0.0246	ICP-AES E3386A
F093	164.00	16.400	10	EHHVHEHEHEHVHVHVH	BIASED HIGH	14.54	1.5196	ICP
F022	150.00	18.750	8	EHEHEHEHVHVH	BIASED HIGH	-10.18	3.7391	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 10.065

PARAMETER: 51095 Antimony ug/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.5000 BASIC ACCEPTABLE ERROR= 0.5000 CONCENTRATION ERROR INCREMENT= 0.0800

SAMPLE	1 = TMHUMB-95		2 = TM-27.2		3 = TM-28.2		4 = TM-FSCal		5 = TM-23.2		6 = TM-24.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.21	5.50	1.9	11.00	2.9	4.50	0.045	2.00	2.5	8.50	2.6	13.50
F003	0.2	2.50	1.7	4.00	2.8	3.00	<0.2	0.00	2.5	8.50	2.6	13.50
F009	<1.0	0.00	2.0	14.50	3.2	13.50	<1.0	0.00	2.2	4.00	1.9 EL	1.50
F011	0.2	2.50	1.8	6.50	3.	7.00	<0.1	0.00	2.6	10.00	2.4	6.50
F012	<3.	0.00	3. EH	19.00	4. EH	17.50	<3.	0.00	<3.	0.00	<3.	0.00
F014	<1.0	0.00	2.2	16.00	3.7	16.00	<1.0	0.00	2.7	14.50	2.7	16.00
F015	<1.	0.00	2.4	17.00	3.5	15.00	<1.	0.00	3.2	17.00	3.1	17.00
F022	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00
F025	<0.2	0.00	2.7 H	18.00	4.0 EH	17.50	<0.2	0.00	3.4 EH	18.00	3.4 EH	18.00
F031	<3.	0.00	<3.	0.00	<3.	0.00	<3.	0.00	<3.	0.00	<3.	0.00
F038	0.21	5.50	1.94	13.00	3.13	12.00	<0.05	0.00	2.61	11.00	2.45	9.00
F046	0.38 EH	8.00	1.8	6.50	2.9	4.50	<0.2	0.00	2.3	6.00	2.3	4.00
F048	<1.0	0.00	1.8	6.50	3.1	10.50	<1.0	0.00	2.7	14.50	2.5	10.00
F060	<0.3	0.00	1.8	6.50	3.0	7.00	<0.3	0.00	2.7	14.50	2.6	13.50
F063	0.1 EL	1.00	1.5	2.50	2.5	2.00	0.1	4.00	2.2	4.00	2.2	3.00
F080	<0.5	0.00	1.2 L	1.00	<0.5 EL	0.00	<0.5	0.00	2.0	1.50	2.4	6.50
F093	<1.0	0.00	1.5	2.50	2.2 EL	1.00	<1.0	0.00	2.0	1.50	2.4	6.50
F094	<0.4	0.00	1.9	11.00	3.0	7.00	<0.4	0.00	2.7	14.50	2.6	13.50
F096	<15.	0.00	<15.	0.00	<15.	0.00	<15.	0.00	<15.	0.00	<15.	0.00
F109	<1.0	0.00	2.0	14.50	3.2	13.50	<1.0	0.00	2.2	4.00	1.9 EL	1.50
F133	0.23	7.00	1.90	11.00	3.10	10.50	0.05	3.00	2.48	7.00	2.40	6.50
F138	0.2021	4.00	1.876	9.00	3.09	9.00	0.0448	1.00	2.6453	12.00	2.5522	11.00
MEDIAN	0.2060		1.9000		3.0950		0.0475		2.5500		2.4750	
1CRIT	0.5000		0.6120		0.7076		0.5000		0.6640		0.6580	
N	6		17		15		2		15		15	
MEAN	0.2087		1.9245		3.0747		0.0475		2.5490		2.5201	
3STDEV	0.0313		0.8585		0.8092		-		0.7619		0.6046	

PARAMETER: 51095 Antimony ug/L

SAMPLE	7 = TM-26.2		8 = TMDA-54.2		9 = TMDA-52.2		10 = TMDA-53.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	2.1	12.50	11.0	11.50	15.3	10.50	14.6	4.00
F003	2.1	12.50	11.1	15.00	15.	9.00	15.2	5.50
F009	1.0 EL	1.50	7.3 EL	1.50	8.5 EL	1.50	17.	13.50
F011	2.1	12.50	10.8	8.00	15.3	10.50	15.2	5.50
F012	<3.	0.00	11.	11.50	14.	6.00	20. VH	20.00
F014	2.0	8.00	13.2 VH	21.00	24.5 EH	21.00	27.1 EH	21.00
F015	2.6	16.00	12.9 H	19.00	19.0 VH	19.00	18.4 H	18.00
F022	<10.	0.00	13. H	20.00	18. VH	18.00	14. L	2.00
F025	2.9 H	18.00	12.0	17.00	21.0 VH	20.00	19.0 VH	19.00
F031	<3.	0.00	11.	11.50	16.	13.50	16.	10.00
F038	1.83	7.00	10.4	6.50	14.7	8.00	17.2	15.50
F046	1.8	6.00	9.9	5.00	14.1	7.00	15.4	7.00
F048	2.1	12.50	11.0	11.50	16.3	17.00	15.5	8.00
F060	2.1	12.50	10.9	9.00	16.0	13.50	15.7	9.00
F063	1.7	4.00	9.4 L	3.00	13.5 L	3.50	13.5 L	1.00
F080	1.6	3.00	12.2	18.00	15.6	12.00	17.3	17.00
F093	2.7	17.00	10.4	6.50	13.5 L	3.50	14.4	3.00
F094	2.1	12.50	11.6	16.00	16.2	16.00	16.1	11.00
F096	<15.	0.00	<15.	0.00	<15.	0.00	<15.	0.00
F109	1.0 EL	1.50	7.3 EL	1.50	8.5 EL	1.50	17.	13.50
F133	1.75	5.00	9.75	4.00	13.63	5.00	17.20	15.50
F138	2.0635	9.00	11.0207	14.00	16.1774	15.00	16.4923	12.00
MEDIAN	2.0817		11.0000		15.3000		16.1000	
1CRIT	0.6265		1.3400		1.6840		1.7480	
N	15		18		18		19	
MEAN	2.0429		11.0761		15.7393		16.4049	
3STDEV	0.8722		2.8652		5.7661		4.6153	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	83.50	8.350	10					ICP-MS
F003	73.50	8.167	9					HYRDRIDE/ICP-OES
F009	51.50	6.438	8	ELELELEL				ICP-MS
F011	69.00	7.667	9					
F012	74.00	14.800	5	EHEH VH				ICP-MS
F014	133.50	16.688	8	VHEHEH	BIASED HIGH	67.55	-1.6520	ICP-MS
F015	138.00	17.250	8	H VHH	BIASED HIGH	17.87	0.1070	GFAA
F022	40.00	13.333	3	H VHL	INSUFFICIENT DATA			ICP
F025	145.50	18.188	8	H EH EHEHH VHVH	BIASED HIGH	22.22	0.2234	AA Hydride
F031	35.00	11.667	3		INSUFFICIENT DATA			ICP
F038	87.50	9.722	9					ICPMS
F046	54.00	6.000	9	EH				ICP-MS As Recd
F048	90.50	11.313	8					ICP
F060	85.50	10.688	8					Hydride - AA
F063	28.00	2.800	10	EL L L L	BIASED LOW	-13.89	-0.0449	HYDRIDE-AA
F080	59.00	8.429	7	L EL				Hydride Gen. ICP
F093	41.50	5.188	8	EL L	BIASED LOW	-10.45	0.0366	ICP - Hydride
F094	101.50	12.688	8					ICP-MS
F096	0.00	-	0		INSUFFICIENT DATA			ICAP 61E Analysis
F109	51.50	6.438	8	ELELELEL				ICP-MS
F133	74.50	7.450	10					ICP-MS
F138	96.00	9.600	10					ICP-MS

OVERALL AVERAGE
RANK IS 9.717

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F096	0.00	-	0		INSUFFICIENT DATA			ICAP 61E Analysis
F063	28.00	2.800	10	ELLLL	BIASED LOW	-13.89	-0.0449	HYDRIDE-AA
F093	41.50	5.188	8	ELL	BIASED LOW	-10.45	0.0366	ICP - Hydride
F046	54.00	6.000	9	EH				ICP-MS As Recd
F009	51.50	6.438	8	ELELELEL				ICP-MS
F109	51.50	6.438	8	ELELELEL				ICP-MS
F133	74.50	7.450	10					ICP-MS
F011	69.00	7.667	9					
F003	73.50	8.167	9					HYRDRIDE/ICP-OES
F001	83.50	8.350	10					ICP-MS
F080	59.00	8.429	7	LEL				Hydride Gen. ICP
F138	96.00	9.600	10					ICP-MS
F038	87.50	9.722	9					ICPMS
F060	85.50	10.688	8					Hydride - AA
F048	90.50	11.313	8					ICP
F031	35.00	11.667	3		INSUFFICIENT DATA			ICP
F094	101.50	12.688	8					ICP-MS
F022	40.00	13.333	3	HVHL	INSUFFICIENT DATA			ICP
F012	74.00	14.800	5	EHEHVH				ICP-MS
F014	133.50	16.688	8	VHEHEH	BIASED HIGH	67.55	-1.6520	ICP-MS
F015	138.00	17.250	8	HVHH	BIASED HIGH	17.87	0.1070	GFAA
F025	145.50	18.188	8	HEHEHEHHVHVH	BIASED HIGH	22.22	0.2234	AA Hydride

OVERALL AVERAGE
RANK IS 9.717

PARAMETER: 81095 Thallium ug/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.7500 BASIC ACCEPTABLE ERROR= 0.7500 CONCENTRATION ERROR INCREMENT= 0.0800

SAMPLE	1 = TMHUMB-95		2 = TM-27.2		3 = TM-28.2		4 = TM-FSCal		5 = TM-23.2		6 = TM-24.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.072	3.00	1.8	4.50	3.8	8.50	0.020	3.00	3.7	3.50	3.8	6.50
F003	0.04	2.00	1.86	8.00	3.78	7.00	0.017	2.00	3.93	10.00	3.84	9.00
F011	<0.2	0.00	1.9	9.00	3.8	8.50	<0.2	0.00	3.7	3.50	3.8	6.50
F014	<1.0	0.00	1.8	4.50	3.7	6.00	<1.0	0.00	3.8	8.00	3.8	6.50
F025	0.2	4.00	2.1	11.00	4.0	10.50	0.2	4.00	3.9	9.00	3.8	6.50
F038	0.54	5.00	1.79	2.00	3.58	2.00	<0.05	0.00	3.77	7.00	3.69	1.00
F046	<0.05	0.00	1.8	4.50	3.5	1.00	<0.05	0.00	3.5	1.00	3.7	3.00
F048	<1.0	0.00	1.8	4.50	3.6	3.50	<1.0	0.00	3.7	3.50	3.7	3.00
F060	<4.	0.00	<4.	0.00	<4.	0.00	<4.	0.00	<4.	0.00	<4.	0.00
F093	1.9 EH	6.00	2.8 EH	13.00	5.2 EH	13.00	1.3 VH	5.00	4.2	13.00	6.3 EH	13.00
F094	<0.05	0.00	1.81	7.00	3.69	5.00	<0.05	0.00	3.73	6.00	3.88	10.00
F096	<2.	0.00	2.	10.00	4.	10.50	<2.	0.00	4.	11.00	4.	11.00
F133	<0.05	0.00	1.70	1.00	3.60	3.50	<0.05	0.00	3.70	3.50	3.70	3.00
F138	-0.0072	1.00	2.1007	12.00	4.1672	12.00	-0.0118	1.00	4.1302	12.00	4.2839	12.00
MEDIAN OR *TARGET CONC.	*0.0500		1.8100		3.7800		*0.0500		3.7700		3.8000	
1CRIT	0.7500		0.8348		0.9924		0.7500		0.9916		0.9940	
N	4		11		11		3		11		11	
MEAN	0.2130		1.8873		3.7925		0.0790		3.8237		3.8458	
3STDEV	-		0.3507		0.5466		-		0.4200		0.4863	

SAMPLE	7 = TM-26.2		8 = TMDA-54.2		9 = TMDA-52.2		10 = TMDA-53.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	4.8	2.00	8.8	7.50	17.8	10.50	16.5	13.00
F003	5.08	8.00	9.	11.00	17.9	12.00	16.1	11.00
F011	4.9	4.50	8.4	4.00	17.2	6.00	14.8	3.00
F014	5.1	9.50	9.0	11.00	17.8	10.50	15.7	8.50
F025	5.1	9.50	8.9	9.00	17.3	7.00	16.4	12.00
F038	4.84	3.00	8.47	5.00	16.9	3.00	15.6	6.00
F046	4.7	1.00	7.2 EL	1.00	14.1 EL	2.00	12.9 L	2.00
F048	4.9	4.50	8.2	3.00	17.0	4.50	15.3	5.00
F060	5.	6.00	9.	11.00	17.	4.50	15.	4.00
F093	8.5 EH	14.00	12.8 EH	14.00	20.3 EH	14.00	19.5 EH	14.00
F094	5.04	7.00	8.80	7.50	17.4	8.00	15.7	8.50
F096	6.	13.00	8.	2.00	14. EL	1.00	12. EL	1.00
F133	5.15	11.00	8.70	6.00	17.53	9.00	15.90	10.00
F138	5.4594	12.00	10.0779	13.00	17.9073	13.00	15.6704	7.00
MEDIAN OR *TARGET CONC.	5.0600		8.8000		17.3500		15.6852	
1CRIT	1.0948		1.3940		2.0780		1.9448	
N	12		12		12		12	
MEAN	5.1141		8.7790		17.1531		15.4642	
3STDEV	0.9451		1.5092		2.9525		2.7350	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	62.00	6.200	10					ICP-MS
F003	80.00	8.000	10					ICP-MS
F011	45.00	5.625	8					EPA-200.8
F014	64.50	8.062	8					ICP-MS
F025	82.50	8.250	10					ICP-MS
F038	34.00	3.778	9					ICPMS
F046	15.50	1.938	8	ELELL	BIASED LOW	-21.78	0.5534	ICP-MS As Recd
F048	31.50	3.938	8					ICP
F060	25.50	6.375	4		INSUFFICIENT DATA			Trace - ICP
F093	119.00	11.900	10	EHEHEHVH EHEHEHEHEH	BIASED HIGH	13.83	1.4262	ICP
F094	59.00	7.375	8					ICP-MS
F096	59.50	7.438	8	ELEL				HGA Analysis-LL
F133	47.00	5.875	8					ICP-MS
F138	95.00	9.500	10					ICP-MS

OVERALL AVERAGE
RANK IS 6.891

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F046	15.50	1.938	8	ELELL	BIASED LOW	-21.78	0.5534	ICP-MS As Recd
F038	34.00	3.778	9					ICPMS
F048	31.50	3.938	8					ICP
F011	45.00	5.625	8					EPA-200.8
F133	47.00	5.875	8					ICP-MS
F001	62.00	6.200	10					ICP-MS
F060	25.50	6.375	4		INSUFFICIENT DATA			Trace - ICP
F094	59.00	7.375	8					ICP-MS
F096	59.50	7.438	8	ELEL				HGA Analysis-LL
F003	80.00	8.000	10					ICP-MS
F014	64.50	8.062	8					ICP-MS
F025	82.50	8.250	10					ICP-MS
F138	95.00	9.500	10					ICP-MS
F093	119.00	11.900	10	EHEHEHVHEHEHEHEHEH	BIASED HIGH	13.83	1.4262	ICP

OVERALL AVERAGE
RANK IS 6.891

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	41.50	4.150	10	H H				ICP-MS
F011	53.00	5.889	9	H VH				EPA-200.8
F025	42.50	5.312	8	EH VLVLH VHVH				ICP-MS
F038	13.50	1.688	8	EL L VLVLVLVLVL				ICPMS
F060	13.00	4.333	3	L				Trace - ICP
F093	23.50	3.917	6	EL VL VL				ICP - Hydride
F094	59.00	7.375	8	VH H VHH				ICP-MS
F096	0.00	-	0					ICAP 61E Analysis
F133	22.00	2.750	8	VL L L VLVLVLVL				ICP-MS
F134	40.00	4.000	10	H VLVLVL				AA FIAS

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

OVERALL AVERAGE
RANK IS 4.400

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F096	0.00	-	0					ICAP 61E Analysis
F038	13.50	1.688	8	ELLVLVLVLVLVL				ICPMS
F133	22.00	2.750	8	VLLLVLVLVLVL				ICP-MS
F093	23.50	3.917	6	ELVLVL				ICP - Hydride
F134	40.00	4.000	10	HVLVLVL				AA FIAS
F001	41.50	4.150	10	HH				ICP-MS
F060	13.00	4.333	3	L				Trace - ICP
F025	42.50	5.312	8	EHVLVLHVHVH				ICP-MS
F011	53.00	5.889	9	HVH				EPA-200.8
F094	59.00	7.375	8	VHHVHH				ICP-MS

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

OVERALL AVERAGE
RANK IS 4.400

Bismuth

PARAMETER: 83095 Bismuth ug/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.5000 BASIC ACCEPTABLE ERROR= 0.5000 CONCENTRATION ERROR INCREMENT= 0.0800

SAMPLE	1 = TMHUMB-95		2 = TM-27.2		3 = TM-28.2		4 = TM-FSCal		5 = TM-23.2		6 = TM-24.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.020	1.00	1.3	4.00	3.3	3.00	0.006	1.00	3.9 H	5.00	2.5	4.50
F011	<0.1	0.00	1.5	5.00	3.7	5.00	0.2	2.00	4.1 H	7.00	2.9	6.00
F025	<0.5	0.00	0.8	1.50	7.2 EH	7.00	<0.5	0.00	1.8 VL	1.00	0.9 VL	1.00
F038	<0.5	0.00	0.8	1.50	2. EL	1.00	<0.5	0.00	2.3 L	3.00	1.5 VL	2.00
F060	<7.	0.00	<7.	0.00	<7.	0.00	<7.	0.00	<7.	0.00	<7.	0.00
F093	<2.0	0.00	<2.0	0.00	<2.0 EL	0.00	<2.0	0.00	2.0 VL	2.00	2.5	4.50
F094	<0.05	0.00	1.58	7.00	3.76	6.00	<0.05	0.00	4.59 VH	8.00	2.98	7.00
F096	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00
F133	<0.05	0.00	0.85	3.00	2.05 VL	2.00	<0.05	0.00	2.38 L	4.00	1.55 L	3.00
F134	0.27	2.00	1.54	6.00	3.48	4.00	0.47	3.00	4.05 H	6.00	3.11	8.00
MEDIAN OR *TARGET CONC.	*0.0500		1.3000		3.4800		*0.0500		3.1400		2.5000	
1CRIT	0.5000		0.5640		0.7384		0.5000		0.7112		0.6600	
N	2		4		5		1		6		6	
MEAN	0.1450		1.2975		3.2580		0.2000		3.1217		2.3217	
3STDEV	-		-		-		-		2.7133		1.7757	

SAMPLE	7 = TM-26.2		8 = TMDA-54.2		9 = TMDA-52.2		10 = TMDA-53.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	4.1	4.00	10.7	7.00	14.0 H	6.00	13.6	6.00
F011	4.5	5.00	11.1	8.00	15.1 VH	8.00	13.9	7.00
F025	5.3 H	8.00	10.5	6.00	15.6 VH	9.00	16.4 VH	9.00
F038	2.3 VL	1.00	6.9 VL	2.00	8.9 VL	1.00	8.9 VL	2.00
F060	<7.	0.00	9. L	4.00	12.	5.00	12.	4.00
F093	2.5 VL	3.00	10.3	5.00	10.8	4.00	12.8	5.00
F094	4.70	7.00	11.7 H	9.00	14.6 VH	7.00	14.4 H	8.00
F096	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00
F133	2.43 VL	2.00	7.61 VL	3.00	9.39 VL	2.00	9.70 VL	3.00
F134	4.53	6.00	5.14 VL	1.00	9.73 VL	3.00	7.74 VL	1.00
MEDIAN OR *TARGET CONC.	4.3000		10.3000		12.0000		12.8000	
1CRIT	0.8040		1.2840		1.4200		1.4840	
N	6		7		7		7	
MEAN	3.7933		9.4443		12.2314		12.1857	
3STDEV	2.8695		4.5639		6.5531		5.9168	

PARAMETER: 92095 Uranium ug/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

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

SAMPLE	1 = TMHUMB-95		2 = TM-27.2		3 = TM-28.2		4 = TM-FSCal		5 = TM-23.2		6 = TM-24.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.39	8.00	2.0	7.00	6.2	13.00	0.47	2.50	5.4	4.50	4.5	7.50
F003	0.358	4.00	2.04	10.00	5.78	5.00	0.479	4.00	5.52	8.00	4.55	9.50
F009	0.3	1.50	1.9	2.50	5.7	3.00	0.5	8.00	5.5	6.50	4.4	4.50
F011	0.4	9.00	2.1	11.50	6.3	14.00	0.5	8.00	5.6	9.50	4.4	4.50
F012	<2.	0.00	2.	7.00	6.	11.00	<2.	0.00	5.	2.50	4. EL	1.50
F014	0.5	10.00	2.0	7.00	5.9	7.00	0.5	8.00	5.6	9.50	4.6	12.00
F022	<50.	0.00	<50.	0.00	<50.	0.00	<50.	0.00	<50.	0.00	<50.	0.00
F024	<0.5	0.00	1.8 EL	1.00	5.3 EL	1.00	<0.5	0.00	5.0	2.50	4.0 EL	1.50
F025	1.1 EH	11.00	2.3 EH	14.00	6.0	11.00	0.7 EH	11.00	4.4 EL	1.00	4.7	14.00
F038	0.37	6.50	2.11	13.00	5.87	6.00	0.45 EL	1.00	6.1	14.00	4.5	7.50
F046	0.37	6.50	2.0	7.00	5.7	3.00	0.50	8.00	5.4	4.50	4.4	4.50
F048	<1.0	0.00	2.0	7.00	6.0	11.00	<1.0	0.00	5.7	12.00	4.6	12.00
F060	<50.	0.00	<50.	0.00	<50.	0.00	<50.	0.00	<50.	0.00	<50.	0.00
F094	0.36	5.00	2.1	11.50	5.99	9.00	0.49	5.00	5.64	11.00	4.60	12.00
F109	0.3	1.50	1.9	2.50	5.7	3.00	0.5	8.00	5.5	6.50	4.4	4.50
F133	0.31	3.00	1.97	4.00	5.91	8.00	0.47	2.50	5.79	13.00	4.55	9.50
MEDIAN	0.3700		2.0000		5.9050		0.5000		5.5100		4.5000	
1CRIT	0.5000		0.5900		0.8243		0.5000		0.8006		0.7400	
N	8		12		12		9		12		11	
MEAN	0.3823		2.0100		5.8958		0.4899		5.4708		4.5000	
3STDEV	0.1531		0.2001		0.4443		0.0377		0.7110		0.2478	

SAMPLE	7 = TM-26.2		8 = TMDA-54.2		9 = TMDA-52.2		10 = TMDA-53.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	7.8	8.00	64.7	6.00	23.8	4.00	34.0	13.50
F003	7.78	7.00	65.7	13.00	24.3	8.50	33.	8.50
F009	7.6	4.50	65.	9.00	25.	13.50	33.	8.50
F011	7.6	4.50	54.7 VL	1.00	24.4	10.00	31.9	4.50
F012	7. EL	1.00	65.	9.00	24.	5.50	34.	13.50
F014	8.0	12.00	65.4	11.00	24.7	12.00	31.9	4.50
F022	<50.	0.00	100. EH	16.00	<50.	0.00	60. EH	15.00
F024	7.3	2.00	59. L	3.00	22. L	3.00	29. VL	2.00
F025	10.0 EH	14.00	61.2	4.00	20.6 VL	2.00	30.4 L	3.00
F038	8.12	13.00	71.2 H	15.00	24.3	8.50	33.9	12.00
F046	7.6	4.50	55.9 VL	2.00	20.2 VL	1.00	27.8 EL	1.00
F048	7.9	10.00	64.0	5.00	24.5	11.00	32.9	6.00
F060	<50.	0.00	70. H	14.00	<50.	0.00	<50.	0.00
F094	7.89	9.00	65.5	12.00	24.0	5.50	33.0	8.50
F109	7.6	4.50	65.	9.00	25.	13.50	33.	8.50
F133	7.96	11.00	64.9	7.00	24.2	7.00	33.3	11.00
MEDIAN	7.7900		65.0000		24.2500		33.0000	
1CRIT	0.9374		4.3700		1.9250		2.4500	
N	12		14		11		13	

MEAN	7.7625	64.4643	23.7091	32.5615
3STDEV	0.6593	11.1869	3.5943	4.2091

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	74.00	7.400	10					ICP-MS
F003	77.50	7.750	10					ICP-MS
F009	61.50	6.150	10					ICP-MS
F011	76.50	7.650	10	VL				EPA-200.8
F012	51.00	6.375	8	ELEL				ICP-MS
F014	93.00	9.300	10					ICP-MS
F022	31.00	15.500	2	EH EH	INSUFFICIENT DATA			ICP
F024	16.00	2.000	8	ELEL EL L L VL	BIASED LOW	-9.66	-0.0333	Phosphorimetry
F025	85.00	8.500	10	EHEH EHEL EH VLL				ICP-MS
F038	96.50	9.650	10	EL H				ICPMS
F046	42.00	4.200	10	VLVLEL	BIASED LOW	-15.19	0.3652	ICP-MS As Recd
F048	74.00	9.250	8					ICP
F060	14.00	14.000	1	H	INSUFFICIENT DATA			Trace - ICP
F094	88.50	8.850	10					ICP-MS
F109	61.50	6.150	10					ICP-MS
F133	76.00	7.600	10					ICP-MS

OVERALL AVERAGE
RANK IS 7.431

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F024	16.00	2.000	8	ELELELLLVL	BIASED LOW	-9.66	-0.0333	Phosphorimetry
F046	42.00	4.200	10	VLVLEL	BIASED LOW	-15.19	0.3652	ICP-MS As Recd
F009	61.50	6.150	10					ICP-MS
F109	61.50	6.150	10					ICP-MS
F012	51.00	6.375	8	ELEL				ICP-MS
F001	74.00	7.400	10					ICP-MS
F133	76.00	7.600	10					ICP-MS
F011	76.50	7.650	10	VL				EPA-200.8
F003	77.50	7.750	10					ICP-MS
F025	85.00	8.500	10	EHEHEHELEHVLL				ICP-MS
F094	88.50	8.850	10					ICP-MS
F048	74.00	9.250	8					ICP
F014	93.00	9.300	10					ICP-MS
F038	96.50	9.650	10	ELH				ICPMS
F060	14.00	14.000	1	H	INSUFFICIENT DATA			Trace - ICP
F022	31.00	15.500	2	EHEH	INSUFFICIENT DATA			ICP

OVERALL AVERAGE
RANK IS 7.431

PARAMETER: 93095 Lithium ug/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

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

SAMPLE	1 = TMHUMB-95		2 = TM-27.2		3 = TM-28.2		4 = TM-FSCal		5 = TM-23.2		6 = TM-24.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	1.9	1.50	4.2	8.00	3.4	3.50	2.7	2.00	3.5	3.00	5.2	5.00
F011	2.	4.00	4.1	7.00	3.3	2.00	2.7	2.00	3.5	3.00	5.4	7.00
F012	32. EH	9.00	15. EH	11.00	11. EH	10.00	10. EH	10.00	<10.	0.00	<10.	0.00
F022	6. VH	7.00	7. VH	10.00	7. VH	9.00	7. VH	9.00	7. EH	9.00	80. EH	9.00
F025	2.0	4.00	3.0 L	1.00	3.0 L	1.00	3.0	5.00	3.0 EL	1.00	4.0 EL	1.00
F038	2.	4.00	4.	5.00	4.	7.00	3.	5.00	4.	7.00	5.	3.00
F046	12.5 VH	8.00	5.0 H	9.00	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00
F048	1.9	1.50	3.6	2.00	3.4	3.50	2.7	2.00	3.5	3.00	5.0	3.00
F060	2.77 H	6.00	3.97	3.00	3.70	5.00	3.87 H	7.00	3.66	5.00	5.26	6.00
F080	<3.	0.00	4.	5.00	4.	7.00	4. VH	8.00	4.	7.00	6. H	8.00
F094	<3.	0.00	4.	5.00	4.	7.00	3.	5.00	4.	7.00	5.	3.00
MEDIAN	2.0000		4.0000		3.8500		3.0000		3.6600		5.2000	
1CRIT	0.5900		0.7100		0.7010		0.6500		0.6896		0.7820	
N	6		9		8		9		7		7	
MEAN	4.5450		4.4300		4.1000		3.5522		3.7371		5.2657	
3STDEV	11.4879		2.9235		3.3908		3.9093		0.7008		0.9972	

SAMPLE	7 = TM-26.2		8 = TMDA-54.2		9 = TMDA-52.2		10 = TMDA-53.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	6.9	6.00	8.6	4.00	12.2	5.00	11.9	7.00
F011	6.7	3.00	8.1	2.00	13.1	9.00	10.2 L	2.00
F012	<10.	0.00	<10.	0.00	10. EL	1.00	11.	4.00
F022	10. EH	10.00	14. EH	10.00	18. EH	11.00	16. EH	11.00
F025	6.0 EL	1.50	8.5	3.00	11.0 L	2.00	10.0 L	1.00
F038	7.	8.00	8.	1.00	12.	3.50	11.	4.00
F046	6.0 EL	1.50	11.0 VH	9.00	13.5	10.00	12.5	10.00
F048	6.8	5.00	9.1	7.00	12.6	7.00	12.0	8.50
F060	6.72	4.00	9.19	8.00	12.5	6.00	11.5	6.00
F080	7.	8.00	9.	5.50	12.	3.50	11.	4.00
F094	7.	8.00	9.	5.50	13.	8.00	12.	8.50
MEDIAN	6.8500		9.0000		12.5000		11.5000	
1CRIT	0.8810		1.0100		1.2200		1.1600	
N	7		8		9		9	
MEAN	6.8743		9.0613		12.4333		11.4556	
3STDEV	0.3722		2.4270		2.1024		2.0205	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	45.00	4.500	10					ICP-MS
F011	41.00	4.100	10	L				EPA-200.8
F012	45.00	7.500	6	EHEHEHEH EL				ICP-MS
F022	95.00	9.500	10	VHVHVHVHEHEHEHEHEHEH	BIASED HIGH	-39.01	13.4453	ICP
F025	20.50	2.050	10	L L ELELEL L L	BIASED LOW	-10.38	-0.1671	ICP-AES
F038	47.50	4.750	10					ICPMS
F046	47.50	7.917	6	VHH ELVH				DirFlameAtomEmis
F048	42.50	4.250	10					ICP
F060	56.00	5.600	10	H H				Trace - ICP
F080	56.00	6.222	9	VH H				FAA dig. conc.
F094	57.00	6.333	9					ICP-MS

OVERALL AVERAGE
RANK IS 5.530

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F025	20.50	2.050	10	LLELELELLL	BIASED LOW	-10.38	-0.1671	ICP-AES
F011	41.00	4.100	10	L				EPA-200.8
F048	42.50	4.250	10					ICP
F001	45.00	4.500	10					ICP-MS
F038	47.50	4.750	10					ICPMS
F060	56.00	5.600	10	HH				Trace - ICP
F080	56.00	6.222	9	VHH				FAA dig. conc.
F094	57.00	6.333	9					ICP-MS
F012	45.00	7.500	6	EHEHEHEHEL				ICP-MS
F046	47.50	7.917	6	VHHELVH				DirFlameAtomEmis
F022	95.00	9.500	10	VHVHVHVHEHEHEHEHEHEH	BIASED HIGH	-39.01	13.4453	ICP

OVERALL AVERAGE
RANK IS 5.530

Lithium

PARAMETER: 94095 Beryllium ug/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

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

SAMPLE	1 = TMHUMB-95		2 = TM-27.2		3 = TM-28.2		4 = TM-FSCal		5 = TM-23.2		6 = TM-24.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	<0.04	0.00	1.6	19.00	2.6	13.00	<0.04	0.00	1.6	8.50	2.1	15.00
F003	<0.05	0.00	1.38	6.00	2.38	4.00	<0.05	0.00	1.5	4.00	2.1	15.00
F009	<0.5	0.00	1.4	8.50	2.4	6.00	<0.5	0.00	1.5	4.00	2.0	8.50
F010	<1.	0.00	1.	2.00	2. EL	1.50	<1.	0.00	2.	18.00	2.	8.50
F011	<0.1	0.00	1.3	4.50	2.7	17.00	<0.1	0.00	1.7	13.50	2.	8.50
F012	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00
F015	<1.	0.00	1.	2.00	3. EH	19.00	<1.	0.00	2.	18.00	2.	8.50
F019	<1.	0.00	1.	2.00	2. EL	1.50	<1.	0.00	2.	18.00	2.	8.50
F022	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00
F025	<0.2	0.00	1.3	4.50	2.5	9.00	<0.2	0.00	1.7	13.50	1.2 EL	1.00
F032		0.00	1.5063	16.00	2.6180	16.00		0.00	1.6162	11.00	2.1190	17.00
F032b		0.00	1.59	18.00	2.37	3.00		0.00	1.6	8.50	1.99	3.00
F038	<0.5	0.00	1.5	13.00	2.6	13.00	<0.5	0.00	1.7	13.50	2.1	15.00
F046	<0.1	0.00	1.4	8.50	2.5	9.00	<0.1	0.00	1.5	4.00	2.0	8.50
F048	<1.0	0.00	1.5	13.00	2.6	13.00	<1.0	0.00	1.6	8.50	2.0	8.50
F060	<0.5	0.00	1.4	8.50	2.4	6.00	<0.5	0.00	1.4	1.00	1.9	2.00
F080	<6.	0.00	<6.	0.00	<6.	0.00	<6.	0.00	<6.	0.00	<6.	0.00
F094	<0.5	0.00	1.5	13.00	2.6	13.00	<0.5	0.00	1.6	8.50	2.0	8.50
F096	<1.	0.00	1.5	13.00	2.6	13.00	<1.	0.00	1.7	13.50	2.2	18.00
F109	<0.5	0.00	1.4	8.50	2.4	6.00	<0.5	0.00	1.5	4.00	2.0	8.50
F131	<2.6	0.00	<2.6	0.00	<2.6	0.00	<2.6	0.00	<2.6	0.00	<2.6	0.00
F133	<0.50	0.00	1.50	13.00	2.50	9.00	<0.50	0.00	1.50	4.00	2.00	8.50
F138	0.0019	1.00	1.5638	17.00	2.8164	18.00	0.0048	1.00	1.886	16.00	2.466 EH	19.00
MEDIAN OR *TARGET CONC.	*0.0500		1.4000		2.5000		*0.0500		1.6000		2.0000	
1CRIT	0.5000		0.5540		0.6200		0.5000		0.5660		0.5900	
N	1		18		16		1		18		17	
MEAN	0.0019		1.3744		2.5365		0.0048		1.6779		2.0299	
3STDEV	-		0.5536		0.3705		-		0.5210		0.2045	

PARAMETER: 94095 Beryllium ug/L

SAMPLE	7 = TM-26.2		8 = TMDA-54.2		9 = TMDA-52.2		10 = TMDA-53.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	3.3	10.00	7.1	11.00	16.7	9.00	12.2	18.50
F003	3.4	14.00	7.3	14.00	17.	11.50	11.5	13.00
F009	3.2	5.50	7.0	7.00	16.4	7.50	10.9	5.50
F010	3.	1.50	7.	7.00	16.	4.00	11.	9.00
F011	3.3	10.00	7.1	11.00	17.6	16.00	11.8	15.00
F012	<10.	0.00	10. EH	23.00	18.	19.00	12.	17.00
F015	4. EH	20.00	7.	7.00	18.	19.00	11.	9.00
F019	3.	1.50	7.	7.00	15. L	1.50	11.	9.00
F022	<5.	0.00	9. VH	22.00	19. H	21.50	14. EH	22.50
F025	3.3	10.00	5.0 EL	1.00	15.0 L	1.50	10.0 L	1.00
F032	3.5212	17.00	7.3878	16.00	17.3131	14.00	11.5660	14.00
F032b	3.14	4.00	6.65	2.00	15.2 L	3.00	10.5	2.00
F038	3.3	10.00	7.4	17.00	17.4	15.00	11.9	16.00
F046	3.3	10.00	6.9	4.00	16.1	5.00	10.9	5.50
F048	3.5	15.50	7.3	14.00	17.2	13.00	11.4	12.00
F060	3.1	3.00	6.8	3.00	16.3	6.00	10.8	3.00
F080	<6.	0.00	8. H	19.50	19. H	21.50	14. EH	22.50
F094	3.3	10.00	7.1	11.00	17.0	11.50	10.9	5.50
F096	3.6	18.00	8. H	19.50	17.7	17.00	12.2	18.50
F109	3.2	5.50	7.0	7.00	16.4	7.50	10.9	5.50
F131	3.3	10.00	7.3	14.00	16.9	10.00	11.1	11.00
F133	3.50	15.50	7.50	18.00	18.00	19.00	12.75 H	20.00
F138	3.9575	19.00	8.3707 H	21.00	19.5535 VH	23.00	13.1357 VH	21.00
MEDIAN OR *TARGET CONC.	3.3000		7.1000		17.0000		11.4000	
1CRIT	0.6680		0.8960		1.4900		1.1540	
N	17		21		20		20	
MEAN	3.3658		7.3433		17.1607		11.4726	
3STDEV	0.5970		1.6610		2.8455		2.0739	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	104.00	13.000	8					ICP-MS
F003	81.50	10.188	8					ICP-OES
F009	52.50	6.562	8					ICP-MS
F010	51.50	6.438	8	EL				ICP
F011	95.50	11.938	8					EPA-200.8
F012	59.00	19.667	3	EH	INSUFFICIENT DATA			ICP-MS
F015	102.50	12.813	8	EH EH				ICP
F019	49.00	6.125	8	EL L				
F022	66.00	22.000	3	VHH EH	INSUFFICIENT DATA			ICP
F025	41.50	5.188	8	EL ELL L	BIASED LOW	-13.21	-0.0232	ICP-MS
F032	121.00	15.125	8					ICP-AES E3386A
F032b	43.50	5.438	8	L				ICP-MS E3391A
F038	112.50	14.063	8					ICPMS
F046	54.50	6.812	8					ICP-MS As Recd
F048	97.50	12.188	8					ICP
F060	32.50	4.062	8		BIASED LOW*	-4.21	-0.0311	Trace - ICP
F080	63.50	21.167	3	H H EH	INSUFFICIENT DATA			ICP dig. conc.
F094	81.00	10.125	8					ICP-MS
F096	130.50	16.313	8	H				ICAP 61E Analysis
F109	52.50	6.562	8					ICP-MS
F131	45.00	11.250	4		INSUFFICIENT DATA			ICP
F133	107.00	13.375	8	H				ICP-MS
F138	156.00	15.600	10	EH H VHVH				ICP-MS

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

OVERALL AVERAGE
RANK IS 10.778

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F060	32.50	4.062	8		BIASED LOW*	-4.21	-0.0311	Trace - ICP
F025	41.50	5.188	8	ELELLL	BIASED LOW	-13.21	-0.0232	ICP-MS
F032b	43.50	5.438	8	L				ICP-MS E3391A
F019	49.00	6.125	8	ELL				
F010	51.50	6.438	8	EL				ICP
F009	52.50	6.562	8					ICP-MS
F109	52.50	6.562	8					ICP-MS
F046	54.50	6.812	8					ICP-MS As Recd
F094	81.00	10.125	8					ICP-MS
F003	81.50	10.188	8					ICP-OES
F131	45.00	11.250	4		INSUFFICIENT DATA			ICP
F011	95.50	11.938	8					EPA-200.8
F048	97.50	12.188	8					ICP
F015	102.50	12.813	8	EHEH				ICP
F001	104.00	13.000	8					ICP-MS
F133	107.00	13.375	8	H				ICP-MS
F038	112.50	14.063	8					ICPMS
F032	121.00	15.125	8					ICP-AES E3386A
F138	156.00	15.600	10	EHHVHVH				ICP-MS
F096	130.50	16.313	8	H				ICAP 61E Analysis
F012	59.00	19.667	3	EH	INSUFFICIENT DATA			ICP-MS
F080	63.50	21.167	3	HHEH	INSUFFICIENT DATA			ICP dig. conc.
F022	66.00	22.000	3	VHHEH	INSUFFICIENT DATA			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 10.778

Beryllium

PARAMETER: 80095 Mercury ug Hg/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
BURLINGTON ONTARIO

NWRI Ecosystem Interlab QA for Mercury

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.0200 BASIC ACCEPTABLE ERROR= 0.0200 CONCENTRATION ERROR INCREMENT= 0.1250

SAMPLE	1 = Merc-Blk		2 = Merc-02		3 = Merc-03		4 = Merc-04		5 = Merc-05		6 = Merc-06	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	<0.04	0.00	0.09	3.00	0.12	5.50	<0.04	0.00	0.23	5.00	0.16	3.50
F002	<0.020	0.00	0.099	6.00	0.131	10.00	0.054	6.00	0.260	13.00	0.184	12.00
F003	<0.005	0.00	0.123	14.50	0.145	14.00	0.071	13.00	0.254	12.00	0.189	13.00
F006	<0.02	0.00	0.11	10.00	0.13	8.50	0.06	8.00	0.28	15.50	0.19	14.00
F008	0.022	2.00	0.123	14.50	0.157	17.00	0.072	14.00	0.292	17.00	0.207	17.00
F010	<0.1	0.00	0.12	12.50	0.13	8.50	0.06	8.00	0.25	9.50	0.18	10.00
F011	<0.01	0.00	0.02 EL	1.00	0.12	5.50	0.05	4.00	0.22	4.00	0.17	6.50
F015	<0.05	0.00	0.12	12.50	0.14	11.50	0.07	11.50	0.24	7.50	0.18	10.00
F025	<0.05	0.00	0.10	7.50	0.14	11.50	0.06	8.00	0.25	9.50	0.18	10.00
F032	<0.02	0.00	0.1	7.50	0.12	5.50	<0.05	0.00	0.24	7.50	0.17	6.50
F036	<0.002	0.00	0.102	9.00	0.154	16.00	0.07	11.50	0.252	11.00	0.16	3.50
F037	<0.02	0.00	0.2129 EH	17.00	0.1061	2.00	0.0471	1.00	0.2022	1.00	0.1767	8.00
F038	<0.005	0.00	0.08	2.00	0.104	1.00	0.05	4.00	0.216	2.50	0.149	1.00
F046	<0.05	0.00	0.093	5.00	0.120	5.50	<0.05	0.00	0.235	6.00	0.168	5.00
F080	<0.04	0.00	0.13	16.00	0.15	15.00	0.05	4.00	0.28	15.50	0.20	16.00
F093	0.056 EH	3.00	0.113	11.00	0.143	13.00	0.065	10.00	0.263	14.00	0.192	15.00
F116	0.0007	1.00	0.0914	4.00	0.117	3.00	0.0494	2.00	0.216	2.50	0.151	2.00
F133	0.83 EH	4.00	<0.20	0.00	<0.20	0.00	<0.20	0.00	0.65 EH	18.00	0.50 EH	18.00
MEDIAN OR *TARGET CONC.	*0.0050		0.1020		0.1300		0.0600		0.2500		0.1800	
1CRIT	0.0224		0.0302		0.0337		0.0250		0.0487		0.0400	
N	2		15		15		12		16		16	
MEAN	0.0390		0.1063		0.1311		0.0591		0.2486		0.1786	
3STDEV	-		0.0429		0.0402		0.0243		0.0665		0.0440	

PARAMETER: 80095 Mercury ug Hg/L

SAMPLE	7 = Merc-07		8 = Merc-08		9 = Merc-09		10 = Merc-10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.24	3.00	0.35	8.00	0.32	9.50	0.40	8.50
F002	0.300	14.00	0.393	14.00	0.345	13.00	0.455	14.00
F003	0.286	10.00	0.368	12.00	0.325	11.00	0.414	11.00
F006	0.32	16.50	0.42 H	15.00	0.35	14.00	0.48 H	15.00
F008	0.325	18.00	0.426 H	16.00	0.393 H	16.00	0.502 H	17.00
F010	0.27	8.00	0.35	8.00	0.41 VH	17.00	0.31 L	1.00
F011	0.25	4.00	0.31	2.00	0.28	2.00	0.36	4.00
F015	0.29	12.00	0.37	13.00	0.32	9.50	0.41	10.00
F025	0.30	14.00	0.36	10.00	0.33	12.00	0.44	13.00
F032	0.27	8.00	0.35	8.00	0.31	7.00	0.4	8.50
F036	0.264	6.00	0.348	6.00	0.294	4.00	0.376	5.00
F037	0.2237 L	1.00	0.3113	3.00	0.3088	6.00	0.4144	12.00
F038	0.236	2.00	0.302	1.00	0.274	1.00	0.353	3.00
F046	0.288	11.00	0.328	4.50	0.313	8.00	0.388	7.00
F080	0.32	16.50	0.45 VH	17.00	0.39 H	15.00	0.49 H	16.00
F093	0.270	8.00	0.361	11.00	0.304	5.00	0.382	6.00
F116	0.255	5.00	0.328	4.50	0.288	3.00	0.350	2.00
F133	0.30	14.00	0.80 EH	18.00	0.66 EH	18.00	6.0 EH	18.00
MEDIAN OR *TARGET CONC.	0.2780		0.3550		0.3200		0.4050	
1CRIT	0.0522		0.0619		0.0575		0.0681	
N	16		16		16		16	
MEAN	0.2787		0.3640		0.3300		0.4134	
3STDEV	0.0757		0.1172		0.1117		0.1393	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F038	17.50	1.944	9		BIASED LOW	-11.80	-0.0079	CVAAS
F116	29.00	2.900	10		BIASED LOW*	-6.34	-0.0138	
F011	33.00	3.667	9	EL	BIASED LOW*	-4.37	-0.0232	CVAA,EPA SW 846
F037	51.00	5.667	9	EHL				CVT
F001	46.00	5.750	8					CV-AAS
F046	52.00	6.500	8					HNO3 H2SO4Dig CVAA
F032	58.50	7.312	8					CVAAS E3060A
F036	72.00	8.000	9					P-T AtomFluor
F010	82.50	9.167	9	VHL				CVAAS
F093	96.00	9.600	10	EH				Perkin Elmer FIMS
F025	95.50	10.611	9					Cold Vapour AA
F015	97.50	10.833	9					
F002	102.00	11.333	9					CVAF
F003	110.50	12.278	9					CVAA
F006	116.50	12.944	9	HH				Auto II LDL UV
F080	131.00	14.556	9	VHHH	BIASED HIGH	26.44	-0.0189	Digestion, CVAA
F008	148.50	14.850	10	HHH	BIASED HIGH	25.14	-0.0133	
F133	108.00	15.429	7	EHEHEHEHEHEH	BIASED HIGH	741.28	-0.8043	COLD VAPOR 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 9.044

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	46.00	5.750	8					CV-AAS
F002	102.00	11.333	9					CVAF
F003	110.50	12.278	9					CVAA
F006	116.50	12.944	9	H H				Auto II LDL UV
F008	148.50	14.850	10	H H H	BIASED HIGH	25.14	-0.0133	
F010	82.50	9.167	9	VHL				CVAAS
F011	33.00	3.667	9	EL	BIASED LOW*	-4.37	-0.0232	CVAA,EPA SW 846
F015	97.50	10.833	9					
F025	95.50	10.611	9					Cold Vapour AA
F032	58.50	7.312	8					CVAAS E3060A
F036	72.00	8.000	9					P-T AtomFluor
F037	51.00	5.667	9	EH L				CVT
F038	17.50	1.944	9		BIASED LOW	-11.80	-0.0079	CVAAS
F046	52.00	6.500	8					HNO3 H2SO4Dig CVAA
F080	131.00	14.556	9	VHH H	BIASED HIGH	26.44	-0.0189	Digestion, CVAA
F093	96.00	9.600	10	EH				Perkin Elmer FIMS
F116	29.00	2.900	10		BIASED LOW*	-6.34	-0.0138	
F133	108.00	15.429	7	EH EHEH EHEHEH	BIASED HIGH	741.28	-0.8043	COLD VAPOR 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 9.044

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