NATIONAL WATER RESEARCH INSTITUTE

INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Ecosystem Interlaboratory QA Program
Study FP 73 - Trace Metals/Elements in Surface Waters
(September & October 1998)

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December 14, 1998

To: Participants of the NWRI Ecosystem Interlaboratory QA Program

Re: Final Report for NWRI Study FP 73 - Trace Metals/Elements Portion

Dear Participant:

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

The Institute is pleased to distribute this final report to the FP participant laboratories. This report includes results and evaluations for a unique series of samples: Trace Metals/Elements. 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,

Harry A.

Harry Alkema
QA Specialist
NLET/NWRI

Interlaboratory QA Studies & CRMs
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Attachment: Individual Laboratory Appraisal

Canada

National Water Research Institute
National Laboratory for Environmental Testing

Report no. NWRI-QA-98-06

Ecosystem Interlaboratory Quality Assurance Propram
Study FP 73 - Final Report

September and October 1998

An Interlaboratory Quality Assurance Study for Trace Metals/Elements in Surface Waters*

by

H. Alkema

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

December 1998

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* 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, some 60 of these labs participate in the various study matrixes. One study consists of five (5) series of ten (10) samples each and includes numerous parameters for analysis. The primary feature of these studies is to report the quality of data produced by the participating laboratories. Laboratory performance is ranked in terms of the number of biased parameters (systematic bias) and flagged results (precision measurement). The reports produced from the client data provide a powerful tool for the diagnosis of problematic analysis. Environmental programs and data users are therefore encouraged to have their labs participate as a means of quantifying laboratory performance and data quality.

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

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Table 1 List of participating† laboratories in the trace metals/elements portion of interlaboratory study FP 73 (September & October 1998).

Accutest Laboratories Ltd.
Activation Laboratories (Ontario)
Appalachian Laboratory
Aqualta, Rossdale (Alberta)
ASL - Analytical Service Lab Ltd.
Can Test Ltd.
Chemex Environmental Services
City of Calgary - Waterworks
Entec Laboratories (Ontario)
Eastern Thai Laboratory (Thailand)
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 Thunder Bay
Falconbridge Ltd. - Kidd Creek Division
Fisheries and Oceans Canada - Freshwater Institute
Food Control S.A. (Argentina)
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
National Physical Laboratory of Israel
Natural Resources Canada - CFS, Atlantic Region
Natural Resources Canada - CFS, Ontario Region
New Brunswick Department of the Environment - ASL
Norwest Laboratories
Ontario Ministry of Environment and Energy - Dorset
Ontario Ministry of Environment and Energy - Etobicoke
Ontario Ministry of Northern Development and Mines - Geosciences Laboratory
Ottawa-Charlton Regional Municipality
Saskatchewan Research Council
TAIGA Environmental Laboratory
US Geological Survey - National Water Quality Laboratory
York-Durham Regional Environmental Laboratory
Wastewater Technology Centre - Conor Pacific

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

Table 2a

Laboratory Performance Scores for Study 0073

Trace Elements

	SYSTEMATIC BIAS			FLAGGED RESULTS			
LAB CODE	NO. OF PARAMETERS ANALYZED	NO. OF PARAMETERS BIASED	PERCENTAGE OF PARAMETERS BIASED (%)	NO. OF RESULTS RANKED	NO. OF FLAGS ASSIGNED	PERCENTAGE OF RESULTS FLAGGED (%)	SUM OF BIAS & FLAGGED DATA % SCORE
F002	9	0	0.00	81	0	0.00	0.00
F038	23	0	0.00	216	9	4.17	2.08
F032	19	0	0.00	173	8	4.62	2.31
F003	21	1	4.76	204	6	2.94	3.85
F096	21	1	4.76	183	9	4.92	4.84
F032b	15	0	0.00	134	14	10.45	5.22
F011	23	0	0.00	218	24	11.01	5.50
F036	3	0	0.00	30	4	13.33	6.67
F093	19	0	0.00	171	27	15.79	7.89
F145	19	1	5.26	175	24	13.71	9.49
F136	12	1	8.33	114	13	11.40	9.87
F024	15	1	6.67	133	18	13.53	10.10
F019	14	0	0.00	104	22	21.15	10.58
F095	19	1	5.26	182	29	15.93	10.60
F010	20	1	5.00	187	31	16.58	10.79
F094	23	3	13.04	217	25	11.52	12.28
F015	19	2	10.53	163	25	15.34	12.93
F046	21	2	9.52	202	35	17.33	13.43
F014	16	2	12.50	136	21	15.44	13.97
F060	23	3	13.04	192	30	15.62	14.33
F133	22	3	13.64	209	39	18.66	16.15
F143	16	2	12.50	146	32	21.92	17.21
F142b	8	1	12.50	80	20	25.00	18.75
F137	23	5	21.74	230	44	19.13	20.43
F138	21	4	19.05	205	47	22.93	20.99
F142a	8	0	0.00	80	38	47.50	23.75
F142d	8	1	12.50	80	30	37.50	25.00
F026	8	2	25.00	78	20	25.64	25.32
F048	22	5	22.73	197	56	28.43	25.58
F134	9	3	33.33	84	20	23.81	28.57
F025	22	4	18.18	195	82	42.05	30.12
F141	18	4	22.22	121	51	42.15	32.19
F142c	8	2	25.00	80	34	42.50	33.75
F037	12	5	41.67	116	37	31.90	36.78
F139	15	4	26.67	136	73	53.68	40.17
F031	12	5	41.67	111	43	38.74	40.20
F131	14	5	35.71	126	71	56.35	46.03
F009	20	13	65.00	192	67	34.90	49.95
F135	7	4	57.14	61	31	50.82	53.98
F012	20	8	40.00	177	123	69.49	54.75

Laboratory parameters are selected from:

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

Table 2b Laboratory Performance Scores for Study 0073

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 & FLAGGED DATA % SCORE
F002	1	0	0.00	9	0	0.00	0.00
F003	1	0	0.00	9	0	0.00	0.00
F032a	1	0	0.00	9	0	0.00	0.00
F036	1	0	0.00	10	0	0.00	0.00
F037	1	0	0.00	10	0	0.00	0.00
F116	1	0	0.00	10	0	0.00	0.00
F138	1	0	0.00	10	0	0.00	0.00
F145	1	0	0.00	9	0	0.00	0.00
F010	1	0	0.00	9	1	11.11	5.56
F016	1	0	0.00	9	1	11.11	5.56
F025	1	0	0.00	9	1	11.11	5.56
F042	1	1	100.00	10	0	0.00	50.00
F148	1	1	100.00	10	0	0.00	50.00
F024	1	1	100.00	9	2	22.22	61.11
F015	1	1	100.00	10	5	50.00	75.00
F046	1	1	100.00	10	5	50.00	75.00
F093	1	1	100.00	10	10	100.00	100.00

Table 3a

SUMMARY OF STUDY-TO-STUDY PERFORMANCE

Trace Elements

LAB CODE	% BIASED PARAMETERS & FLAGGED RESULTS ON STUDIES 0064	0065	0066	0067	0068	0069	0070	0071	0072	0073	MEDIAN SCORE	COMMENTS
F002	1.8	1.7	-	5.7	0.0	1.4	0.6	0.0	0.6	0.0	0.6	GOOD
F003	2.3	5.8	4.2	6.1	7.8	0.7	1.2	3.1	5.4	3.9	4.0	GOOD
F009	43.0	20.5	19.7	24.7	30.9	10.8	22.2	26.4	16.2	49.9	23.5	MODERATE
F010	18.1	13.4	19.5	25.0	12.5	-	20.2	9.6	19.7	10.8	18.1	MODERATE
F011	7.4	17.1	9.9	7.3	3.7	22.7	14.0	10.0	15.8	5.5	10.0	SATISFACTORY
F012	-	-	-	-	20.6	26.2	28.0	25.1	20.5	54.7	25.6	MODERATE
F014	26.3	25.3	26.2	27.3	26.9	30.9	9.6	19.0	15.1	14.0	25.8	MODERATE
F015	4.7	4.5	5.4	9.9	1.9	5.9	7.0	11.0	6.4	12.9	6.2	SATISFACTORY
F019	-	-	30.2	20.7	26.6	12.9	14.2	6.8	7.7	10.6	13.6	MODERATE
F024	3.9	3.1	10.8	9.6	10.5	14.4	8.1	16.2	18.1	10.1	10.3	SATISFACTORY
F025	24.0	19.4	20.9	-	-	-	59.0	23.8	51.9	30.1	24.0	MODERATE
F026	4.5	15.5	-	35.5	14.7	28.5	22.2	13.6	8.1	25.3	15.5	MODERATE
F031	22.6	24.9	16.8	29.0	28.3	32.3	32.8	48.6	32.5	40.2	30.7	POOR
F032	5.3	8.0	0.7	1.4	9.4	13.0	3.1	21.8	5.5	2.3	5.4	SATISFACTORY
F032b	-	-	-	-	5.7	-	-	10.6	7.2	5.2	6.4	SATISFACTORY
F036	27.4	-	-	39.3	53.2	36.8	26.7	37.1	22.2	6.7	32.1	POOR
F037	20.5	39.7	-	20.5	17.0	41.7	25.9	18.7	26.2	36.8	25.9	MODERATE
F038	8.6	28.1	10.4	9.7	4.0	5.4	5.3	4.2	4.2	2.1	5.3	SATISFACTORY
F046	8.5	17.8	10.4	21.3	15.0	15.4	17.4	12.7	15.5	13.4	15.2	MODERATE
F048	15.0	14.7	27.1	2.8	5.2	31.2	11.0	1.9	13.0	25.6	13.8	MODERATE
F060	40.2	-	-	-	7.7	-	9.3	4.0	13.1	14.3	11.2	SATISFACTORY
F093	-	-	-	17.2	11.8	22.5	17.9	23.3	14.9	7.9	17.2	MODERATE
F094	-	-	-	45.8	37.3	4.8	6.5	9.8	14.0	12.3	12.3	SATISFACTORY
F095	-	-	-	7.9	-	-	-	-	68.9	10.6	10.6	SATISFACTORY
F096	-	-	-	-	32.2	-	7.4	10.5	17.3	4.8	10.5	SATISFACTORY
F131	-	-	-	-	-	-	-	25.7	-	46.0	35.9	POOR
F133	-	-	-	-	-	-	54.2	17.0	10.1	16.1	16.6	MODERATE
F134	-	-	-	-	-	-	-	26.9	-	28.6	27.7	MODERATE
F135	-	-	-	-	-	-	-	-	57.2	54.0	55.6	POOR
F136	-	-	-	-	-	-	-	-	23.6	9.9	16.7	MODERATE
F137	-	-	-	-	-	-	-	-	-	20.4	-	-
F138	-	-	-	-	-	-	20.0	3.6	-	21.0	20.0	MODERATE
F139	-	-	-	-	-	-	-	-	43.1	40.2	41.6	POOR
F141	-	-	-	-	-	-	-	-	-	32.2	-	-
F142a	-	-	-	-	-	-	-	-	-	23.8	-	-
F142b	-	-	-	-	-	-	-	-	-	18.8	-	-
F142c	-	-	-	-	-	-	-	-	-	33.8	-	-
F142d	-	-	-	-	-	-	-	-	-	25.0	-	-
F143	-	-	-	-	-	-	-	-	-	17.2	-	-
F145	-	-	-	-	-	-	-	-	-	9.5	-	-
INTERLAB MEDIAN	15.0	17.1	16.8	20.5	12.5	15.4	14.2	13.6	15.5	16.1		

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

Table 3b

SUMMARY OF STUDY-TO-STUDY PERFORMANCE

Mercury in Water

% BIASED PARAMETERS & FLAGGED RESULTS ON STUDIES

LAB CODE	0065	0067	0069	0071	0073	MEDIAN SCORE	COMMENTS
F002	5.6	0.0	0.0	0.0	0.0	0.0	GOOD
F003	0.0	0.0	0.0	0.0	0.0	0.0	GOOD
F010	35.0	28.6	-	11.1	5.6	19.8	MODERATE
F015	0.0	0.0	0.0	0.0	75.0	0.0	GOOD
F016	-	-	-	-	5.6	-	-
F024	-	-	-	-	61.1	-	-
F025	57.1	-	-	0.0	5.6	5.6	SATISFACTORY
F032a	-	-	-	-	0.0	-	-
F036	70.0	-	80.0	0.0	0.0	35.0	POOR
F037	12.5	10.0	5.6	11.1	0.0	10.0	SATISFACTORY
F042	-	-	-	-	50.0	-	-
F046	50.0	11.1	0.0	0.0	75.0	11.1	SATISFACTORY
F093	-	-	-	5.0	100.0	52.5	POOR
F116	-	-	50.0	0.0	0.0	0.0	GOOD
F138	-	-	-	-	0.0	-	-
F145	-	-	-	-	0.0	-	-
F148	-	-	-	-	50.0	-	-
INTERLAB MEDIAN	35.0	10.0	0.0	0.0	5.6		

STUDY DATES: 0065(05-JUL-1994), 0067(05-JUL-1995), 0069(01-SEP-1996), 0071(02-SEP-1997), 0073(01-SEP-1998)

Table 4a Sample design for the trace elements portion

Sample Number	Sample Name	Expected Copper concentration
FP73 TM-1	TM-FSKen	8.0
FP73 TM-2	TM-24.2	7.5
FP73 TM-3	TM-27.2	4.7
FP73 TM-4	TM-26.2	14.
FP73 TM-5	TM-28.2	6.2
FP73 TM-6	TMDA-51.2	90.
FP73 TM-7	TMDA-51.2	321.
FP73 TM-8	TMDA-61t†	71.
FP73 TM-9	TMDA-62t†	110.
FP73 TM-10	TMDA-63t†	201.

Note: † Barium and Strontium values were 10 times higher than expected due to a spiking error. (These samples will not appear in the studies again.)

Table 4b Sample design for the Mercury in water portion

Sample Number	Sample Name	Design Value (µg/L)
FP73 HG-1	HG73-1	0.020
FP73 HG-2	HG73-2	0.068
FP73 HG-3	HG73-3	0.122
FP73 HG-4	HG73-4	0.105
FP73 HG-5	HG73-5	0.163
FP73 HG-6	HG73-6	0.228
FP73 HG-7	HG73-7	0.281
FP73 HG-8	HG73-8	0.209
FP73 HG-9	HG73-9	0.350
FP73 HG-10	HG73-10	0.440

Note: Samples are preserved with 1% H_2SO_4 and 0.05% $K_2Cr_2O_7$

Table 5a

Summary of Interlaboratory Median Values for Trace Elements - Study 0073

PARAMETER		SAMPLE NUMBER					
		TM-FSKEN SAMPLE 1	TM-24.2 SAMPLE 2	TM-27.2 SAMPLE 3	TM-26.2 SAMPLE 4	TM-28.2 SAMPLE 5	TMDA-51.2 SAMPLE 6
Aluminum	ug/L	67.000	31.000	15.150	68.000	48.000	100.000
Antimony	ug/L	0.0500	2.6400	1.9300	2.0300	3.1800	12.390
Arsenic	ug/L	0.1000	4.9500	2.3950	7.6000	5.8600	14.800
Barium	ug/L	10.900	8.5400	5.0000	24.500	15.400	72.955
Beryllium	ug/L	-	2.0200	1.4000	3.3350	2.5000	9.0000
Bismuth	ug/L	-	2.1400	1.1850	4.2350	3.0000	15.800
Cadmium	ug/L	0.0200	4.1300	1.2100	6.7700	1.3000	25.000
Chromium	ug/L	0.0200	4.5900	1.8650	11.000	4.9000	62.050
Cobalt	ug/L	0.0800	6.0300	2.4000	8.2000	3.7000	71.400
Copper	ug/L	8.0000	7.4500	4.7000	14.040	6.2000	90.250
Iron	ug/L	11.200	11.000	12.000	22.000	17.500	110.000
Lead	ug/L	0.2000	6.1240	3.2200	10.000	4.2100	72.400
Lithium	ug/L	1.5000	5.1000	3.8400	6.5100	3.5000	16.500
Manganese	ug/L	1.1000	8.2000	2.5400	16.550	7.0200	83.100
Molybdenum	ug/L	0.2750	5.7000	2.5000	8.9000	4.2350	59.000
Nickel	ug/L	0.6000	5.1700	2.6000	9.8400	11.400	67.600
Selenium	ug/L	0.1000	3.1500	1.7000	5.1000	3.8500	12.000
Silver	ug/L	0.0100	3.6550	2.0900	6.7550	3.3000	13.000
Strontium	ug/L	28.100	66.750	52.200	94.750	48.800	117.500
Thallium	ug/L	0.0030	3.8700	1.7800	5.0300	3.6950	19.880
Uranium	ug/L	0.0130	4.3500	1.9800	7.6400	5.6600	30.400
Vanadium	ug/L	0.2000	7.0000	2.6150	12.225	2.5700	48.000
Zinc	ug/L	4.1400	19.850	11.750	32.200	13.250	107.000

PARAMETER		TMDA-53.2 SAMPLE 7	TMDA-61t SAMPLE 8	TMDA-62t SAMPLE 9	TMDA-63t SAMPLE 10
Aluminum	ug/L	367.500	90.000	129.865	210.500
Antimony	ug/L	17.000	29.250	58.900	102.500
Arsenic	ug/L	33.950	36.000	51.900	96.100
Barium	ug/L	287.800	544.000	1220.000	1837.000
Beryllium	ug/L	11.000	37.100	55.000	100.000
Bismuth	ug/L	13.500	30.000	58.000	97.000
Cadmium	ug/L	121.000	61.000	97.250	176.150
Chromium	ug/L	312.000	65.600	95.000	183.000
Cobalt	ug/L	255.000	65.000	100.000	196.800
Copper	ug/L	321.100	70.900	110.000	201.900
Iron	ug/L	331.100	78.000	119.000	207.900
Lead	ug/L	357.170	61.000	100.000	206.100
Lithium	ug/L	10.560	35.225	58.770	105.050
Manganese	ug/L	366.500	75.800	106.000	205.000
Molybdenum	ug/L	215.000	77.400	100.620	174.000
Nickel	ug/L	320.000	57.850	99.200	193.000
Selenium	ug/L	22.000	39.000	54.500	102.000
Silver	ug/L	18.000	21.750	20.360	28.000
Strontium	ug/L	373.000	67.950	552.000	1351.000
Thallium	ug/L	16.000	37.300	53.000	98.300
Uranium	ug/L	33.200	36.100	53.255	95.900
Vanadium	ug/L	299.000	71.800	112.150	190.000
Zinc	ug/L	372.000	69.800	107.000	200.900

Table 5b

Summary of Interlaboratory Median Values for Mercury in Water - Study 0073

PARAMETER	units	SAMPLE NUMBER					
		HG73-1 SAMPLE 1	HG73-2 SAMPLE 2	HG73-3 SAMPLE 3	HG73-4 SAMPLE 4	HG73-5 SAMPLE 5	HG73-6 SAMPLE 6
Mercury	ug/L	0.0030	0.0680	0.1220	0.1050	0.1633	0.2280

HG73-7 SAMPLE 7	HG73-8 SAMPLE 8	HG73-9 SAMPLE 9	HG73-10 SAMPLE 10	
0.2810	0.2090	0.3560	0.4400	

Appendix A

Glossary of Terms
Quantifying Bias in NWRI QA Studies

GLOSSARY OF TERMS

Used for the Evaluation of Interlaboratory Results

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

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

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

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

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

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

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

Satisfactory: Fully acceptable, 'good results'.

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

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

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

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

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

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

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

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

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

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

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

References:

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

June 1996

Quantifying Bias in NWRI QA Studies

Introduction

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

Degree of Bias

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

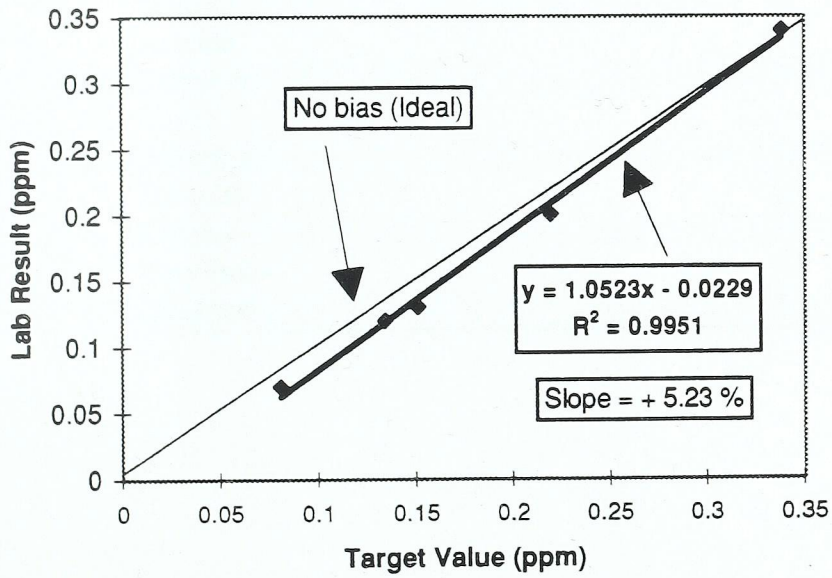
[1] Systematic bias is often identified with the comparison of data to a certified standard.

Parameter Performance Graph and Bias

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

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

Figure 2 **Parameter Performance**



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

Conclusion

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

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NWRI Ecosystem Interlaboratory QA Program

Bias Critical Values
Trace Metals/Elements

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

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Appendix B

Data & Evaluation Summary

PARAMETER: 13095 Aluminum ug/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Elements

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

SAMPLE	1 = TM-FSKEN		2 = TM-24.2		3 = TM-27.2		4 = TM-26.2		5 = TM-28.2		6 = TMDA-51.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	62.0	10.00	29.0	9.50	15.0	13.50	66.0	13.50	45.0	9.50	95.0	14.00
F003	65.	16.50	31.	17.50	14.	9.50	68.	20.00	47.	15.50	100.	19.50
F009	69.	21.50	33.	23.50	1.7 EL	1.00	75.	30.00	52.	27.00	107.	30.00
F010	70.	26.00	36.	29.00	19.	25.00	73.	28.00	53.	28.50	104.	26.00
F011	55.4 L	1.50	26.6	4.00	11.3	4.00	61.4	7.00	41.5	3.00	87.9	2.00
F012	70.	26.00	35.	28.00	17.	21.00	75.	30.00	53.	28.50	105.	27.00
F014	63.9	15.00	30.1	15.00	14.0	9.50	67.4	16.00	46.6	14.00	95.7	15.00
F015	67.	18.00	25.	3.00	12.	5.50	61.	6.00	42.	6.50	92.	10.00
F019	70.	26.00	30.	13.00	<20.	0.00	60.	2.50	50.	23.50	90.	8.50
F024	68.	20.00	27.	5.00	15.	13.50	66.	13.50	48.	17.50	94.	11.50
F025	<10. EL	0.00	<10. EL	0.00	<10.	0.00	110. EH	36.00	230. EH	35.00	280. EH	36.00
F026	72.12	29.00	34.62	26.00	17.29	22.00	69.53	25.00	48.51	21.00	101.04	23.00
F031	60.	7.00	3. EL	1.00	20.	26.50	60.	2.50	40.	2.00	100.	19.50
F032	63.7	14.00	31.4	21.00	15.1	15.50	68.	20.00	48.4	20.00	97.6	17.00
F032b	60.7	8.00	31.37	20.00	15.1	15.50	70.5	27.00	49.	22.00	96.4	16.00
F036	58.	4.00	28.	8.00	12.	5.50	68.	20.00	48.	17.50	124. VH	33.00
F037	60.94	9.00	27.17	6.00	11.09	2.00	60.83	5.00	41.74	4.00	89.54	6.00
F038	69.	21.50	30.	13.00	14.	9.50	65.	11.50	45.	9.50	100.	19.50
F046	63.2	13.00	30.5	16.00	14.0	9.50	67.0	15.00	46.3	12.50	94.9	13.00
F048	65.00	16.50	31.01	19.00	14.36	12.00	69.11	24.00	48.33	19.00	100.93	22.00
F060	73.	31.00	45. VH	33.00	27. EH	31.00	68.	20.00	55.	32.00	90.	8.50
F093	58.4	5.00	27.4	7.00	21.1	29.00	63.2	10.00	51.9	26.00	103.5	25.00
F094	70.	26.00	30.	13.00	20.	26.50	70.	26.00	50.	23.50	100.	19.50
F095	82.9 H	33.00	42.2 H	32.00	33.1 EH	32.00	79.1	33.00	53.6	30.00	109.	31.00
F096	62.8	11.00	29.9	11.00	21.7 H	30.00	75.0	30.00	41.9	5.00	105.5	29.00
F131	67.9	19.00	23.5	2.00	11.1	3.00	68.9	23.00	46.3	12.50	89.3	5.00
F133	63.	12.00	33.	23.50	16.	20.00	68.	20.00	47.	15.50	94.	11.50
F134	72.47	30.00	34.86	27.00	18.04	24.00	67.99	17.00	51.08	25.00	105.24	28.00
F135	104.1 EH	35.00	49.3 EH	34.00	20.2	28.00	95.7 EH	35.00	81.0 EH	34.00	130.2 VH	35.00
F136	100. EH	34.00	37.4	31.00	<20.0	0.00	46.6 VL	1.00	39.4	1.00	73.2 VL	1.00
F137	59.	6.00	29.	9.50	13.	7.00	62.	9.00	42.	6.50	89.	3.50
F138	69.4	23.00	34.3	25.00	15.8	19.00	76.2	32.00	53.9	31.00	111.	32.00
F139	77.0	32.00	36.6	30.00	17.3	23.00	85.1 VH	34.00	60.7 H	33.00	124.6 VH	34.00
F141	70.	26.00	<50.	0.00	<50.	0.00	65.	11.50	<50.	0.00	89.	3.50
F143	55.4 L	1.50	32.6	22.00	15.2	17.00	61.9	8.00	45.9	11.00	101.8	24.00
F145	57.7	3.00	31.	17.50	15.3	18.00	60.1	4.00	43.	8.00	89.9	7.00
MEDIAN	67.0000		31.0000		15.1500		68.0000		48.0000		100.0000	
1CRIT	11.2000		7.6000		6.0150		11.3000		9.3000		14.5000	
N	32		32		30		34		33		34	
MEAN	67.5353		31.6728		16.0660		68.7341		48.9897		100.2074	
3STDEV	24.4054		13.4952		10.6941		22.2868		21.8164		30.8587	

PARAMETER: 13095 Aluminum ug/L

SAMPLE	7 = TMDA-53.2		8 = TMDA-61t		9 = TMDA-62t		10 = TMDA-63t	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	369.0	20.00	87.0	10.50	128.0	13.00	215.0	21.50
F003	350.	10.00	90.	20.00	130.	20.50	200.	9.00
F009	411. H	32.00	97.	28.00	139.	27.50	230.	29.00
F010	373.	24.00	98.	29.00	139.	27.50	220.	24.50
F011	348.	9.00	90.1	23.00	125.	8.50	201.	11.00
F012	368.	18.50	94.	26.00	135.	25.50	217.	23.00
F014	361.	11.50	87.3	12.00	128.	13.00	211.	18.00
F015	390.	29.00	87.	10.50	128.	13.00	200.	9.00
F019	340.	6.00	80.	4.00	120.	5.00	200.	9.00
F024	365.	14.00	90.	20.00	125.	8.50	207.	13.00
F025	300. VL	2.00	50. EL	1.00	250. EH	36.00	340. EH	36.00
F026	366.13	16.00	87.31	13.00	130.79	23.00	209.82	15.00
F031	380.	26.00	90.	20.00	130.	20.50	210.	16.50
F032	366.	15.00	89.2	17.00	128.	13.00	221.	26.00
F032b	368.	18.50	96.7	27.00	129.	16.50	22.1 EL	1.00
F036	384.	28.00	114. VH	33.00	174. VH	34.00	292. VH	33.00
F037	337.	5.00	80.87	5.00	115.	3.50	192.	3.00
F038	380.	26.00	90.	20.00	130.	20.50	210.	16.50
F046	361.	11.50	85.6	7.00	122.	6.00	199.	6.00
F048	273.0 VL	1.00	90.82	24.00	129.73	18.00	213.4	20.00
F060	327.	4.00	104. H	31.00	131.	24.00	199.	6.00
F093	372.0	23.00	93.2	25.00	135.0	25.50	215.0	21.50
F094	370.	21.00	90.	20.00	130.	20.50	220.	24.50
F095	367.	17.00	107. H	32.00	147.	30.00	224.	28.00
F096	370.1	22.00	88.3	14.00	129.0	16.50	212.6	19.00
F131	483.4 EH	35.00	69.4 VL	2.00	109.5 L	2.00	221.8	27.00
F133	344.	7.00	86.	8.00	128.	13.00	195.	4.00
F134	424.50 H	33.00	118.64 VH	35.00	154.33 H	32.00	241.96 H	32.00
F135	489.7 EH	36.00	119.6 VH	36.00	171.6 VH	33.00	321.4 EH	35.00
F136	347.	8.00	79.4	3.00	86.4 EL	1.00	199.	6.00
F137	316. L	3.00	82.	6.00	115.	3.50	178. L	2.00
F138	409.	30.00	101.	30.00	148. H	31.00	241. H	31.00
F139	474.3 VH	34.00	117.8 VH	34.00	178.3 VH	35.00	297.2 VH	34.00
F141	410. H	31.00	89.	16.00	144.	29.00	231.	30.00
F143	380.	26.00	86.3	9.00	126.	10.00	202.	12.00
F145	362.5	13.00	88.4	15.00	123.8	7.00	208.7	14.00
MEDIAN	368.0000		90.0000		129.8650		211.8000	
1CRIT	41.3000		13.5000		17.4865		25.6800	
N	34		34		34		34	
MEAN	372.7627		91.9218		134.0015		219.2906	
3STDEV	110.5805		31.3256		46.6760		88.8052	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	135.00	13.500	10					AAS
F003	158.00	15.800	10					ICP-OES
F009	249.50	24.950	10	EL H				
F010	267.50	26.750	10					ICP-OES
F011	73.00	7.300	10	L	BIASED LOW*	-4.10	-3.4387	ICP-MS
F012	253.50	25.350	10					ICPMS
F014	139.00	13.900	10					ICP-MS
F015	110.50	11.050	10					GFAA, ICP
F019	97.50	10.833	9					ICP
F024	136.50	13.650	10					ICP-AES
F025	182.00	26.000	7	ELEL EHEHEHVLELEHEH				ICP
F026	213.00	21.300	10					ICP
F031	141.50	14.150	10	EL				ICP
F032	178.50	17.850	10					ICP-AES
F032b	171.50	17.150	10	EL				ICP-MS
F036	216.00	21.600	10	VH VHVHVH				Colourimetry
F037	48.50	4.850	10		BIASED LOW	-8.02	-2.2049	ICP-MS
F038	167.50	16.750	10					ICPMS
F046	109.50	10.950	10					ICP-MS
F048	175.50	17.550	10	VL				ICP
F060	220.50	22.050	10	VHEH H				ICP
F093	197.00	19.700	10					ICP
F094	220.50	22.050	10					ICP-MS
F095	298.00	29.800	10	H H EH H	BIASED HIGH*	-3.51	15.5700	ICP - USN
F096	187.50	18.750	10	H				ICP
F131	130.50	13.050	10	EHVLL				AA
F133	134.50	13.450	10					ICP-MS
F134	283.00	28.300	10	H VHH H	BIASED HIGH	15.97	-2.0001	GFAAS
F135	341.00	34.100	10	EHEH EHEHVHEHVHVHEH	BIASED HIGH	34.30	6.6748	AAS-ETA
F136	86.00	9.556	9	EH VL VL EL				DCP
F137	56.00	5.600	10	L L	BIASED LOW	-15.07	2.6325	ICP-MS
F138	284.00	28.400	10	H H	BIASED HIGH	12.02	-0.4855	ICP-MS
F139	323.00	32.300	10	VHH VHVHVHVHVH	BIASED HIGH	32.58	-2.7641	ICP-MS
F141	147.00	21.000	7	H				ICP-OES
F143	140.50	14.050	10	L				ICP
F145	106.50	10.650	10					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 18.122

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F037	48.50	4.850	10		BIASED LOW	-8.02	-2.2049	ICP-MS
F137	56.00	5.600	10	LL	BIASED LOW	-15.07	2.6325	ICP-MS
F011	73.00	7.300	10	L	BIASED LOW*	-4.10	-3.4387	ICP-MS
F136	86.00	9.556	9	EHVLVLEL				DCP
F145	106.50	10.650	10					ICP-AES
F019	97.50	10.833	9					ICP
F046	109.50	10.950	10					ICP-MS
F015	110.50	11.050	10					GFAA, ICP
F131	130.50	13.050	10	EHVLL				AA
F133	134.50	13.450	10					ICP-MS
F002	135.00	13.500	10					AAS
F024	136.50	13.650	10					ICP-AES
F014	139.00	13.900	10					ICP-MS
F143	140.50	14.050	10	L				ICP
F031	141.50	14.150	10	EL				ICP
F003	158.00	15.800	10					ICP-OES
F038	167.50	16.750	10					ICPMS
F032b	171.50	17.150	10	EL				ICP-MS
F048	175.50	17.550	10	VL				ICP
F032	178.50	17.850	10					ICP-AES
F096	187.50	18.750	10	H				ICP
F093	197.00	19.700	10					ICP
F141	147.00	21.000	7	H				ICP-OES
F026	213.00	21.300	10					ICP
F036	216.00	21.600	10	VHVHVHVH				Colourimetry
F060	220.50	22.050	10	VHEHH				ICP
F094	220.50	22.050	10					ICP-MS
F009	249.50	24.950	10	ELH				
F012	253.50	25.350	10					ICPMS
F025	182.00	26.000	7	ELELEHEHEHVLELEHEH				ICP
F010	267.50	26.750	10					ICP-OES
F134	283.00	28.300	10	HVHHH	BIASED HIGH	15.97	-2.0001	GFAAS
F138	284.00	28.400	10	HH	BIASED HIGH	12.02	-0.4855	ICP-MS
F095	298.00	29.800	10	HHEHH	BIASED HIGH*	-3.51	15.5700	ICP - USN
F139	323.00	32.300	10	VHHVHVHVHVHVH	BIASED HIGH	32.58	-2.7641	ICP-MS
F135	341.00	34.100	10	EHEHEHEHVHEHVHVHEH	BIASED HIGH	34.30	6.6748	AAS-ETA

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

OVERALL AVERAGE
RANK IS 18.122

PARAMETER: 51095 Antimony ug/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Elements

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

SAMPLE	1 = TM-FSKEN		2 = TM-24.2		3 = TM-27.2		4 = TM-26.2		5 = TM-28.2		6 = TMDA-51.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	<0.2	0.00	2.3	2.00	1.7	2.50	1.9	2.50	2.7	1.00	11.4	6.00
F009	0.2	5.00	2.1	1.00	1.8	8.00	1.8	1.00	2.9	3.00	11.	3.50
F011	0.1	4.00	2.6	11.00	1.9	9.00	2.	8.00	3.1	7.50	12.6	15.00
F012	<5.	0.00	6. EH	20.00	5. EH	18.00	5. EH	18.00	6. EH	19.00	22. EH	22.00
F014	<1.0	0.00	2.8	14.50	2.2	13.50	2.1	12.00	3.4	16.00	12.9	17.50
F015	<1.	0.00	3.8 EH	19.00	3.0 VH	17.00	2.9 H	16.00	4.4 VH	18.00	14.5 VH	21.00
F025	<0.2	0.00	2.4	4.00	1.7	2.50	1.9	2.50	3.3	15.00	12.0	8.50
F031	<3.	0.00	3.	16.50	<3.	0.00	3. VH	17.00	4. H	17.00	12.	8.50
F032	<0.5	0.00	2.5	6.50	1.5T	1.00	2.T	8.00	3.	6.00	11.	3.50
F038	<0.05	0.00	2.5	6.50	1.79	5.50	1.98	5.50	2.84	2.00	12.3	11.50
F046	<0.1	0.00	2.59	10.00	1.95	11.00	2.02	10.00	3.17	11.00	12.5	14.00
F048	<1.0	0.00	2.57	8.00	1.79	5.50	2.03	11.00	3.13	9.00	13.69	19.00
F060	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	10. VL	2.00
F093	<2.0	0.00	3.0	16.50	<2.0	0.00	<2.0	0.00	<2.0 VL	0.00	12.3	11.50
F094	<0.8	0.00	3.2	18.00	2.2	13.50	2.2	14.50	3.2	13.00	12.7	16.00
F095	<6.0	0.00	<6.0	0.00	6.0 EH	19.00	11.0 EH	19.00	9.1 EH	20.00	11.3	5.00
F096	<1.	0.00	2.68	12.00	2.29	16.00	2.16	13.00	3.29	14.00	12.9	17.50
F133	0.05	2.00	2.58	9.00	1.93	10.00	1.98	5.50	3.15	10.00	12.48	13.00
F137	0.05	2.00	2.38	3.00	1.79	5.50	1.91	4.00	2.92	4.50	11.7	7.00
F138	0.05	2.00	2.48	5.00	1.79	5.50	2.00	8.00	2.92	4.50	12.1	10.00
F141	<0.4	0.00	2.8	14.50	2.0	12.00	2.2	14.50	3.1	7.50	1.3 EL	1.00
F145	<1.	0.00	2.75	13.00	2.22	15.00	<1. VL	0.00	3.19	12.00	13.99 H	20.00
MEDIAN	0.0500		2.5950		1.9300		2.0200		3.1600		12.3000	
1CRIT	0.5000		0.6676		0.6144		0.6216		0.7128		1.4440	
N	4		18		17		17		18		20	
MEAN	0.0625		2.7183		2.1794		2.3106		3.3894		12.2680	
3STDEV	-		1.0467		2.3100		2.2208		2.2110		3.1256	

PARAMETER: 51095 Antimony ug/L

SAMPLE	7 = TMDA-53.2		8 = TMDA-61t		9 = TMDA-62t		10 = TMDA-63t	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	15.4	2.00	24.0 VL	2.00	56.3	6.00	90.6 L	3.00
F009	17.	12.00	22. VL	1.00	47. EL	1.00	83. VL	2.00
F011	16.7	8.00	28.9	7.00	58.9	11.50	93.5 L	4.00
F012	26. EH	22.00	44. EH	22.00	86. EH	22.00	150. EH	22.00
F014	19.1 H	20.00	30.5	16.00	64.6 H	19.00	113. H	19.00
F015	18.5	18.00	35.0 VH	19.50	68. VH	21.00	107.	17.00
F025	18.0	17.00	29.0	9.00	54.0	2.00	75.0 EL	1.00
F031	17.	12.00	29.	9.00	57.	7.00	99.	9.50
F032	16.	5.50	25. L	3.50	58.	9.00	96.	5.50
F038	16.4	7.00	29.2	12.00	57.3	8.00	97.9	7.50
F046	16.9	10.00	29.0	9.00	58.9	11.50	103.	12.50
F048	17.81	16.00	32.31 H	18.00	64.45 H	18.00	112.30 H	18.00
F060	17.	12.00	25. L	3.50	55.	4.00	99.	9.50
F093	15.1 L	1.00	27.0	5.50	54.5	3.00	97.9	7.50
F094	16.8	9.00	30.2	15.00	60.	14.00	105.	15.50
F095	21.7 EH	21.00	38.9 VH	21.00	64.0	17.00	114. H	20.00
F096	17.2	14.00	29.6	14.00	58.6	10.00	102.0	11.00
F133	17.33	15.00	29.1	11.00	62.0	16.00	103.5	14.00
F137	15.6	4.00	27.0	5.50	55.4	5.00	96.	5.50
F138	15.5	3.00	29.3	13.00	59.2	13.00	103.	12.50
F141	16.	5.50	35. VH	19.50	66. H	20.00	105.	15.50
F145	18.73	19.00	30.95	17.00	61.38	15.00	117.59 VH	21.00
MEDIAN	17.0000		29.1500		58.9000		102.5000	
1CRIT	1.8200		2.7920		5.1720		8.6600	
N	20		20		20		20	
MEAN	17.2335		29.6980		59.6765		101.9145	
3STDEV	4.3332		10.4833		11.8524		24.6299	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	27.00	3.000	9	VL L	BIASED LOW	-10.29	0.0412	HYDRIDE - ICP-OES
F009	37.50	3.750	10	VLELVL	BIASED LOW	-19.86	0.4803	
F011	85.00	8.500	10	L				
F012	185.00	20.556	9	EHEHEHEHEHEHEHEH	BIASED HIGH	43.75	2.2238	ICPMS
F014	147.50	16.389	9	H H H				ICP-MS
F015	166.50	18.500	9	EHVHH VHVH VHVH	BIASED HIGH	5.60	1.6314	GFAA
F025	61.50	6.833	9	EL				AA HYDRIDE
F031	96.50	12.062	8	VHH				ICP
F032	48.50	5.389	9	L				FAAS
F038	65.50	7.278	9					ICPMS
F046	99.00	11.000	9					ICP-MS
F048	122.50	13.611	9	H H H				ICP
F060	31.00	6.200	5	VL L				ICP
F093	45.00	7.500	6	VL L				ICP - Hydride
F094	128.50	14.278	9					ICP-MS
F095	142.00	17.750	8	EHEHEH EHVH H	BIASED HIGH	5.48	4.5760	ICP - USN
F096	121.50	13.500	9					ICP-MS
F133	105.50	10.550	10					ICP-MS
F137	46.00	4.600	10		BIASED LOW	-6.26	-0.0485	ICP-MS
F138	76.50	7.650	10					ICP-MS
F141	110.00	12.222	9	EL VHH				Hydride, AAS
F145	132.00	16.500	8	VL H VH				HG-AAS

OVERALL AVERAGE
RANK IS 10.777

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	27.00	3.000	9	VLL	BIASED LOW	-10.29	0.0412	HYDRIDE - ICP-OES
F009	37.50	3.750	10	VLELVL	BIASED LOW	-19.86	0.4803	
F137	46.00	4.600	10		BIASED LOW	-6.26	-0.0485	ICP-MS
F032	48.50	5.389	9	L				FAAS
F060	31.00	6.200	5	VLL				ICP
F025	61.50	6.833	9	EL				AA HYDRIDE
F038	65.50	7.278	9					ICPMS
F093	45.00	7.500	6	VLL				ICP - Hydride
F138	76.50	7.650	10					ICP-MS
F011	85.00	8.500	10	L				
F133	105.50	10.550	10					ICP-MS
F046	99.00	11.000	9					ICP-MS
F031	96.50	12.062	8	VHH				ICP
F141	110.00	12.222	9	ELVHH				Hydride, AAS
F096	121.50	13.500	9					ICP-MS
F048	122.50	13.611	9	HHH				ICP
F094	128.50	14.278	9					ICP-MS
F014	147.50	16.389	9	HHH				ICP-MS
F145	132.00	16.500	8	VLHVH				HG-AAS
F095	142.00	17.750	8	EHEHEHEHVHH	BIASED HIGH	5.48	4.5760	ICP - USN
F015	166.50	18.500	9	EHVHHVHVHVHVH	BIASED HIGH	5.60	1.6314	GFAA
F012	185.00	20.556	9	EHEHEHEHEHEHEHEHEH	BIASED HIGH	43.75	2.2238	ICPMS

OVERALL AVERAGE
RANK IS 10.777

PARAMETER: 33095 Arsenic ug/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Elements

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

SAMPLE	1 = TM-FSKEN		2 = TM-24.2		3 = TM-27.2		4 = TM-26.2		5 = TM-28.2		6 = TMDA-51.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	<0.5	0.00	4.8	10.00	2.3	10.00	7.6	15.00	5.8	14.00	15.0	18.00
F003	0.1	1.00	5.1	17.00	2.3	10.00	8.0	19.50	6.0	18.00	15.0	18.00
F009	0.3	2.50	5.1	17.00	2.5	16.00	8.	19.50	6.1	20.00	16.	21.50
F010	<1.	0.00	4. L	2.50	2.	3.00	8.	19.50	5.	3.00	14.	9.00
F011	<0.2	0.00	5.5	23.00	2.5	16.00	7.6	15.00	5.6	10.00	14.6	11.50
F012	<5.	0.00	10. EH	26.00	7. EH	24.00	12. EH	27.00	10. EH	27.00	21. EH	28.00
F014	<1.0	0.00	5.2	19.50	2.6	18.00	7.7	17.00	5.9	16.00	15.5	20.00
F015	<0.5	0.00	5.1	17.00	2.2	7.00	7.5	11.50	6.0	18.00	14.3	10.00
F025	<0.2	0.00	4.3	5.00	2.1	5.00	7.2	5.50	5.3	6.50	12.0 VL	3.50
F031	<2.	0.00	4. L	2.50	<2.	0.00	7.	4.00	5.	3.00	13. L	5.00
F032	<0.5	0.00	4.5	7.50	2.T	3.00	7.5	11.50	5.	3.00	12. VL	3.50
F037	0.3734	6.00	4.131	4.00	2.636	19.00	8.464	24.00	6.414	23.00	17.02 H	24.00
F038	0.3	2.50	4.9	13.50	2.3	10.00	7.4	10.00	5.7	13.00	15.	18.00
F046	0.35	5.00	5.40	22.00	2.65	20.00	8.24	23.00	6.31	22.00	16.3	23.00
F048	<1.0	0.00	6.0 H	25.00	3.13 H	22.00	9.00 H	25.00	6.99 H	24.00	17.71 VH	25.00
F060	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	20. VH	27.00
F093	<2.0	0.00	4.7	9.00	2.2	7.00	7.3	7.00	5.3	6.50	14.8	15.00
F094	<0.4	0.00	4.9	13.50	2.4	14.00	7.2	5.50	5.6	10.00	14.6	11.50
F095	<6.0	0.00	<6.0	0.00	<6.0	0.00	6.2 L	2.00	8.0 VH	25.00	14.8	15.00
F096	<1.	0.00	4.84	11.00	2.39	13.00	7.31	8.50	5.86	15.00	14.8	15.00
F131	0.56	7.00	5.29	21.00	2.89	21.00	9.50 VH	26.00	8.63 EH	26.00	18.54 VH	26.00
F133	<1.	0.00	5.	15.00	2.	3.00	8.	19.50	6.	18.00	16.	21.50
F135	<2.	0.00	5.2	19.50	<2.	0.00	7.6	15.00	5.3	6.50	13.1 L	6.50
F137	0.31	4.00	4.86	12.00	2.38	12.00	7.31	8.50	5.69	12.00	14.7	13.00
F138	<0.012 EL	0.00	3.43 VL	1.00	1.41 EL	1.00	7.55	13.00	3.73 VL	1.00	13.1 L	6.50
F141	<0.4	0.00	4.4	6.00	2.2	7.00	6.8	3.00	5.3	6.50	1.3 EL	1.00
F143	3.0 EH	8.00	4.5	7.50	2.5	16.00	5.0 EL	1.00	5.6	10.00	11.9 VL	2.00
F145	<1.	0.00	5.7	24.00	3.23 H	23.00	8.01	22.00	6.22	21.00	13.69	8.00
MEDIAN OR *TARGET CONC.	*0.1000		4.9000		2.3850		7.6000		5.8000		14.8000	
1CRIT	0.5000		0.8520		0.6508		1.0680		0.9240		1.6440	
N	6		24		22		25		25		26	
MEAN	0.3656		4.8925		2.4275		7.6794		5.9446		14.9023	
3STDEV	0.2733		1.5146		0.9813		1.9889		2.5344		5.7410	

PARAMETER: 33095 Arsenic ug/L

SAMPLE	7 = TMDA-53.2		8 = TMDA-61t		9 = TMDA-62t		10 = TMDA-63t	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	34.0	17.50	36.0	14.50	51.0	10.50	95.0	13.50
F003	33.6	14.00	37.3	19.00	53.2	18.00	97.4	17.00
F009	34.	17.50	38.	20.00	55.	20.00	100.	22.50
F010	27. VL	2.00	36.	14.50	49.	6.50	100.	22.50
F011	36.1	23.00	35.3	12.00	56.7 H	21.50	98.6	18.00
F012	39. VH	27.00	41. H	26.00	58. H	24.00	100.	22.50
F014	34.0	17.50	36.2	18.00	54.2	19.00	98.7	19.00
F015	31.5	9.00	33.9	6.00	45.1 L	3.00	94.2	10.00
F025	28.0 VL	4.00	34.0	7.00	51.0	10.50	84.0 L	3.00
F031	30. L	5.50	32. L	5.00	48.	5.00	88.	5.00
F032	20. EL	1.00	36.	14.50	52.	15.50	94.	9.00
F037	37.61 H	26.00	41.57 VH	27.00	60.31 VH	26.00	114. VH	27.00
F038	34.	17.50	36.	14.50	52.	15.50	96.	15.00
F046	35.8	22.00	38.8	21.50	56.7 H	21.50	103.	26.00
F048	39.47 VH	28.00	42.98 VH	28.00	62.04 VH	27.00	114.27 VH	28.00
F060	30. L	5.50	40. H	24.00	60. VH	25.00	100.	22.50
F093	32.8	11.00	35.2	11.00	51.5	13.00	95.0	13.50
F094	32.7	10.00	34.2	8.00	50.8	9.00	96.2	16.00
F095	35.1	21.00	31.8 L	4.00	49.1	8.00	89.4	6.00
F096	33.5	13.00	36.1	17.00	51.3	12.00	94.4	11.00
F131	36.76	25.00	40.92 H	25.00	62.07 VH	28.00	101.9	25.00
F133	35.	20.00	39.	23.00	57. H	23.00	99.	20.00
F135	30.8	7.00	31.7 L	3.00	40.8 VL	2.00	74.1 VL	2.00
F137	33.4	12.00	35.0	9.50	51.8	14.00	94.8	12.00
F138	36.6	24.00	38.8	21.50	52.1	17.00	93.8	8.00
F141	31.	8.00	35.	9.50	49.	6.50	86. L	4.00
F143	33.9	15.00	22.3 EL	1.00	36.7 EL	1.00	69.1 EL	1.00
F145	27.92 VL	3.00	27.64 VL	2.00	47.2 L	4.00	92.29	7.00
MEDIAN OR *TARGET CONC.	33.7500		36.0000		51.9000		95.5000	
1CRIT	3.1600		3.3400		4.6120		8.1000	
N	26		26		26		26	
MEAN	33.2342		36.0550		52.4942		95.3765	
3STDEV	8.9305		9.5482		14.2992		21.6154	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	123.00	13.667	9					Hydride AAS
F003	151.50	15.150	10					HYDRIDE - ICP-OES
F009	176.50	17.650	10					
F010	82.50	9.167	9	L VL				Hydride AAS
F011	150.00	16.667	9	H				
F012	231.50	25.722	9	EHEHEHEHEHVHH H	BIASED HIGH*	0.21	4.9819	ICPMS
F014	164.00	18.222	9					ICP-MS
F015	91.50	10.167	9	L				GFAA
F025	50.00	5.556	9	VLVL L	BIASED LOW	-10.24	0.1259	AA HYDRIDE
F031	35.00	4.375	8	L L L L	BIASED LOW	-7.43	-0.5808	ICP
F032	68.50	7.611	9	VLEL				FAAS
F037	206.00	20.600	10	H H VHVHVH				ICP-MS
F038	129.50	12.950	10					ICPMS
F046	206.00	20.600	10	H				ICP-MS
F048	232.00	25.778	9	H H H H VHVHVHVHVH	BIASED HIGH	19.43	-0.0145	ICP
F060	104.00	20.800	5	VHL H VH				ICP
F093	93.00	10.333	9					ICP - Hydride
F094	97.50	10.833	9					ICP-MS
F095	81.00	11.571	7	L VH L				ICP - USN
F096	115.50	12.833	9					ICP-MS
F131	230.00	23.000	10	VHEHVH H VH	BIASED HIGH	7.87	1.4184	Hydride Psa AAF
F133	163.00	18.111	9	H				ICP-MS
F135	61.50	7.688	8	L L VLVL				AAS-ETA
F137	109.00	10.900	10					ICP-MS
F138	93.00	10.333	9	ELVLEL VLL				HG-AFS
F141	51.50	5.722	9	EL L	BIASED LOW	-6.81	-1.6047	Hydride, AAS
F143	62.50	6.250	10	EH EL VL ELELEL	BIASED LOW	-29.11	1.5166	ICP
F145	114.00	12.667	9	H VLVLL				HG-AAS

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

OVERALL AVERAGE
RANK IS 13.782

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F031	35.00	4.375	8	LLLL	BIASED LOW	-7.43	-0.5808	ICP
F025	50.00	5.556	9	VLVLL	BIASED LOW	-10.24	0.1259	AA HYDRIDE
F141	51.50	5.722	9	ELL	BIASED LOW	-6.81	-1.6047	Hydride, AAS
F143	62.50	6.250	10	EHELVLELELEL	BIASED LOW	-29.11	1.5166	ICP
F032	68.50	7.611	9	VLEL				FAAS
F135	61.50	7.688	8	LLVLVL				AAS-ETA
F010	82.50	9.167	9	LVL				Hydride AAS
F015	91.50	10.167	9	L				GFAA
F093	93.00	10.333	9					ICP - Hydride
F138	93.00	10.333	9	ELVLELVLL				HG-AFS
F094	97.50	10.833	9					ICP-MS
F137	109.00	10.900	10					ICP-MS
F095	81.00	11.571	7	LVHL				ICP - USN
F145	114.00	12.667	9	HVLVLL				HG-AAS
F096	115.50	12.833	9					ICP-MS
F038	129.50	12.950	10					ICPMS
F002	123.00	13.667	9					Hydride AAS
F003	151.50	15.150	10					HYDRIDE - ICP-OES
F011	150.00	16.667	9	H				
F009	176.50	17.650	10					
F133	163.00	18.111	9	H				ICP-MS
F014	164.00	18.222	9					ICP-MS
F037	206.00	20.600	10	HHVHVHVH				ICP-MS
F046	206.00	20.600	10	H				ICP-MS
F060	104.00	20.800	5	VHLHVH				ICP
F131	230.00	23.000	10	VHEHVHHVH	BIASED HIGH	7.87	1.4184	Hydride Psa AAF
F012	231.50	25.722	9	EHEHEHEHEHVHHH	BIASED HIGH*	0.21	4.9819	ICPMS
F048	232.00	25.778	9	HHHHVHVHVHVHVH	BIASED HIGH	19.43	-0.0145	ICP

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

OVERALL AVERAGE
RANK IS 13.782

Arsenic

PARAMETER: 56095 Barium ug/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Elements

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.5000 BASIC ACCEPTABLE ERROR= 1.5000 CONCENTRATION ERROR INCREMENT= 0.0600

SAMPLE	1 = TM-FSKEN		2 = TM-24.2		3 = TM-27.2		4 = TM-26.2		5 = TM-28.2		6 = TMDA-51.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	11.5	23.50	8.6	17.00	5.0	12.00	24.9	21.00	15.3	14.50	73.2	17.00
F009	11.	16.50	8.1	10.00	4.8	7.00	23.	5.50	15.	9.00	69.	5.00
F010	11.	16.50	9.	23.00	5.	12.00	24.	10.00	15.	9.00	72.	10.50
F011	10.9	13.50	8.6	17.00	5.1	18.50	24.3	12.00	15.5	16.50	70.3	7.00
F012	19. EH	29.00	15. EH	28.00	9. EH	28.00	38. EH	30.00	25. EH	30.00	114. EH	30.00
F014	12.	27.50	<10.	0.00	<10.	0.00	25.	23.50	16.	21.50	74.	20.00
F015	10.	6.00	8.	8.00	5.	12.00	25.	23.50	14.	5.50	76.	24.00
F019	10.	6.00	7.	4.00	4.	3.00	23.	5.50	14.	5.50	73.	16.00
F024	12.	27.50	8.	8.00	5.	12.00	25.	23.50	16.	21.50	77.	27.00
F025	<10.	0.00	<10.	0.00	<10.	0.00	20. EL	2.00	20. EH	29.00	80. H	29.00
F031	10.	6.00	8.	8.00	5.	12.00	24.	10.00	15.	9.00	70.	6.00
F032	11.4	21.00	9.01	24.00	5.3	23.00	25.4	27.50	16.5	27.00	74.5	22.00
F032b	11.4	21.00	9.62	27.00	5.26	21.50	24.61	18.00	17.3	28.00	76.7	25.00
F037	11.96	26.00	9.105	26.00	5.478	25.00	24.87	20.00	16.04	24.00	72.91	15.00
F038	10.9	13.50	8.58	15.00	5.	12.00	23.2	7.00	14.8	7.00	73.3	18.00
F046	11.6	25.00	8.93	22.00	5.26	21.50	25.0	23.50	16.0	21.50	74.3	21.00
F048	7.94 L	3.00	5.21 VL	3.00	1.45 EL	2.00	21.54 L	3.00	12.45 L	2.00	71.37	8.00
F060	11.2	18.00	8.7	19.00	5.1	18.50	24.5	15.50	15.5	16.50	72.8	13.00
F093	11.3	19.00	8.8	20.00	5.6	27.00	24.7	19.00	15.6	18.00	72.9	14.00
F094	11.5	23.50	9.1	25.00	5.5	26.00	25.4	27.50	16.3	26.00	75.1	23.00
F095	10.8	10.50	8.5	13.50	5.4	24.00	24.5	15.50	15.3	14.50	72.4	12.00
F096	10.8	10.50	8.5	13.50	5.1	18.50	24.4	13.50	15.2	12.50	72.0	10.50
F133	11.40	21.00	8.88	21.00	5.08	16.00	25.2	26.00	15.93	19.00	73.5	19.00
F136	10.9	13.50	7.9	6.00	4.1	4.00	24.6	17.00	15.2	12.50	76.9	26.00
F137	10.4	8.00	8.6	17.00	5.1	18.50	24.	10.00	16.	21.50	65. L	2.00
F138	10.6	9.00	8.42	12.00	4.88	8.00	23.5	8.00	15.1	11.00	68.7	3.00
F139	1.105 EL	1.00	0.86 EL	1.00	0.49 EL	1.00	2.43 EL	1.00	1.53 EL	1.00	7.21 EL	1.00
F141	6. EL	2.00	4. EL	2.00	5.	12.00	27.	29.00	13. L	3.00	79. H	28.00
F143	9.6	4.00	7.6	5.00	4.4	5.00	22.7	4.00	13.8	4.00	68.9	4.00
F145	10.9	13.50	8.4	11.00	4.7	6.00	24.4	13.50	16.1	25.00	71.5	9.00
MEDIAN	10.9000		8.5400		5.0000		24.5000		15.4000		72.9550	
1CRIT	2.0640		1.9224		1.7100		2.8800		2.3340		5.7873	
N	27		26		26		28		28		28	
MEAN	10.7037		8.1983		4.8695		24.2043		15.4257		73.0814	
3STDEV	3.7410		3.5320		2.3345		3.9082		4.0656		9.6111	

PARAMETER: 56095 Barium ug/L

SAMPLE	7 = TMDA-53.2		8 = TMDA-61t		9 = TMDA-62t		10 = TMDA-63t	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	292.	20.50	547.	17.00	1220.	16.00	1850.	18.00
F009	277.	3.00	506. L	2.00	1140. L	2.00	1740.	3.00
F010	279.	5.50	527.	5.00	1170.	5.00	1780.	6.00
F011	282.	9.00	540.	11.00	1250.	21.50	1870.	19.00
F012	406. EH	30.00	788. EH	30.00	1777. EH	30.00	2622. EH	30.00
F014	292.	20.50	549.	18.50	1220.	16.00	1820.	12.50
F015	299.	26.00	572.	24.00	1260.	25.00	1910.	26.00
F019	285.	14.00	535.	7.00	1220.	16.00	1820.	12.50
F024	302.	27.00	578.	27.00	1300. H	27.00	1900.	24.00
F025	290.	19.00	550.	20.00	1250.	21.50	1920.	27.00
F031	282.	9.00	536.	9.50	1180.	6.50	1810.	9.00
F032	293.	22.50	543.	15.00	1190.	8.50	1770.	4.00
F032b	283.	12.00	549.	18.50	1207.	13.00	1796.	8.00
F037	283.	12.00	536.	9.50	1150.	3.50	1780.	6.00
F038	287.	15.00	545.	16.00	1190.	8.50	1780.	6.00
F046	279.	5.50	542.	13.00	1205.	12.00	1836.	15.00
F048	288.6	16.50	535.7	8.00	1221.	18.00	1874.	20.00
F060	298.	25.00	570.	23.00	1280.	26.00	1940.	28.00
F093	289.9	18.00	542.3	14.00	1214.	14.00	1844.	17.00
F094	296.	24.00	575.	25.50	1240.	19.00	1880.	21.50
F095	278.	4.00	529.	6.00	1180.	6.50	1838.	16.00
F096	281.9	7.00	541.5	12.00	1202.	11.00	1834.	14.00
F133	293.	22.50	558.	21.00	1248.	20.00	1818.	11.00
F136	311. H	29.00	575.	25.50	1196.	10.00	1895.	23.00
F137	265. L	2.00	512.	3.00	1150.	3.50	1730.	2.00
F138	282.	9.00	526.	4.00	1256.	24.00	1902.	25.00
F139	27.81 EL	1.00	52.19 EL	1.00	115.01 EL	1.00	171.40 EL	1.00
F141	303.	28.00	585. H	28.00	1310. H	28.00	1980. H	29.00
F143	283.	12.00	603. VH	29.00	1391. EH	29.00	1814.	10.00
F145	288.6	16.50	567.	22.00	1251.	23.00	1880.	21.50
MEDIAN	287.8000		544.0000		1220.0000		1837.0000	
1CRIT	18.6780		34.0500		74.6100		111.6300	
N	28		28		28		28	
MEAN	287.9643		549.0893		-		-	
3STDEV	28.1612		65.6518		158.9469		178.4748	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	176.50	17.650	10					ICP-OES
F009	63.00	6.300	10	L L	BIASED LOW	-5.69	-0.3072	
F010	102.50	10.250	10					ICP-OES
F011	145.00	14.500	10					
F012	295.00	29.500	10	EHEHEHEHEHEHEHEHEH	BIASED HIGH	43.35	4.1400	ICPMS
F014	160.00	20.000	8					ICP-MS
F015	180.00	18.000	10					ICP
F019	89.50	8.950	10					ICP
F024	224.50	22.450	10	H				ICP-AES
F025	147.50	21.071	7	ELEHH				ICP
F031	85.00	8.500	10					ICP
F032	194.50	19.450	10					ICP-AES
F032b	192.00	19.200	10					ICP-MS
F037	167.00	16.700	10					ICP-MS
F038	118.00	11.800	10					ICPMS
F046	180.00	18.000	10					ICP-MS
F048	83.50	8.350	10	L VLELL L				ICP
F060	202.50	20.250	10					ICP
F093	180.00	18.000	10					ICP
F094	241.00	24.100	10		BIASED HIGH*	2.19	1.9653	ICP-MS
F095	122.50	12.250	10					ICP - OES
F096	123.00	12.300	10					ICP
F133	196.50	19.650	10					ICP-MS
F136	166.50	16.650	10	H				DCP
F137	87.50	8.750	10	L L				ICP-MS
F138	113.00	11.300	10					ICP-MS
F139	10.00	1.000	10	ELELELELELELELELELEL	BIASED LOW	-90.65	0.3535	ICP-MS
F141	189.00	18.900	10	ELEL L H H H H				ICP-OES
F143	106.00	10.600	10	VHEH				ICP
F145	161.00	16.100	10					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 15.261

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F139	10.00	1.000	10	ELELELELELELELELELEL	BIASED LOW	-90.65	0.3535	ICP-MS
F009	63.00	6.300	10	LL	BIASED LOW	-5.69	-0.3072	
F048	83.50	8.350	10	LVLELLL				ICP
F031	85.00	8.500	10					ICP
F137	87.50	8.750	10	LL				ICP-MS
F019	89.50	8.950	10					ICP
F010	102.50	10.250	10					ICP-OES
F143	106.00	10.600	10	VHEH				ICP
F138	113.00	11.300	10					ICP-MS
F038	118.00	11.800	10					ICPMS
F095	122.50	12.250	10					ICP - OES
F096	123.00	12.300	10					ICP
F011	145.00	14.500	10					
F145	161.00	16.100	10					ICP-AES
F136	166.50	16.650	10	H				DCP
F037	167.00	16.700	10					ICP-MS
F003	176.50	17.650	10					ICP-OES
F093	180.00	18.000	10					ICP
F015	180.00	18.000	10					ICP
F046	180.00	18.000	10					ICP-MS
F141	189.00	18.900	10	ELELLHHHH				ICP-OES
F032b	192.00	19.200	10					ICP-MS
F032	194.50	19.450	10					ICP-AES
F133	196.50	19.650	10					ICP-MS
F014	160.00	20.000	8					ICP-MS
F060	202.50	20.250	10					ICP
F025	147.50	21.071	7	ELEHH				ICP
F024	224.50	22.450	10	H				ICP-AES
F094	241.00	24.100	10		BIASED HIGH*	2.19	1.9653	ICP-MS
F012	295.00	29.500	10	EHEHEHEHEHEHEHEHEHEH	BIASED HIGH	43.35	4.1400	ICPMS

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

OVERALL AVERAGE
RANK IS 15.261

Barium

PARAMETER: 94095 Beryllium ug/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Elements

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

SAMPLE	1 = TM-FSKEN		2 = TM-24.2		3 = TM-27.2		4 = TM-26.2		5 = TM-28.2		6 = TMDA-51.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	<0.05	0.00	2.04	13.00	1.41	14.00	3.24	10.00	2.37	7.00	8.9	11.00
F009	<1.	0.00	1.8	3.00	1.3	6.00	3.1	6.50	2.3	5.50	8.3	6.00
F010	<0.2	0.00	2.1	15.50	1.5	19.00	3.3	11.50	2.5	12.50	9.0	14.00
F011	<0.1	0.00	2.	8.50	1.4	11.00	4.7 EH	23.00	2.4	9.50	8.7	8.50
F012	<5.	0.00	5. EH	24.00	5. EH	23.00	6. EH	24.00	6. EH	24.00	12. EH	25.00
F015	<1.	0.00	2.	8.50	1.	2.50	3.	4.00	2.	3.50	9.	14.00
F019	<1.	0.00	2.	8.50	1.	2.50	3.	4.00	2.	3.50	8.	3.50
F025	<0.2	0.00	3.3 VH	22.00	1.4	11.00	3.8	22.00	2.5	12.50	9.2	18.50
F032	<0.03	0.00	2.12	18.00	1.47	16.00	3.41	16.00	2.59	15.00	9.18	17.00
F032b	<1.	0.00	2.	8.50	1.43	15.00	3.37	13.00	2.6	17.50	8.46	7.00
F038	<0.5	0.00	2.1	15.50	1.4	11.00	3.3	11.50	2.4	9.50	9.	14.00
F046	<0.1	0.00	2.20	19.50	1.54	22.00	3.54	20.50	2.66	20.00	9.57	20.00
F048	<1.0	0.00	2.06	14.00	1.35	8.00	3.54	20.50	2.53	14.00	10.10 H	24.00
F060	<0.5	0.00	2.0	8.50	1.4	11.00	3.2	8.50	2.4	9.50	8.8	10.00
F094	<0.5	0.00	2.4	21.00	1.5	19.00	3.5	18.00	2.8	22.50	9.7	22.00
F095	0.3	2.00	2.0	8.50	1.3	6.00	3.1	6.50	2.4	9.50	8.7	8.50
F096	<1.	0.00	2.11	17.00	1.50	19.00	3.50	18.00	2.60	17.50	9.59	21.00
F131	<2.6	0.00	3.5 EH	23.00	<2.6	0.00	3.2	8.50	2.6	17.50	8.0	3.50
F133	<0.5	0.00	2.0	8.50	1.5	19.00	3.5	18.00	2.8	22.50	9.8	23.00
F137	-0.1	1.00	1.9	4.00	1.3	6.00	3.0	4.00	2.3	5.50	8.2	5.00
F138	<0.004	0.00	1.52	2.00	1.07	4.00	2.4 L	2.00	1.79 L	2.00	6.46 EL	2.00
F139	<0.01	0.00	0.2 EL	1.00	0.14 EL	1.00	0.31 EL	1.00	0.24 EL	1.00	0.85 EL	1.00
F141	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	9.	14.00
F143	<0.5	0.00	2.2	19.50	1.4	11.00	3.4	14.50	2.7	21.00	9.2	18.50
F145	<1.	0.00	2.	8.50	1.5	19.00	3.4	14.50	2.6	17.50	9.	14.00
MEDIAN OR *TARGET CONC.	*0.1000		2.0200		1.4000		3.3350		2.5000		9.0000	
1CRIT	0.5000		0.5912		0.5540		0.6701		0.6200		1.0100	
N	2		22		21		22		22		23	
MEAN	0.1000		2.1523		1.3652		3.3409		2.4473		8.8635	
3STDEV	-		1.2795		0.4682		1.2184		0.7499		2.2380	

PARAMETER: 94095 Beryllium ug/L

SAMPLE	7 = TMDA-53.2		8 = TMDA-61t		9 = TMDA-62t		10 = TMDA-63t	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	11.2	16.00	36.8	12.00	54.5	10.00	100.	13.50
F009	10.	3.00	34. L	4.00	50. L	3.00	92. L	3.00
F010	10.7	7.50	37.6	14.50	55.8	15.00	103.	16.50
F011	10.3	4.00	35.5	6.50	52.	4.50	92.1 L	4.00
F012	14. VH	25.00	41. H	22.00	58.	20.50	103.	16.50
F015	11.	12.00	39.	19.00	58.	20.50	106.	20.00
F019	11.	12.00	36.	9.00	54.	8.00	97.	7.00
F025	13.7 VH	24.00	47.3 EH	25.00	65.6 VH	25.00	121. EH	25.00
F032	11.5	18.00	37.1	13.00	54.9	11.50	98.3	10.00
F032b	10.6	5.50	31.23 VL	2.00	54.2	9.00	98.5	11.00
F038	11.	12.00	38.	16.50	57.	17.00	99.	12.00
F046	11.9	19.00	38.2	18.00	54.9	11.50	100.	13.50
F048	12.89 VH	23.00	43.03 VH	24.00	64.15 VH	24.00	116.9 VH	24.00
F060	11.1	15.00	36.5	10.00	55.0	13.00	103.	16.50
F094	12.7 VH	22.00	39.4	21.00	58.7	22.00	109. H	23.00
F095	10.8	9.00	35.5	6.50	53.4	6.00	97.1	8.00
F096	12.1	20.00	36.6	11.00	55.1	14.00	98.1	9.00
F131	10.7	7.50	32.4 VL	3.00	45.6 VL	2.00	83.7 VL	2.00
F133	12.3 H	21.00	41.8 VH	23.00	61.8 VH	23.00	108.3 H	22.00
F137	11.	12.00	35.	5.00	52.	4.50	93. L	5.00
F138	7.71 EL	2.00	37.6	14.50	57.3	18.00	108. H	21.00
F139	1.033 EL	1.00	3.467 EL	1.00	5.262 EL	1.00	9.63 EL	1.00
F141	11.	12.00	38.	16.50	56.	16.00	103.	16.50
F143	10.6	5.50	35.6	8.00	53.5	7.00	95.5	6.00
F145	11.3	17.00	39.2	20.00	57.6	19.00	104.2	19.00
MEDIAN OR *TARGET CONC.	11.0000		37.1000		55.0000		100.0000	
1CRIT	1.1300		2.6960		3.7700		6.4700	
N	23		23		23		23	
MEAN	11.1783		37.1765		55.3674		100.3783	
3STDEV	3.4248		8.1276		11.0902		20.5043	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	106.50	11.833	9					ICP-OES
F009	40.00	4.444	9	L L L	BIASED LOW	-8.20	-0.0453	
F010	126.00	14.000	9					ICP-OES
F011	79.50	8.833	9	EH L				
F012	204.00	22.667	9	EHEHEHEHEHVHH	BIASED HIGH*	-0.07	3.1992	ICPMS
F015	104.00	11.556	9					ICP
F019	58.00	6.444	9					ICP
F025	185.00	20.556	9	VH VHEHVHEH	BIASED HIGH	21.29	-0.0751	ICP-MS
F032	134.50	14.944	9					ICP-AES
F032b	88.50	9.833	9	VL				ICP-MS
F038	119.00	13.222	9					ICPMS
F046	164.00	18.222	9					ICP-MS
F048	175.50	19.500	9	H VHVHVHVH	BIASED HIGH	17.20	-0.3189	ICP
F060	102.00	11.333	9					ICP
F094	190.50	21.167	9	VH . H	BIASED HIGH	8.33	-0.0102	ICP-MS
F095	70.50	7.050	10					ICP - OES
F096	146.50	16.278	9					ICP
F131	67.00	8.375	8	EH VLVLVL				ICP
F133	180.00	20.000	9	H VHVHH	BIASED HIGH	9.25	0.2193	ICP-MS
F137	52.00	5.200	10	L	BIASED LOW	-96.86	23.2036	ICP-MS
F138	67.50	7.500	9	L L ELEL H				ICP-MS
F139	9.00	1.000	9	ELELELELELELELELEL	BIASED LOW	-90.39	-0.0158	ICP-MS
F141	75.00	15.000	5					ICP-OES
F143	111.00	12.333	9					ICP
F145	148.50	16.500	9					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 12.631

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F139	9.00	1.000	9	ELELELELELELELELEL	BIASED LOW	-90.39'	-0.0158	ICP-MS
F009	40.00	4.444	9	LLL	BIASED LOW	-8.20	-0.0453	
F137	52.00	5.200	10	L	BIASED LOW	-96.86'	23.2036	ICP-MS
F019	58.00	6.444	9					ICP
F095	70.50	7.050	10					ICP - OES
F138	67.50	7.500	9	LLELELH				ICP-MS
F131	67.00	8.375	8	EHVLVLVL				ICP
F011	79.50	8.833	9	EHL				
F032b	88.50	9.833	9	VL				ICP-MS
F060	102.00	11.333	9					ICP
F015	104.00	11.556	9					ICP
F003	106.50	11.833	9					ICP-OES
F143	111.00	12.333	9					ICP
F038	119.00	13.222	9					ICPMS
F010	126.00	14.000	9					ICP-OES
F032	134.50	14.944	9					ICP-AES
F141	75.00	15.000	5					ICP-OES
F096	146.50	16.278	9					ICP
F145	148.50	16.500	9					ICP-AES
F046	164.00	18.222	9					ICP-MS
F048	175.50	19.500	9	HVHVHVHVH	BIASED HIGH	17.20	-0.3189	ICP
F133	180.00	20.000	9	HVHVHH	BIASED HIGH	9.25	0.2193	ICP-MS
F025	185.00	20.556	9	VHVHEHVHEH	BIASED HIGH	21.29	-0.0751	ICP-MS
F094	190.50	21.167	9	VHH	BIASED HIGH	8.33	-0.0102	ICP-MS
F012	204.00	22.667	9	EHEHEHEHEHVHH	BIASED HIGH*	-0.07	3.1992	ICPMS

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

OVERALL AVERAGE
RANK IS 12.631

Beryllium

PARAMETER: 83095 Bismuth ug/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Elements

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

SAMPLE	1 = TM-FSKEN		2 = TM-24.2		3 = TM-27.2		4 = TM-26.2		5 = TM-28.2		6 = TMDA-51.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F011	0.1	2.00	1.5 L	1.00	1.	3.00	7.2 VH	7.00	2.3	3.00	11.5 VL	1.00
F038	<0.5	0.00	1.6	3.00	0.9	2.00	2.4 VL	1.00	2.2 L	2.00	18. H	6.00
F060	<7.	0.00	<7.	0.00	<7.	0.00	<7.	0.00	<7.	0.00	15.	4.00
F093	<2.0	0.00	2.3	5.00	<2.0	0.00	3.8	4.00	3.0	4.00	16.6	5.00
F094	<0.05	0.00	3.41 EH	7.00	1.76 H	6.00	4.8	6.00	3.99 H	6.00	18.9 VH	7.00
F096	<20.	0.00	<20.	0.00	<20.	0.00	32.2 EH	8.00	<20.	0.00	<20.	0.00
F133	<0.05	0.00	1.55	2.00	0.88	1.00	2.45 VL	2.00	2.10 L	1.00	11.80 VL	2.00
F137	0.072	1.00	2.14	4.00	1.37	4.00	3.35 L	3.00	3.09	5.00	13.9 L	3.00
F145	1.35	3.00	2.67	6.00	1.65	5.00	4.67	5.00	4.2 VH	7.00	19.52 VH	8.00
MEDIAN			2.1400		1.1850		4.2350		3.0000		15.8000	
1CRIT	0.5000		0.6312		0.5548		0.7988		0.7000		1.7240	
N	1		5		4		6		5		6	
MEAN	0.1000		2.0520		1.2300		4.3783		2.9160		15.7000	
3STDEV	-		-		-		4.4724		-		7.2746	

SAMPLE	7 = TMDA-53.2		8 = TMDA-61t		9 = TMDA-62t		10 = TMDA-63t	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F011	11.6 L	2.00	22.3 VL	2.00	50.5 L	3.00	84.9 L	3.00
F038	15.	6.00	31.	8.00	59.	6.00	97.	5.00
F060	14.	5.00	30.	5.00	58.	5.00	100.	6.50
F093	13.0	4.00	28.2	4.00	55.2	4.00	90.6	4.00
F094	15.2 H	7.00	30.9	7.00	59.6	7.00	100.	6.50
F096	<20.	0.00	37.7 VH	9.00	70.4 VH	8.00	103.9	8.00
F133	9.33 EL	1.00	20.9 VL	1.00	46.3 VL	2.00	77.9 VL	2.00
F137	12.1	3.00	23.8 VL	3.00	41.8 VL	1.00	70.4 VL	1.00
F145	16.52 VH	8.00	30.33	6.00	80.7 EH	9.00	105.7 H	9.00
MEDIAN	13.5000		30.0000		58.0000		97.0000	
1CRIT	1.5400		2.8600		5.1000		8.2200	
N	6		7		7		7	
MEAN	13.4833		28.0757		57.0000		93.4714	
3STDEV	4.1003		9.9479		21.2526		26.1196	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F011	27.00	2.700	10	L VH VLL VLL L				ICPMS
F038	39.00	4.333	9	VLL H				ICP
F060	25.50	5.100	5					ICP - Hydride
F093	34.00	4.250	8					ICP-MS
F094	59.50	6.611	9	EHH H VHH				ICP
F096	33.00	8.250	4	EH VHVH				ICP-MS
F133	14.00	1.556	9	VLL VLELVLVLVL				ICP-MS
F137	28.00	2.800	10	L L VLVLVL				HG-AAS
F145	66.00	6.600	10	VHVHVH EHH				

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

OVERALL AVERAGE RANK IS 4.405

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F133	14.00	1.556	9	VLLVLELVLVLVL				ICP-MS
F011	27.00	2.700	10	LVHVLLVLLL				
F137	28.00	2.800	10	LLVLVLVL				ICP-MS
F093	34.00	4.250	8					ICP - Hydride
F038	39.00	4.333	9	VLLH				ICPMS
F060	25.50	5.100	5					ICP
F145	66.00	6.600	10	VHVHVHEHH				HG-AAS
F094	59.50	6.611	9	EHHHVHH				ICP-MS
F096	33.00	8.250	4	EHVHVH				ICP

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

OVERALL AVERAGE RANK IS 4.405

Bismuth

PARAMETER: 48095 Cadmium ug/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Elements

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

SAMPLE	1 = TM-FSKEN		2 = TM-24.2		3 = TM-27.2		4 = TM-26.2		5 = TM-28.2		6 = TMDA-51.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	<1.0	0.00	4.2	21.00	1.2	13.00	6.6	9.00	1.4	23.50	24.4	6.50
F003	<0.1	0.00	4.2	21.00	1.2	13.00	6.9	21.50	1.3	14.50	25.	18.50
F009	<1.	0.00	4.1	14.00	1.2	13.00	6.8	19.50	1.3	14.50	25.	18.50
F010	<0.3	0.00	4.2	21.00	1.1	6.50	6.7	13.00	1.3	14.50	24.8	12.00
F011	<0.1	0.00	4.	9.00	1.2	13.00	6.6	9.00	1.3	14.50	24.9	14.00
F012	<5.	0.00	9. EH	35.00	5. EH	33.00	13. EH	35.00	6. EH	33.00	37. EH	35.00
F014	<0.1	0.00	4.6	27.00	1.3	23.50	7.5	30.50	1.4	23.50	27.6 H	32.00
F015	<0.2	0.00	4.4	25.00	1.3	23.50	6.7	13.00	1.4	23.50	25.	18.50
F019	<4.	0.00	6. EH	34.00	<4.	0.00	8.	33.50	<4.	0.00	26.	27.00
F024	<1.	0.00	3.	2.00	<1.	0.00	6.	2.50	<1.	0.00	24.	4.00
F025	<0.2	0.00	3.7	4.00	1.1	6.50	6.7	13.00	0.5 EL	1.00	23.2	3.00
F026	0.1403	6.00	5.1175	33.00	1.5488	29.00	6.1280	4.00	1.7137	31.00	24.58	9.00
F031	<1.	0.00	4.	9.00	1.	4.00	6.	2.50	1.	4.50	22. L	1.00
F032	<1.	0.00	3.98	6.00	1.21	17.50	6.74	16.00	1.32	19.50	25.	18.50
F032b	<0.5	0.00	4.06	11.00	1.22	19.00	6.77	17.50	1.34	21.00	25.7	26.00
F037	0.1457	7.00	3.99	7.00	1.452	28.00	7.789	32.00	1.562	29.00	28.56 H	34.00
F038	<0.05	0.00	4.13	18.00	1.24	20.00	6.62	11.00	1.27	10.00	24.4	6.50
F046	<0.04	0.00	4.12	17.00	1.21	17.50	6.73	15.00	1.31	18.00	25.0	18.50
F048	<1.0	0.00	4.63	28.00	1.45	27.00	7.48	29.00	1.57	30.00	28.05 H	33.00
F060	<0.5	0.00	4.2	21.00	1.2	13.00	7.0	24.50	1.3	14.50	25.6	25.00
F093	<0.4	0.00	4.1	14.00	1.4	26.00	6.6	9.00	1.1	8.00	24.7	10.00
F094	<0.1	0.00	4.2	21.00	1.2	13.00	6.8	19.50	1.3	14.50	25.3	24.00
F095	0.3	8.00	4.1	14.00	0.7	1.00	6.9	21.50	0.9	2.00	25.2	23.00
F096	<0.1	0.00	4.10	14.00	1.19	9.00	6.77	17.50	1.32	19.50	24.8	12.00
F133	<0.1	0.00	4.5	26.00	1.3	23.50	7.2	28.00	1.5	27.50	26.3	30.00
F136	<0.05	0.00	3.27	3.00	0.97	2.00	5.77	1.00	1.05	7.00	24.5	8.00
F137	0.02	5.00	4.00	9.00	1.20	13.00	6.53	7.00	1.28	11.00	24.8	12.00
F138	<0.003	0.00	3.86	5.00	1.12	8.00	6.38	5.00	1.25	9.00	24.3	5.00
F139	0.016	4.00	4.35	24.00	1.28	21.00	7.17	27.00	1.42	26.00	26.22	29.00
F141	<8.	0.00	<8.	0.00	<8.	0.00	<8.	0.00	<8.	0.00	<8. EL	0.00
F142a	0.	2.00	1. EL	1.00	1.	4.00	7.	24.50	1.	4.50	25.	18.50
F142b	1. EH	9.00	5.	31.00	2.	31.00	8.	33.50	2. EH	32.00	27.	31.00
F142c	0.	2.00	5.	31.00	2.	31.00	7.	24.50	1.	4.50	25.	18.50
F142d	0.	2.00	5.	31.00	2.	31.00	7.	24.50	1.	4.50	25.	18.50
F143	<0.5	0.00	4.1	14.00	1.3	23.50	6.5	6.00	1.4	23.50	22.2 L	2.00
F145	<0.8	0.00	4.9	29.00	1.	4.00	7.5	30.50	1.5	27.50	26.2	28.00
MEDIAN	0.0200		4.1300		1.2100		6.7700		1.3000		25.0000	
1CRIT	1.0000		1.1878		1.0126		1.3462		1.0180		2.4400	
N	8		33		31		33		31		33	
MEAN	0.0778		4.2760		1.2933		6.8820		1.3163		25.2518	
3STDEV	0.3060		1.6317		0.7967		1.4603		0.6725		3.7363	

PARAMETER: 48095 Cadmium ug/L

SAMPLE	7 = TMDA-53.2		8 = TMDA-61t		9 = TMDA-62t		10 = TMDA-63t	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	122.0	21.00	62.0	24.50	98.0	20.00	180.0	20.50
F003	121.	18.50	59.	9.50	93.	5.50	174.	12.00
F009	119.	9.50	61.	19.50	93.	5.50	165.	4.00
F010	120.	13.00	60.	12.50	95.	12.00	174.	12.00
F011	118.	7.00	58.2	5.50	94.5	11.00	164. L	3.00
F012	155. EH	36.00	82. EH	36.00	136. EH	36.00	221. EH	36.00
F014	120.	13.00	58.2	5.50	93.2	7.50	171.	7.50
F015	123.	23.50	63.	26.50	100.	25.50	183.	24.00
F019	123.	23.50	64.	30.00	101.	27.50	183.	24.00
F024	125.	27.00	61.	19.50	99.	22.00	180.	20.50
F025	125.	27.00	57.6	4.00	101.	27.50	196. VH	34.00
F026	115.39	2.00	57.44	3.00	90.48	3.00	162.42 L	2.00
F031	104. EL	1.00	52. EL	1.00	80. EL	1.00	143. EL	1.00
F032	121.	18.50	59.1	11.00	93.2	7.50	168.	5.00
F032b	123.	23.50	60.0	12.50	99.6	24.00	184.	27.00
F037	138. EH	35.00	68.98 VH	35.00	110. VH	35.00	203. VH	35.00
F038	118.	7.00	61.1	22.00	97.5	19.00	175.	15.50
F046	120.	13.00	60.2	15.00	96.5	16.00	177.	19.00
F048	133.6 VH	34.00	67.37 H	34.00	107.5 VH	33.00	189.7 H	31.00
F060	128.	30.50	62.0	24.50	98.9	21.00	186.	28.00
F093	120.9	16.00	59.0	9.50	95.1	13.00	175.3	18.00
F094	123.	23.50	61.4	23.00	99.4	23.00	182.	22.00
F095	120.	13.00	60.4	16.00	95.8	15.00	175.	15.50
F096	118.0	7.00	60.9	17.00	92.7	4.00	171.0	7.50
F133	129.8 H	32.00	64.1	31.00	102.8	31.00	190.0 H	32.00
F136	120.	13.00	58.6	7.50	93.6	9.00	172.	10.00
F137	116.	4.50	58.6	7.50	93.9	10.00	171.	7.50
F138	116.	4.50	60.1	14.00	95.3	14.00	174.	12.00
F139	125.495	29.00	63.11	28.00	101.64	30.00	186.04	29.00
F141	131. H	33.00	66. H	33.00	108. VH	34.00	193. H	33.00
F142a	125.	27.00	63.	26.50	100.	25.50	183.	24.00
F142b	128.	30.50	65.	32.00	105. H	32.00	187.	30.00
F142c	121.	18.50	61.	19.50	97.	17.50	175.	15.50
F142d	121.	18.50	61.	19.50	97.	17.50	175.	15.50
F143	119.	9.50	56.6	2.00	87.7 L	2.00	171.	7.50
F145	115.7	3.00	63.2	29.00	101.5	29.00	183.1	26.00
MEDIAN	121.0000		61.0000		97.2500		176.1500	
1CRIT	8.2000		4.6000		6.7750		11.5090	
N	34		34		34		34	
MEAN	122.4378		61.2412		97.8771		178.7812	
3STDEV	15.3281		8.4161		14.8478		27.4032	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	159.00	17.667	9					AAS
F003	134.00	14.889	9					ICP-OES
F009	118.00	13.111	9					
F010	116.50	12.944	9					ICP-OES
F011	86.00	9.556	9	L				
F012	315.00	35.000	9	EHEHEHEHEHEHEHEH	BIASED HIGH	24.96	5.2142	ICPMS
F014	170.00	18.889	9	H				ICP-MS
F015	203.00	22.556	9					GFAA, ICP
F019	199.50	28.500	7	EH	BIASED HIGH*	2.61	0.9802	ICP
F024	97.50	13.929	7					ICP-AES
F025	120.00	13.333	9	EL VH				ICP-MS
F026	122.00	12.200	10	L				GFAAS, ICP
F031	25.00	2.778	9	L ELELELEL	BIASED LOW	-17.79	0.7795	ICP
F032	119.50	13.278	9					ICP-AES
F032b	181.50	20.167	9					ICP-MS
F037	277.00	27.700	10	H EHVHVHVH	BIASED HIGH	14.71	-0.2978	ICP-MS
F038	129.00	14.333	9					ICPMS
F046	149.00	16.556	9					ICP-MS
F048	279.00	31.000	9	H VHH VHH	BIASED HIGH	8.54	0.5942	ICP
F060	202.00	22.444	9					ICP
F093	123.50	13.722	9					ICP
F094	183.50	20.389	9					ICP-MS
F095	129.00	12.900	10					ICP - USN
F096	107.50	11.944	9					ICP-MS
F133	261.00	29.000	9	H H	BIASED HIGH	7.47	-0.3527	ICP-MS
F136	60.50	6.722	9		BIASED LOW*	-1.87	-0.5364	GFAAS, FAAS
F137	86.50	8.650	10					ICP-MS
F138	76.50	8.500	9					ICP-MS
F139	247.00	24.700	10					ICP-MS
F141	133.00	33.250	4	ELH H VHH	INSUFFICIENT DATA			ICP-OES
F142a	157.50	15.750	10	EL				Flame AAS
F142b	292.00	29.200	10	EH EH H	BIASED HIGH	5.78	0.7603	Flame AAS
F142c	182.50	18.250	10					Flame AAS
F142d	182.50	18.250	10					Flame AAS
F143	90.00	10.000	9	L L				ICP
F145	206.00	22.889	9					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 17.657

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F031	25.00	2.778	9	LELELELEL	BIASED LOW	-17.79	0.7795	ICP
F136	60.50	6.722	9		BIASED LOW*	-1.87	-0.5364	GFAAS, FAAS
F138	76.50	8.500	9					ICP-MS
F137	86.50	8.650	10					ICP-MS
F011	86.00	9.556	9	L				ICP
F143	90.00	10.000	9	LL				ICP-MS
F096	107.50	11.944	9					GFAAS, ICP
F026	122.00	12.200	10	L				ICP - USN
F095	129.00	12.900	10					ICP-OES
F010	116.50	12.944	9					
F009	118.00	13.111	9					ICP-AES
F032	119.50	13.278	9					ICP-MS
F025	120.00	13.333	9	ELVH				ICP
F093	123.50	13.722	9					ICP-AES
F024	97.50	13.929	7					ICPMS
F038	129.00	14.333	9					ICP-OES
F003	134.00	14.889	9					Flame AAS
F142a	157.50	15.750	10	EL				ICP-MS
F046	149.00	16.556	9					AAS
F002	159.00	17.667	9					Flame AAS
F142c	182.50	18.250	10					Flame AAS
F142d	182.50	18.250	10					ICP-MS
F014	170.00	18.889	9	H				ICP-MS
F032b	181.50	20.167	9					ICP-MS
F094	183.50	20.389	9					ICP
F060	202.00	22.444	9					GFAA, ICP
F015	203.00	22.556	9					ICP-AES
F145	206.00	22.889	9					ICP-MS
F139	247.00	24.700	10					ICP-MS
F037	277.00	27.700	10	HEHVHVHVH	BIASED HIGH	14.71	-0.2978	ICP
F019	199.50	28.500	7	EH	BIASED HIGH*	2.61	0.9802	ICP-MS
F133	261.00	29.000	9	HH	BIASED HIGH	7.47	-0.3527	Flame AAS
F142b	292.00	29.200	10	EHEHH	BIASED HIGH	5.78	0.7603	ICP
F048	279.00	31.000	9	HVHHVHH	BIASED HIGH	8.54	0.5942	ICP-OES
F141	133.00	33.250	4	ELHHVHH	INSUFFICIENT DATA			ICPMS
F012	315.00	35.000	9	EHEHEHEHEHEHEHEHEH	BIASED HIGH	24.96	5.2142	

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

OVERALL AVERAGE
RANK IS 17.657

Cadmium

PARAMETER: 24095 Chromium ug/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Elements

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.5000 BASIC ACCEPTABLE ERROR= 1.5000 CONCENTRATION ERROR INCREMENT= 0.0600

SAMPLE	1 = TM-FSKEN		2 = TM-24.2		3 = TM-27.2		4 = TM-26.2		5 = TM-28.2		6 = TMDA-51.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	<0.2	0.00	4.5	15.00	1.7	12.00	10.8	15.00	4.6	13.00	62.	16.50
F009	<1.	0.00	3.9	7.00	1.6	9.00	9.8	6.00	4.1	7.00	56. L	4.00
F010	<1.	0.00	4.8	22.00	1.9	17.50	10.8	15.00	4.4	11.00	63.	21.00
F011	0.2	6.00	4.6	18.50	1.9	17.50	11.	19.00	4.8	17.00	59.8	9.50
F012	<5.	0.00	6.	32.00	<5.	0.00	13.	35.00	6.	32.00	68. H	32.00
F014	<0.5	0.00	5.3	28.00	2.1	26.00	12.4	33.00	5.4	29.00	68.2 H	33.00
F015	<0.5	0.00	4.9	24.00	2.	22.00	12.	30.00	5.2	27.00	62.	16.50
F019	<6.	0.00	<6.	0.00	<6.	0.00	10.	9.00	<6.	0.00	62.	16.50
F024	<1.	0.00	4.	9.00	2.	22.00	11.	19.00	5.	20.00	65.	27.00
F025	<1.	0.00	4.	9.00	2.	22.00	10.	9.00	5.	20.00	66.	31.00
F031	<1.	0.00	4.	9.00	2.	22.00	10.	9.00	5.	20.00	57.	5.00
F032	<1.	0.00	4.59	17.00	1.54	7.00	11.	19.00	5.47	30.00	62.1	19.00
F032b	<5.	0.00	<5.	0.00	<5.	0.00	11.4	26.50	5.22	28.00	63.2	22.00
F037	<1.0	0.00	3.056	5.00	<1.0	0.00	9.924	7.00	3.129 L	5.00	65.5	29.00
F038	<0.5	0.00	4.7	21.00	1.9	17.50	10.8	15.00	4.7	15.00	64.	25.00
F046	<0.2	0.00	4.92	26.00	1.83	15.00	12.3	32.00	5.10	24.50	68.6 H	34.00
F048	<1.0	0.00	4.14	11.00	1.43	5.00	10.40	12.50	4.23	8.00	59.80	9.50
F060	<0.8	0.00	5.4	29.00	1.5	6.00	11.3	24.50	5.1	24.50	65.7	30.00
F093	<1.4	0.00	4.9	24.00	2.3	27.50	9.6	5.00	3.1 L	4.00	58.6	8.00
F094	<0.4	0.00	4.5	15.00	1.8	13.50	11.	19.00	4.7	15.00	62.8	20.00
F095	0.3	7.00	5.8	31.00	1.6	9.00	12.8	34.00	6.5	33.00	63.6	24.00
F096	<2.	0.00	3.6	6.00	<2.	0.00	11.1	23.00	3.4	6.00	65.0	27.00
F131	<15.	0.00	<15.	0.00	<15.	0.00	<15.	0.00	<15.	0.00	18.4 EL	1.00
F133	<0.5	0.00	4.5	15.00	1.8	13.50	11.3	24.50	5.0	20.00	62.0	16.50
F134	0.35	8.00	4.67	20.00	2.02	25.00	11.06	22.00	5.14	26.00	63.28	23.00
F135	<2.	0.00	5.5	30.00	2.3	27.50	12.1	31.00	5.8	31.00	69.5 H	35.00
F136	<0.5	0.00	4.96	27.00	1.90	17.50	11.44	28.00	5.03	23.00	58.5	7.00
F137	-0.5 EL	1.00	4.9	24.00	2.0	22.00	11.	19.00	5.0	20.00	65.	27.00
F138	0.02	5.00	4.34	13.00	1.67	11.00	10.3	11.00	4.42	12.00	57.5	6.00
F139	<0.63	0.00	6.96 H	33.00	0.86 EL	3.00	11.54	29.00	4.24	9.00	205.4 EH	36.00
F141	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10. EL	0.00
F142a	2. EH	9.00	1. VL	2.00	0. EL	1.50	8. L	4.00	1. EL	1.00	55. L	2.00
F142b	0.	3.00	2. VL	4.00	0. EL	1.50	7. VL	2.00	7. H	34.00	60.	12.00
F142c	0.	3.00	1. VL	2.00	3. EH	29.50	7. VL	2.00	2. VL	2.50	60.	12.00
F142d	0.	3.00	1. VL	2.00	3. EH	29.50	7. VL	2.00	2. VL	2.50	60.	12.00
F143	<1.	0.00	4.6	18.50	1.6	9.00	10.4	12.50	4.7	15.00	55.3 L	3.00
F145	<0.4	0.00	4.3	12.00	1.3	4.00	11.4	26.50	4.3	10.00	60.2	14.00
MEDIAN	0.0200		4.5900		1.8650		11.0000		4.9000		62.0500	
1CRIT	1.5000		1.6854		1.5219		2.0700		1.7040		5.1330	
N	7		32		26		34		32		34	
MEAN	0.1243		4.1993		1.7904		10.5578		4.6181		62.1818	
3STDEV	0.4314		3.8151		0.9213		4.2842		2.9547		11.2395	

PARAMETER: 24095 Chromium ug/L

SAMPLE	7 = TMDA-53.2		8 = TMDA-61t		9 = TMDA-62t		10 = TMDA-63t	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	307.	13.00	65.	17.50	94.	15.00	181.	17.00
F009	281. VL	3.00	57. VL	6.00	83. VL	1.00	162. VL	3.00
F010	314.	25.00	66.	21.00	95.	18.50	183.	19.00
F011	305.	10.00	64.4	15.50	93.4	14.00	182.	18.00
F012	322.	31.00	73. H	35.00	104. H	34.50	195.	34.00
F014	312.	18.00	64.2	14.00	94.3	17.00	174.	9.00
F015	297.	8.00	64.	13.00	99.	29.50	177.	14.50
F019	312.	18.00	65.	17.50	95.	18.50	177.	14.50
F024	328.	33.00	68.	26.50	99.	29.50	190.	31.00
F025	458. EH	37.00	74. VH	36.00	114. EH	36.00	255. EH	37.00
F031	286. L	4.00	59. L	7.00	84. VL	3.00	164. VL	6.00
F032	314.	25.00	64.4	15.50	92.5	13.00	176.	12.00
F032b	313.	21.00	68.6	29.00	99.4	32.00	187.	26.00
F037	321.	30.00	68.42	28.00	98.8	28.00	194.	33.00
F038	312.	18.00	69.	30.00	97.	25.50	188.	27.50
F046	317.	29.00	71.5 H	33.00	101.	33.00	190.	31.00
F048	298.11	9.00	63.63	12.00	90.38	11.00	173.45	8.00
F060	343. VH	36.00	70.2	31.00	104. H	34.50	201. H	35.00
F093	306.6	11.00	60.4	8.00	88.9	8.00	175.7	11.00
F094	313.	21.00	65.6	19.00	95.5	20.50	184.	20.50
F095	314.	25.00	76.9 VH	37.00	96.3	24.00	186.	25.00
F096	323.6	32.00	67.6	24.00	98.2	27.00	188.6	29.00
F131	104.6 EL	2.00	51.9 VL	2.00	85.4 L	6.00	151.6 VL	2.00
F133	307.	13.00	66.5	22.00	95.5	20.50	176.3	13.00
F134	316.96	28.00	67.86	25.00	99.07	31.00	185.56	24.00
F135	336.2 H	34.00	72.4 H	34.00	90.3	10.00	207.1 VH	36.00
F136	292.	5.00	65.8	20.00	94.2	16.00	188.	27.50
F137	316.	27.00	68.	26.50	97.	25.50	184.	20.50
F138	313.	21.00	61.2	11.00	85.8 L	7.00	171.	7.00
F139	102.2 EL	1.00	70.5	32.00	331.6 EH	37.00	67.4 EL	1.00
F141	340. H	35.00	49. VL	1.00	96.	22.00	190.	31.00
F142a	308.	15.00	55. VL	3.00	89.	9.00	175.	10.00
F142b	307.	13.00	61.	10.00	91.	12.00	179.	16.00
F142c	295.	6.50	56. VL	4.50	84. VL	3.00	163. VL	4.50
F142d	295.	6.50	56. VL	4.50	84. VL	3.00	163. VL	4.50
F143	311.	16.00	60.5	9.00	84.2 VL	5.00	185.	23.00
F145	313.9	23.00	67.3	23.00	96.1	23.00	184.5	22.00
MEDIAN	312.0000		65.6000		95.0000		183.0000	
1CRIT	20.1300		5.3460		7.1100		12.3900	
N	35		35		35		35	
MEAN	305.5706		64.8260		94.4357		180.9089	
3STDEV	110.8177		15.9638		19.3286		33.9908	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	134.00	14.889	9					ICP-OES
F009	46.00	5.111	9	L VLVLVLVL	BIASED LOW	-10.20	-0.6830	
F010	170.00	18.889	9					ICP-OES
F011	145.00	14.500	10					
F012	265.50	33.188	8	H H H	BIASED HIGH*	3.19	3.1676	ICPMS
F014	207.00	23.000	9	H				ICP-MS
F015	184.50	20.500	9					GFAA, ICP
F019	94.00	15.667	6					ICP
F024	217.00	24.111	9					ICP-AES
F025	237.00	26.333	9	EHVHEHEH				ICP
F031	85.00	9.444	9	L L VLVL				ICP
F032	157.50	17.500	9					ICP-AES
F032b	184.50	26.357	7					ICP-MS
F037	165.00	20.625	8	L				ICP-MS
F038	194.50	21.611	9					ICPMS
F046	257.50	28.611	9	H H	BIASED HIGH*	1.80	2.1048	ICP-MS
F048	86.00	9.556	9					ICP
F060	250.50	27.833	9	VH H H	BIASED HIGH	10.11	-0.8484	ICP
F093	106.50	11.833	9	L				ICP
F094	163.50	18.167	9					ICP-MS
F095	249.00	24.900	10	VH				ICP - USN
F096	174.00	21.750	8					ICP
F131	13.00	2.600	5	ELELVLL VL	BIASED LOW	-69.08	37.9970	ICP
F133	158.00	17.556	9					ICP-MS
F134	232.00	23.200	10					GFAAS
F135	268.50	29.833	9	H H H VH	BIASED HIGH	8.49	-0.1790	AAS-ETA
F136	171.00	19.000	9					GFAAS, DCP
F137	212.50	21.250	10	EL				ICP-MS
F138	104.00	10.400	10	L				ICP-MS
F139	181.00	20.111	9	H EL EHEL EHEL				ICP-OES
F141	89.00	22.250	4	ELH VL	INSUFFICIENT DATA			ICP-OES
F142a	56.50	5.650	10	EHVLELL ELL VL	BIASED LOW*	-1.16	-3.7463	Flame AAS
F142b	107.50	10.750	10	VLELVLH				Flame AAS
F142c	69.50	6.950	10	VLEHVLVL VLVLVL	BIASED LOW	-6.13	-2.3630	Flame AAS
F142d	69.50	6.950	10	VLEHVLVL VLVLVL	BIASED LOW	-6.13	-2.3630	Flame AAS
F143	111.00	12.333	9	L VL				ICP
F145	157.50	17.500	9					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 17.766

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F131	13.00	2.600	5	ELELVLLVL	BIASED LOW	-69.08	37.9970	ICP
F009	46.00	5.111	9	LVLVLVLVL	BIASED LOW	-10.20	-0.6830	
F142a	56.50	5.650	10	EHVLELLELLVL	BIASED LOW*	-1.16	-3.7463	Flame AAS
F142c	69.50	6.950	10	VLEHVLVLVLVLVL	BIASED LOW	-6.13	-2.3630	Flame AAS
F142d	69.50	6.950	10	VLEHVLVLVLVLVL	BIASED LOW	-6.13	-2.3630	Flame AAS
F031	85.00	9.444	9	LLVLVL				ICP
F048	86.00	9.556	9					ICP
F138	104.00	10.400	10	L				ICP-MS
F142b	107.50	10.750	10	VLELVLH				Flame AAS
F093	106.50	11.833	9	L				ICP
F143	111.00	12.333	9	LVL				ICP
F011	145.00	14.500	10					ICP-OES
F003	134.00	14.889	9					ICP
F019	94.00	15.667	6					ICP-AES
F032	157.50	17.500	9					ICP-AES
F145	157.50	17.500	9					ICP-MS
F133	158.00	17.556	9					ICP-MS
F094	163.50	18.167	9					ICP-OES
F010	170.00	18.889	9					GFAAS, DCP
F136	171.00	19.000	9					ICP-OES
F139	181.00	20.111	9	HELEHELEHEL				GFAA, ICP
F015	184.50	20.500	9					ICP-MS
F037	165.00	20.625	8	L				ICP-MS
F137	212.50	21.250	10	EL				ICPMS
F038	194.50	21.611	9					ICP
F096	174.00	21.750	8					ICP-OES
F141	89.00	22.250	4	ELHVL	INSUFFICIENT DATA			ICP-MS
F014	207.00	23.000	9	H				GFAAS
F134	232.00	23.200	10					ICP-AES
F024	217.00	24.111	9					ICP - USN
F095	249.00	24.900	10	VH				ICP
F025	237.00	26.333	9	EHVHEHEH				ICP-MS
F032b	184.50	26.357	7					ICP
F060	250.50	27.833	9	VHHH	BIASED HIGH	10.11	-0.8484	ICP-MS
F046	257.50	28.611	9	HH	BIASED HIGH*	1.80	2.1048	AAS-ETA
F135	268.50	29.833	9	HHHVH	BIASED HIGH	8.49	-0.1790	ICPMS
F012	265.50	33.188	8	HHH	BIASED HIGH*	3.19	3.1676	

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

OVERALL AVERAGE
RANK IS 17.766

PARAMETER: 27095 Cobalt ug/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Elements

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.5000 BASIC ACCEPTABLE ERROR= 1.5000 CONCENTRATION ERROR INCREMENT= 0.0600

SAMPLE	1 = TM-FSKEN		2 = TM-24.2		3 = TM-27.2		4 = TM-26.2		5 = TM-28.2		6 = TMDA-51.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	0.1	4.00	5.9	10.00	2.2	6.50	7.9	7.00	3.6	9.00	71.	12.50
F009	<1.	0.00	4.9	2.00	2.	3.50	6.8	2.00	3.1	4.00	59. VL	2.00
F010	<1.	0.00	6.6	23.00	2.2	6.50	8.2	14.00	3.8	15.50	72.	17.50
F011	<0.1	0.00	6.	12.50	2.4	12.50	8.1	10.50	3.7	12.00	69.9	8.00
F012	<5.	0.00	7.	25.00	<5.	0.00	10. EH	25.50	5. EH	24.50	77.	27.00
F015	<5.	0.00	8. EH	26.50	<5.	0.00	<5. EL	0.00	<5.	0.00	69.	7.00
F019	<5.	0.00	8. EH	26.50	<5.	0.00	10. EH	25.50	5. EH	24.50	73.	21.00
F024	<1.	0.00	5.	3.00	2.	3.50	8.	8.50	3.	3.00	72.	17.50
F025	0.3	5.00	4.4 EL	1.00	1.8	2.00	6.0 EL	1.00	2.7	1.00	68.2	6.00
F032	<2.	0.00	6.16	15.00	2.74	21.00	8.7	22.00	4.31	23.00	71.4	15.00
F032b	<1.	0.00	6.46	22.00	2.57	17.00	8.59	17.00	3.96	20.00	73.2	22.00
F038	<0.1	0.00	5.8	8.00	2.3	10.50	7.8	6.00	3.5	8.00	71.	12.50
F046	<0.1	0.00	6.40	19.50	2.51	15.00	8.67	20.00	3.88	17.00	76.4	26.00
F048	<1.0	0.00	5.12	4.00	1.48	1.00	7.28	4.00	2.73	2.00	70.68	10.00
F060	<0.7	0.00	6.3	17.50	2.7	20.00	8.7	22.00	4.0	21.00	75.2	25.00
F093	<1.8	0.00	6.4	19.50	4.2 EH	23.00	8.0	8.50	3.7	12.00	70.6	9.00
F094	<0.1	0.00	6.	12.50	2.4	12.50	8.2	14.00	3.7	12.00	71.9	16.00
F095	0.5	6.00	6.3	17.50	2.9	22.00	8.2	14.00	4.1	22.00	72.3	20.00
F096	<3.	0.00	5.8	8.00	4.6 EH	24.00	8.6	18.00	<3.	0.00	72.2	19.00
F131	<8.2	0.00	<8.2	0.00	<8.2	0.00	<8.2	0.00	<8.2	0.00	19.2 EL	1.00
F133	0.06	3.00	5.95	11.00	2.29	9.00	8.16	12.00	3.61	10.00	71.3	14.00
F135	<2.	0.00	6.7	24.00	2.6	18.50	8.7	22.00	3.9	18.50	73.9	24.00
F136	<0.5	0.00	6.03	14.00	2.24	8.00	8.10	10.50	3.42	7.00	67.2	5.00
F137	0.049	2.00	6.41	21.00	2.55	16.00	8.61	19.00	3.90	18.50	77.9 H	28.00
F138	0.03	1.00	5.44	5.00	2.12	5.00	7.41	5.00	3.30	5.50	62.1 VL	3.00
F139	<19.	0.00	6.23	16.00	2.421	14.00	8.39	16.00	3.79	14.00	73.89	23.00
F141	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	82. VH	29.00
F143	<1.	0.00	5.6	6.00	2.3	10.50	8.8	24.00	3.8	15.50	62.7 VL	4.00
F145	<0.5	0.00	5.8	8.00	2.6	18.50	7.	3.00	3.3	5.50	70.7	11.00
MEDIAN	0.0800		6.0300		2.4000		8.2000		3.7000		71.4000	
1CRIT	1.5000		1.7718		1.5540		1.9020		1.6320		5.6940	
N	4		24		22		23		22		27	
MEAN	0.1273		6.0125		2.4564		8.1265		3.6409		70.9507	
3STDEV	-		1.5487		1.3815		1.6485		1.1080		12.6762	

PARAMETER: 27095 Cobalt ug/L

SAMPLE	7 = TMDA-53.2		8 = TMDA-61t		9 = TMDA-62t		10 = TMDA-63t	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	252.	9.00	65.	15.00	98.	9.50	192.	12.00
F009	21. EL	1.00	52. EL	2.00	81. EL	1.00	161. VL	2.00
F010	255.	15.00	65.	15.00	99.	11.00	194.	13.00
F011	253.	10.00	63.8	11.00	99.4	13.00	186.	7.00
F012	258.	18.00	70.	27.00	106.	28.00	203.	23.50
F015	254.	12.50	62.	7.50	103.	22.50	203.	23.50
F019	261.	22.00	67.	21.00	104.	25.50	198.	17.00
F024	260.	20.00	65.	15.00	100.	15.50	200.	19.50
F025	343. EH	29.00	62.0	7.50	106.	28.00	250. EH	29.00
F032	255.	15.00	63.4	10.00	98.	9.50	188.	8.00
F032b	247.	6.00	64.9	13.00	92.0 L	6.00	170. VL	3.00
F038	254.	12.50	66.	20.00	100.	15.50	195.	14.00
F046	272. H	26.00	69.0	25.00	103.	22.50	201.	21.00
F048	247.0	6.00	64.59	12.00	96.86	8.00	188.2	9.00
F060	276. H	28.00	68.2	24.00	106.	28.00	210.	28.00
F093	253.5	11.00	61.3	5.00	96.5	7.00	191.6	11.00
F094	256.	17.00	65.3	18.00	101.	19.00	200.	19.50
F095	255.	15.00	62.8	9.00	101.	19.00	197.	16.00
F096	260.1	21.00	65.5	19.00	99.1	12.00	196.8	15.00
F131	105.5 EL	2.00	51.5 EL	1.00	87.6 VL	3.00	155.9 EL	1.00
F133	247.	6.00	65.1	17.00	99.7	14.00	182.5 L	6.00
F135	267.2	24.00	71.0 H	28.00	100.3	17.00	205.8	25.00
F136	236. L	3.00	61.8	6.00	91.5 L	5.00	171. VL	4.00
F137	246.	4.00	69.6	26.00	101.	19.00	191.	10.00
F138	250.	8.00	57.0 VL	3.00	85.7 VL	2.00	176. VL	5.00
F139	259.27	19.00	67.29	23.00	103.66	24.00	201.59	22.00
F141	269.	25.00	72. H	29.00	104.	25.50	209.	27.00
F143	273. H	27.00	57.5 L	4.00	90.9 L	4.00	206.	26.00
F145	261.2	23.00	67.1	22.00	101.9	21.00	198.7	18.00
MEDIAN	255.0000		65.0000		100.0000		196.8000	
1CRIT	16.7100		5.3100		7.4100		13.2180	
N	27		27		28		27	
MEAN	251.2137		64.4141		99.1114		193.1922	
3STDEV	89.7990		12.3065		15.6879		36.2676	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	94.50	9.450	10					ICP-OES
F009	19.50	2.167	9	VLELELELVL	BIASED LOW	-67.27	17.6543	
F010	130.50	14.500	9					ICP-OES
F011	96.50	10.722	9					
F012	198.50	24.812	8	EHEH	BIASED HIGH*	1.15	2.7202	ICPMS
F015	99.50	16.583	6	EH EL				ICP
F019	183.00	22.875	8	EH EHEH	BIASED HIGH*	1.13	1.4861	ICP
F024	105.50	11.722	9					ICP-AES
F025	109.50	10.950	10	EL EL EH EH				ICP-MS
F032	138.50	15.389	9					ICP-AES
F032b	126.00	14.000	9	L VL				ICP-MS
F038	107.00	11.889	9					ICPMS
F046	192.00	21.333	9	H				ICP-MS
F048	56.00	6.222	9		BIASED LOW*	-3.27	-0.1546	ICP
F060	213.50	23.722	9	H	BIASED HIGH	7.74	-0.6938	ICP
F093	106.00	11.778	9	EH				ICP
F094	140.50	15.611	9					ICP-MS
F095	160.50	16.050	10					ICP - USN
F096	136.00	17.000	8	EH				ICP
F131	8.00	1.600	5	ELELELVLEL	BIASED LOW	-53.11	19.4048	ICP
F133	102.00	10.200	10	L				ICP-MS
F135	201.00	22.333	9	H	BIASED HIGH*	4.46	-0.0007	AAS-ETA
F136	62.50	6.944	9	L L VL				GFAAS, FAAS
F137	163.50	16.350	10	H				ICP-MS
F138	42.50	4.250	10	VL VLVLVL	BIASED LOW	-5.18	-2.2834	ICP-MS
F139	171.00	19.000	9					ICP
F141	135.50	27.100	5	VH H	BIASED HIGH*	3.54	4.6882	ICP-OES
F143	121.00	13.444	9	VLH L L				ICP
F145	130.00	14.444	9					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 14.032

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F131	8.00	1.600	5	ELELELVLEL	BIASED LOW	-53.11	19.4048	ICP
F009	19.50	2.167	9	VLELELELVL	BIASED LOW	-67.27	17.6543	
F138	42.50	4.250	10	VLVLVLVL	BIASED LOW	-5.18	-2.2834	ICP-MS
F048	56.00	6.222	9		BIASED LOW*	-3.27	-0.1546	ICP
F136	62.50	6.944	9	LLVL				GFAAS, FAAS
F003	94.50	9.450	10					ICP-OES
F133	102.00	10.200	10	L				ICP-MS
F011	96.50	10.722	9					
F025	109.50	10.950	10	ELELEHEH				ICP-MS
F024	105.50	11.722	9					ICP-AES
F093	106.00	11.778	9	EH				ICP
F038	107.00	11.889	9					ICPMS
F143	121.00	13.444	9	VLHLL				ICP
F032b	126.00	14.000	9	LVL				ICP-MS
F145	130.00	14.444	9					ICP-AES
F010	130.50	14.500	9					ICP-OES
F032	138.50	15.389	9					ICP-AES
F094	140.50	15.611	9					ICP-MS
F095	160.50	16.050	10					ICP - USN
F137	163.50	16.350	10	H				ICP-MS
F015	99.50	16.583	6	EHEL				ICP
F096	136.00	17.000	8	EH				ICP
F139	171.00	19.000	9					ICP
F046	192.00	21.333	9	H				ICP-MS
F135	201.00	22.333	9	H	BIASED HIGH*	4.46	-0.0007	AAS-ETA
F019	183.00	22.875	8	EHEHEH	BIASED HIGH*	1.13	1.4861	ICP
F060	213.50	23.722	9	H	BIASED HIGH	7.74	-0.6938	ICP
F012	198.50	24.812	8	EHEH	BIASED HIGH*	1.15	2.7202	ICPMS
F141	135.50	27.100	5	VHH	BIASED HIGH*	3.54	4.6882	ICP-OES

* 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 14.032

Cobalt

PARAMETER: 29095 Copper ug/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Elements

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.5000 BASIC ACCEPTABLE ERROR= 1.5000 CONCENTRATION ERROR INCREMENT= 0.0600

SAMPLE	1 = TM-FSKEN		2 = TM-24.2		3 = TM-27.2		4 = TM-26.2		5 = TM-28.2		6 = TMDA-51.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	8.1	20.50	7.5	19.50	4.7	17.00	14.8	23.00	6.0	12.50	90.0	16.50
F003	8.0	16.00	7.8	23.50	4.8	19.00	14.5	21.00	6.6	23.00	90.	16.50
F009	8.	16.00	6.5	8.00	4.3	10.50	13.	9.00	5.6	7.00	82. L	3.00
F010	7.	6.50	7.	13.50	4.	7.00	14.	15.50	6.	12.50	90.	16.50
F011	7.7	10.00	7.5	19.50	4.7	17.00	14.3	20.00	6.3	20.50	88.6	10.00
F012	11. VH	34.00	10. H	32.00	7. H	31.00	18. VH	34.00	9. VH	32.00	101. VH	35.50
F014	8.6	27.00	7.9	25.50	5.1	26.00	15.4	28.00	6.8	25.00	96.8	30.00
F015	7.5	8.00	6.3	7.00	3.8	5.00	13.9	12.00	5.3	5.00	94.	29.00
F019	8.	16.00	7.	13.50	<5.	0.00	12.	3.00	<5.	0.00	90.	16.50
F024	8.	16.00	7.	13.50	5.	23.50	15.	25.50	6.	12.50	97.	32.00
F025	7.	6.50	38. EH	36.00	25. EH	35.00	14.	15.50	12. EH	35.00	101. VH	35.50
F026	9.85	30.00	7.80	23.50	5.58	29.00	14.08	19.00	7.45	29.00	86.09	4.00
F031	9.	29.00	8.	27.50	5.	23.50	15.	25.50	6.	12.50	88.	8.00
F032	8.15	22.00	6.58	9.00	4.36	12.00	12.9	8.00	6.22	19.00	87.7	6.00
F032b	8.49	26.00	7.22	16.00	5.	23.50	15.	25.50	6.5	22.00	90.2	19.00
F037	7.789	11.00	5.598	5.00	2.995 L	3.00	12.82	7.00	5.04	4.00	91.36	23.00
F038	8.1	20.50	7.4	18.00	4.6	14.00	14.	15.50	6.2	17.50	88.	8.00
F046	10.1 H	33.00	8.44	30.00	5.13	27.00	15.9	31.00	6.86	26.00	98.1 H	34.00
F048	6.05 L	2.00	5.57 L	4.00	2.74 L	2.00	12.73	6.00	4.40 L	3.00	89.49	13.00
F060	8.	16.00	8.	27.50	5.	23.50	15.	25.50	7.	28.00	92.	24.00
F093	6.4	3.00	5.4 L	2.00	2.6 L	1.00	12.6	4.00	3.8 L	2.00	89.1	11.00
F094	8.9	28.00	8.2	29.00	5.3	28.00	15.5	29.00	6.9	27.00	92.2	25.00
F095	7.9	12.00	6.7	10.00	4.3	10.50	13.3	11.00	6.1	16.00	92.3	26.00
F096	8.19	23.00	7.60	21.50	4.85	20.00	14.7	22.00	6.64	24.00	89.5	14.00
F131	13.1 VH	35.00	11.4 VH	34.00	13.1 EH	34.00	18.5 VH	35.00	9.7 VH	33.00	89.2	12.00
F133	8.0	16.00	7.3	17.00	4.6	14.00	15.6	30.00	6.2	17.50	90.3	20.00
F135	15.2 EH	36.00	16.0 EH	35.00	11.3 EH	33.00	25.0 EH	36.00	11.7 EH	34.00	106.5 VH	37.00
F136	7.6	9.00	7.9	25.50	4.6	14.00	14.0	15.50	6.0	12.50	90.7	21.00
F137	8.2	24.50	7.6	21.50	4.7	17.00	14.	15.50	6.3	20.50	93.	27.50
F138	6.95	5.00	6.77	11.00	4.2	9.00	13.2	10.00	5.74	9.00	80.8 L	2.00
F139	48.08 EH	37.00	<14.	0.00	<14.	0.00	<14.	0.00	<14.	0.00	253.8 EH	38.00
F141	<10.	0.00	<10.	0.00	<10.	0.00	<10. VL	0.00	<10.	0.00	66. EL	1.00
F142a	6. L	1.00	4. VL	1.00	4.	7.00	11. L	1.00	2. EL	1.00	93.	27.50
F142b	8.	16.00	7.	13.50	4.	7.00	14.	15.50	6.	12.50	91.	22.00
F142c	10. H	31.50	10. H	32.00	7. H	31.00	16.	32.50	8. H	30.50	97.	32.00
F142d	10. H	31.50	10. H	32.00	7. H	31.00	16.	32.50	8. H	30.50	97.	32.00
F143	8.2	24.50	5.5 L	3.00	4.9	21.00	11.9	2.00	5.7	8.00	86.2	5.00
F145	6.9	4.00	6.1	6.00	3.3	4.00	12.7	5.00	5.5	6.00	88.	8.00
MEDIAN	8.0000		7.4500		4.7000		14.0400		6.2000		90.2500	
1CRIT	1.8900		1.8570		1.6920		2.2524		1.7820		6.8250	
N	35		34		33		34		33		36	
MEAN	8.5134		7.7229		5.1805		14.3626		6.5318		91.5872	
3STDEV	5.2516		5.8710		6.0900		4.4274		4.3648		15.2772	

PARAMETER: 29095 Copper ug/L

SAMPLE LAB NO	7 = TMDA-53.2 REPORTED VALUE	RANK	8 = TMDA-61t REPORTED VALUE	RANK	9 = TMDA-62t REPORTED VALUE	RANK	10 = TMDA-63t REPORTED VALUE	RANK
F002	316.0	16.50	71.0	21.00	110.0	19.50	201.0	18.00
F003	313.	13.50	71.	21.00	110.	19.50	199.	15.50
F009	286. VL	3.00	62. VL	2.00	96. VL	2.00	177. VL	5.00
F010	313.	13.50	617. EH	38.00	106.	10.50	195.	13.00
F011	328.	29.00	69.8	14.00	114.	28.50	202.	20.00
F012	330.	33.00	80. VH	34.00	120. H	34.00	214.	35.00
F014	357. VH	36.00	80.4 VH	35.00	124. VH	36.00	219. H	36.00
F015	329.	31.00	74.	27.00	113.	27.00	204.	23.50
F019	312.	11.50	72.	24.50	110.	19.50	199.	15.50
F024	325.	27.00	76.	31.50	110.	19.50	220. H	37.00
F025	361. VH	37.00	102. EH	37.00	126. VH	37.00	204.	23.50
F026	295.55 L	5.00	65.37	7.00	100.31 L	7.00	182.09 L	7.00
F031	312.	11.50	65. L	6.00	97. VL	4.00	173. VL	3.50
F032	324.	25.50	63.2 L	4.00	96.5 VL	3.00	178. VL	6.00
F032b	310.	9.00	68.6	10.00	98.0 L	5.00	172. VL	2.00
F037	322.	22.00	70.08	17.00	107.	13.00	205.	25.00
F038	304.	7.50	69.	11.00	104.	9.00	191.	11.00
F046	316.	16.50	75.9	30.00	115.	30.00	209.	29.50
F048	311.82	10.00	69.7	13.00	106.4	12.00	196.8	14.00
F060	319.	18.00	76.	31.50	117.	31.50	209.	29.50
F093	315.2	15.00	68.0	9.00	107.9	14.00	199.9	17.00
F094	322.	22.00	73.1	26.00	112.	25.50	213.	34.00
F095	321.	19.00	70.8	18.50	110.	19.50	203.	21.50
F096	304.0	7.50	70.8	18.50	106.0	10.50	194.0	12.00
F131	286.2 VL	4.00	66.7	8.00	100.2 L	6.00	184.8 L	9.00
F133	303.	6.00	69.5	12.00	109.8	15.00	183.3 L	8.00
F135	406.1 EH	38.00	82.6 VH	36.00	121.5 H	35.00	237.2 VH	38.00
F136	329.	31.00	71.4	23.00	114.	28.50	208.	28.00
F137	281. VL	2.00	70.	15.50	110.	19.50	187. L	10.00
F138	323.	24.00	62.0 VL	2.00	95.5 VL	1.00	173. VL	3.50
F139	131.7 EL	1.00	75.5	29.00	442.3 EH	38.00	104.8 EL	1.00
F141	322.	22.00	62. VL	2.00	110.	19.50	203.	21.50
F142a	335.	34.50	72.	24.50	112.	25.50	212.	32.50
F142b	327.	28.00	70.	15.50	111.	24.00	210.	31.00
F142c	335.	34.50	79. H	33.00	118.	33.00	212.	32.50
F142d	329.	31.00	75.	28.00	117.	31.50	207.	26.50
F143	324.	25.50	63.6 L	5.00	103.	8.00	207.	26.50
F145	321.2	20.00	71.	21.00	110.	19.50	201.8	19.00
MEDIAN	321.1000		70.9000		110.0000		201.9000	
1CRIT	20.6760		5.6640		8.0100		13.5240	
N	36		37		36		36	
MEAN	318.3881		71.7311		109.7947		198.5747	
3STDEV	49.0154		21.5366		22.0474		39.5509	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	184.00	18.400	10					AAS
F003	188.50	18.850	10					ICP-OES
F009	65.50	6.550	10	L VLVLVLVL	BIASED LOW	-11.40	0.0989	
F010	146.50	14.650	10	EH				ICP-OES
F011	188.50	18.850	10					
F012	334.50	33.450	10	VHH H VHVHVH VHH	BIASED HIGH*	2.68	4.3065	ICPMS
F014	304.50	30.450	10	VHVHVHH	BIASED HIGH	10.62	-0.2132	ICP-MS
F015	174.50	17.450	10					GFAA, ICP
F019	120.00	15.000	8					ICP
F024	238.00	23.800	10	H				ICP-AES
F025	298.00	29.800	10	EHEH EHVHVHEHVH	BIASED HIGH	5.55	10.9103	ICP
F026	160.50	16.050	10	L L L				ICP
F031	151.00	15.100	10	L VLVL				ICP
F032	114.50	11.450	10	L VLVL				ICP-AES
F032b	158.00	15.800	10	L VL				ICP-MS
F037	130.00	13.000	10	L				ICP-MS
F038	132.00	13.200	10					ICPMS
F046	287.00	28.700	10	H H				ICP-MS
F048	79.00	7.900	10	L L L L	BIASED LOW*	-2.22	-1.0284	ICP
F060	255.00	25.500	10					ICP
F093	78.00	7.800	10	L L L	BIASED LOW*	-0.94	-1.5795	ICP
F094	273.50	27.350	10					ICP-MS
F095	164.00	16.400	10					ICP - USN
F096	173.00	17.300	10					ICP-MS
F131	210.00	21.000	10	VHVHEHVHVH VL L L				ICP
F133	155.50	15.550	10	L				ICP-MS
F135	358.00	35.800	10	EHEHEHEHEHVHEHVHH VH	BIASED HIGH	21.78	1.6804	AAS-ETA
F136	208.00	20.800	10					GFAAS, FAAS
F137	173.50	17.350	10	VL L				ICP-MS
F138	76.50	7.650	10	L VLVLVL	BIASED LOW*	-3.05	-3.7937	ICP-MS
F139	144.00	24.000	6	EH EHEL EHEL				ICP-OES
F141	66.00	13.200	5	VL EL VL				ICP-OES
F142a	155.50	15.550	10	L VL L EL				Flame AAS
F142b	185.00	18.500	10					Flame AAS
F142c	322.50	32.250	10	H H H H H	BIASED HIGH*	3.86	2.5246	Flame AAS
F142d	306.50	30.650	10	H H H H	BIASED HIGH*	1.86	2.5912	Flame AAS
F143	128.50	12.850	10	L L				ICP
F145	112.50	11.250	10					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 18.970

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F009	65.50	6.550	10	LVLVLVLVL	BIASED LOW	-11.40	0.0989	
F138	76.50	7.650	10	LVLVLVL	BIASED LOW*	-3.05	-3.7937	ICP-MS
F093	78.00	7.800	10	LLL	BIASED LOW*	-0.94	-1.5795	ICP
F048	79.00	7.900	10	LLLL	BIASED LOW*	-2.22	-1.0284	ICP
F145	112.50	11.250	10					ICP-AES
F032	114.50	11.450	10	LVLVL				ICP-AES
F143	128.50	12.850	10	LL				ICP
F037	130.00	13.000	10	L				ICP-MS
F038	132.00	13.200	10					ICPMS
F141	66.00	13.200	5	VLELVL				ICP-OES
F010	146.50	14.650	10	EH				ICP-OES
F019	120.00	15.000	8					ICP
F031	151.00	15.100	10	LVLVL				ICP
F133	155.50	15.550	10	L				ICP-MS
F142a	155.50	15.550	10	LVLLEL				Flame AAS
F032b	158.00	15.800	10	LVL				ICP-MS
F026	160.50	16.050	10	LLL				ICP
F095	164.00	16.400	10					ICP - USN
F096	173.00	17.300	10					ICP-MS
F137	173.50	17.350	10	VLL				ICP-MS
F015	174.50	17.450	10					GFAA, ICP
F002	184.00	18.400	10					AAS
F142b	185.00	18.500	10					Flame AAS
F003	188.50	18.850	10					ICP-OES
F011	188.50	18.850	10					
F136	208.00	20.800	10					GFAAS, FAAS
F131	210.00	21.000	10	VHVHEHVHVHVLLL				ICP
F024	238.00	23.800	10	H				ICP-AES
F139	144.00	24.000	6	EHEHELEHEL				ICP-OES
F060	255.00	25.500	10					ICP
F094	273.50	27.350	10					ICP-MS
F046	287.00	28.700	10	HH				ICP-MS
F025	298.00	29.800	10	EHEHEHVHVHEHVH	BIASED HIGH	5.55	10.9103	ICP
F014	304.50	30.450	10	VHVHVHH	BIASED HIGH	10.62	-0.2132	ICP-MS
F142d	306.50	30.650	10	HHHH	BIASED HIGH*	1.86	2.5912	Flame AAS
F142c	322.50	32.250	10	HHHHH	BIASED HIGH*	3.86	2.5246	Flame AAS
F012	334.50	33.450	10	VHHHVHVHVHVHH	BIASED HIGH*	2.68	4.3065	ICPMS
F135	358.00	35.800	10	EHEHEHEHEHVHEHVHHVH	BIASED HIGH	21.78	1.6804	AAS-ETA

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

OVERALL AVERAGE
RANK IS 18.970

Copper

PARAMETER: 26095 Iron ug/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Elements

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 2.0000 BASIC ACCEPTABLE ERROR= 2.0000 CONCENTRATION ERROR INCREMENT= 0.0800

SAMPLE	1 = TM-FSKEN		2 = TM-24.2		3 = TM-27.2		4 = TM-26.2		5 = TM-28.2		6 = TMDA-51.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	10.5	10.00	10.8	11.50	11.9	15.00	23.7	22.00	17.5	16.50	112.0	19.00
F003	9.6	5.00	11.8	19.00	10.5	13.00	21.3	12.00	16.3	10.00	117.	23.00
F009	23. VH	23.00	14. H	24.00	15. H	24.00	23.	19.00	22. H	24.00	104.	11.00
F010	11.1	14.00	10.8	11.50	11.4	14.00	23.1	20.50	17.5	16.50	116.	21.50
F011	<20.	0.00	<20.	0.00	<20.	0.00	20.	6.50	20.	20.50	120.	29.00
F012	24. VH	24.00	31. VH	29.00	29. EH	30.00	43. VH	31.00	36. VH	30.00	157. EH	37.00
F014	<50.	0.00	<50.	0.00	<50.	0.00	<50.	0.00	<50.	0.00	110.	17.50
F015	11.	12.00	13.	23.00	12.	17.00	26. H	27.00	17.	12.50	121.	32.00
F019	<2. VL	0.00	<2. VL	0.00	<2. VL	0.00	<2. EL	0.00	<2. VL	0.00	87. VL	3.00
F024	11.	12.00	11.	14.50	13.	20.00	24.	24.50	20.	20.50	120.	29.00
F025	<10.	0.00	<10.	0.00	<10.	0.00	<10. VL	0.00	<10. VL	0.00	80. VL	2.00
F026	12.58	18.00	8.80	4.00	9.14 L	6.00	21.00	10.00	14.37	5.00	107.52	14.00
F031	11.	12.00	10.	8.00	10.	8.00	20.	6.50	15.	6.00	102.	9.50
F032	9.3	4.00	9.78	7.00	10.2	11.50	21.9	13.00	16.5	11.00	115.	20.00
F032b	<50.	0.00	<50.	0.00	<50.	0.00	<50.	0.00	20.1	22.00	120.	29.00
F036	10.	7.00	12.	20.50	12.	17.00	22.	15.50	16.	8.50	120.	29.00
F037	30.63 VH	25.00	18.07 VH	25.00	18.86 VH	25.00	32.69 VH	30.00	27.96 VH	26.00	140. VH	35.00
F038	<30.	0.00	<30.	0.00	<30.	0.00	90. EH	33.00	<30.	0.00	120.	29.00
F046	15.4 VH	22.00	7.55 L	2.00	8.40 L	3.00	20.5	8.50	15.8	7.00	107.	13.00
F048	<100.	0.00	<100.	0.00	<100.	0.00	<100.	0.00	<100.	0.00	<100. L	0.00
F060	13.	20.50	12.	20.50	12.	17.00	24.	24.50	18.	18.00	118.	24.50
F093	7.1 L	2.00	8.3	3.00	8.2 L	2.00	19.3	5.00	14.1 L	4.00	109.4	16.00
F094	40. VH	26.00	30. VH	28.00	20. VH	28.00	30. VH	28.00	40. VH	32.00	110.	17.50
F095	11.5	17.00	11.3	18.00	14.1	22.00	22.9	18.00	20.7	23.00	118.	24.50
F096	11.2	15.00	10.7	10.00	13.2	21.00	25.0	26.00	17.0	12.50	121.6	33.00
F131	12.8	19.00	12.7	22.00	12.1	19.00	23.9	23.00	17.3	15.00	99.0 L	5.50
F133	45. VH	27.00	25. VH	26.00	10.	8.00	15. VL	2.50	25. VH	25.00	125. H	34.00
F136	11.3	16.00	11.1	17.00	14.8	23.00	23.1	20.50	17.2	14.00	108.	15.00
F137	71. EH	29.00	39. EH	30.00	38. EH	31.00	48. EH	32.00	51. EH	33.00	144. VH	36.00
F138	<0.65 VL	0.00	1.07 VL	1.00	2.15 VL	1.00	6.23 VL	1.00	3.86 VL	1.00	43.6 EL	1.00
F139	57.1 EH	28.00	27.8 VH	27.00	26.9 VH	29.00	32.1 VH	29.00	36.3 VH	31.00	93.94 VL	4.00
F141	<10.	0.00	<10.	0.00	10.	8.00	17. L	4.00	11. VL	2.00	119.	26.00
F142a	13.	20.50	9.	6.00	9. L	4.50	22.	15.50	13. L	3.00	116.	21.50
F142b	5. VL	1.00	11.	14.50	9. L	4.50	15. VL	2.50	28. VH	27.00	106.	12.00
F142c	10.	7.00	11.	14.50	19. VH	26.50	22.	15.50	34. VH	28.50	102.	9.50
F142d	10.	7.00	11.	14.50	19. VH	26.50	22.	15.50	34. VH	28.50	99. L	5.50
F143	10.1	9.00	10.2	9.00	10.1	10.00	20.5	8.50	16.0	8.50	101. L	7.00
F145	9.2	3.00	8.9	5.00	10.2	11.50	21.2	11.00	18.4	19.00	101.6	8.00
MEDIAN	11.2000		11.0000		12.0000		22.0000		17.5000		112.0000	
1CRIT	2.7360		2.7200		2.8000		3.6000		3.2400		10.8000	
N	27		28		29		31		31		35	
MEAN	16.6819		13.5214		13.4138		24.0384		21.0332		111.7160	
3STDEV	36.5593		19.3559		15.3991		20.5680		22.7757		37.8539	

PARAMETER: 26095 Iron ug/L

SAMPLE LAB NO	7 = TMDA-53.2 REPORTED VALUE	RANK	8 = TMDA-61t REPORTED VALUE	RANK	9 = TMDA-62t REPORTED VALUE	RANK	10 = TMDA-63t REPORTED VALUE	RANK
F002	330.0	17.50	77.0	15.50	119.0	18.00	205.0	16.00
F003	337.	21.00	85.	29.00	123.	22.00	212.	21.50
F009	310.	5.00	79.	20.00	115.	15.00	196.	9.00
F010	340.	22.50	77.	15.50	120.	20.50	210.	20.00
F011	350.	29.00	80.	23.00	130.	29.50	230. H	29.50
F012	475. EH	38.00	115. VH	35.50	179. EH	36.00	305. VH	36.00
F014	367. H	35.00	101. VH	31.00	138. VH	32.00	233. H	31.00
F015	341.	24.50	79.	20.00	125.	24.00	219.	26.00
F019	315.	9.00	65. VL	3.00	94. VL	4.00	183. L	3.00
F024	352.	30.00	81.	24.50	128.	27.50	220.	27.00
F025	310.	5.00	40. VL	2.00	90. VL	2.00	190. L	7.00
F026	311.82	8.00	67.55 L	6.00	105.15 L	7.00	183.08 L	4.00
F031	303. L	3.00	67. L	4.00	104. L	6.00	185. L	6.00
F032	344.	26.00	76.	13.00	119.	18.00	206.	17.00
F032b	310.	5.00	76.	13.00	93. VL	3.00	202.	14.00
F036	346.	27.00	78.	18.00	120.	20.50	216.	25.00
F037	388. VH	37.00	105. VH	33.00	155. VH	35.00	257. VH	33.00
F038	330.	17.50	90. H	30.00	130.	29.50	200.	12.00
F046	325.	12.50	76.0	13.00	115.	15.00	202.	14.00
F048	311.2	7.00	<100.	0.00	<100. VL	0.00	184.35 L	5.00
F060	362.	34.00	83.	28.00	126.	25.50	255. VH	32.00
F093	332.2	19.00	72.4	10.00	115.0	15.00	327.0 EH	37.00
F094	340.	22.50	110. VH	34.00	150. VH	34.00	***** EH	38.00
F095	341.	24.50	79.4	22.00	124.	23.00	215.	23.50
F096	355.8	32.00	82.1	27.00	126.0	25.50	220.4	28.00
F131	277.0 VL	2.00	67.4 L	5.00	101.2 VL	5.00	174.7 VL	2.00
F133	335.	20.00	115. VH	35.50	145. VH	33.00	230. H	29.50
F136	323.	11.00	71.3	9.00	112.	12.00	196.	9.00
F137	356.	33.00	151. EH	37.00	188. EH	37.00	276. VH	35.00
F138	373. H	36.00	29.6 EL	1.00	29.8 EL	1.00	55.2 EL	1.00
F139	251.1 EL	1.00	102.2 VH	32.00	132.8 H	31.00	271.5 VH	34.00
F141	354.	31.00	81.	24.50	128.	27.50	215.	23.50
F142a	347.	28.00	82.	26.00	119.	18.00	212.	21.50
F142b	319.	10.00	79.	20.00	107. L	8.00	202.	14.00
F142c	325.	12.50	71.	7.50	111.	11.00	209.	19.00
F142d	329.	15.00	71.	7.50	110.	10.00	196.	9.00
F143	326.	14.00	73.1	11.00	109.	9.00	197.	11.00
F145	329.8	16.00	77.7	17.00	113.	13.00	206.8	18.00
MEDIAN	333.6000		79.0000		119.0000		209.5000	
1CRIT	28.5280		8.1600		11.3600		18.6000	
N	36		35		35		36	
MEAN	334.6061		80.9186		120.8900		217.8286	
3STDEV	64.7893		44.6506		53.0342		100.0952	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	161.00	16.100	10					AAS
F003	175.50	17.550	10					ICP-OES
F009	174.00	17.400	10	VHH H H				
F010	176.50	17.650	10					ICP-OES
F011	167.00	23.857	7	H				
F012	326.50	32.650	10	VHVHEHVHVHEHEHVHEHVH	BIASED HIGH	38.93	10.6417	ICPMS
F014	146.50	29.300	5	H VHVHH				ICP-OES
F015	218.00	21.800	10	H				ICP
F019	22.00	4.400	5	VLVLVLELVLVL VLVLL	BIASED LOW*	-0.05	-21.7274	ICP
F024	229.50	22.950	10					ICP-AES
F025	18.00	3.600	5	VLVLVL VLVLL	BIASED LOW	5.50	-38.0049	ICP
F026	82.00	8.200	10	L L L L	BIASED LOW	-7.76	-1.3875	ICP
F031	69.00	6.900	10	L L L L	BIASED LOW	-9.74	-0.9554	ICP
F032	140.50	14.050	10					ICP-AES
F032b	86.00	14.333	6	VL				ICP-MS
F036	188.00	18.800	10					Colourimetry
F037	304.00	30.400	10	VHVHVHVHVHVHVHVHVHVH	BIASED HIGH	15.02	10.7208	ICP-MS
F038	151.00	25.167	6	EH H				FAAS
F046	110.00	11.000	10	VHL L				ICP-MS
F048	12.00	6.000	2	L VLL	INSUFFICIENT DATA			ICP
F060	244.50	24.450	10	VH				ICP
F093	113.00	11.300	10	L L L EH				ICP
F094	288.00	28.800	10	VHVHVHVHVH VHVHEH	BIASED HIGH	2479.47	-83.6548	ICP-MS
F095	215.50	21.550	10					ICP - USN
F096	230.00	23.000	10					ICP
F131	117.50	11.750	10	L VLL VLVL				ICP
F133	240.50	24.050	10	VHVH VLVHH VHVHH				ICP-MS
F136	146.50	14.650	10					GFAAS, FAAS
F137	333.00	33.300	10	EHEHEHEHEHVH EHEHVH	BIASED HIGH*	0.97	42.6228	ICP-MS
F138	44.00	4.889	9	VLVLVLVLVLELH ELELEL	BIASED LOW*	-4.60	-36.5488	Colorimetry
F139	246.00	24.600	10	EHVHVHVHVHVLELVHH VH				ICP-MS
F141	146.50	18.312	8	L VL				ICP-OES
F142a	164.50	16.450	10	L L				Flame AAS
F142b	113.50	11.350	10	VL L VLVH L				Flame AAS
F142c	151.50	15.150	10	VH VH				Flame AAS
F142d	139.00	13.900	10	VH VHL				Flame AAS
F143	97.00	9.700	10	L				ICP
F145	121.50	12.150	10					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 17.810

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F025	18.00	3.600	5	VLVLVLVLVLL	BIASED LOW	5.50	-38.0049	ICP
F019	22.00	4.400	5	VLVLVLELVLVLVLVLL	BIASED LOW*	-0.05	-21.7274	ICP
F138	44.00	4.889	9	VLVLVLVLVLELHELELEL	BIASED LOW*	-4.60	-36.5488	Colorimetry
F048	12.00	6.000	2	LVLL	INSUFFICIENT DATA			ICP
F031	69.00	6.900	10	LLLL	BIASED LOW	-9.74	-0.9554	ICP
F026	82.00	8.200	10	LLLL	BIASED LOW	-7.76	-1.3875	ICP
F143	97.00	9.700	10	L				ICP
F046	110.00	11.000	10	VHLL				ICP-MS
F093	113.00	11.300	10	LLLEH				ICP
F142b	113.50	11.350	10	VLLVLVHL				Flame AAS
F131	117.50	11.750	10	LVLLVLVL				ICP
F145	121.50	12.150	10					ICP-AES
F142d	139.00	13.900	10	VHVHL				Flame AAS
F032	140.50	14.050	10					ICP-AES
F032b	86.00	14.333	6	VL				ICP-MS
F136	146.50	14.650	10					GFAAS, FAAS
F142c	151.50	15.150	10	VHVH				Flame AAS
F002	161.00	16.100	10					AAS
F142a	164.50	16.450	10	LL				Flame AAS
F009	174.00	17.400	10	VHHHH				
F003	175.50	17.550	10					ICP-OES
F010	176.50	17.650	10					ICP-OES
F141	146.50	18.312	8	LVL				ICP-OES
F036	188.00	18.800	10					Colourimetry
F095	215.50	21.550	10					ICP - USN
F015	218.00	21.800	10	H				ICP
F024	229.50	22.950	10					ICP-AES
F096	230.00	23.000	10					ICP
F011	167.00	23.857	7	H				
F133	240.50	24.050	10	VHVHVLVHHVHVHH				ICP-MS
F060	244.50	24.450	10	VH				ICP
F139	246.00	24.600	10	EHVHVHVHVHVLELVHHVH				ICP-MS
F038	151.00	25.167	6	EHH				FAAS
F094	288.00	28.800	10	VHVHVHVHVHVHVHEH	BIASED HIGH	2479.47	-83.6548	ICP-MS
F014	146.50	29.300	5	HVHVHH				ICP-OES
F037	304.00	30.400	10	VHVHVHVHVHVHVHVHVHVH	BIASED HIGH	15.02	10.7208	ICP-MS
F012	326.50	32.650	10	VHVHEHVHVHEHEHVHEHVH	BIASED HIGH	38.93	10.6417	ICPMS
F137	333.00	33.300	10	EHEHEHEHEHVHEHEHVH	BIASED HIGH*	0.97	42.6228	ICP-MS

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

OVERALL AVERAGE
RANK IS 17.810

PARAMETER: 82095 Lead ug/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Elements

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.5000 BASIC ACCEPTABLE ERROR= 1.5000 CONCENTRATION ERROR INCREMENT= 0.0600

SAMPLE	1 = TM-FSKEN		2 = TM-24.2		3 = TM-27.2		4 = TM-26.2		5 = TM-28.2		6 = TMDA-51.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	<2.0	0.00	6.1	17.00	3.2	16.50	10.2	23.00	4.2	16.50	71.0	13.00
F003	<0.2	0.00	5.9	10.50	3.4	22.00	9.4	8.00	4.3	20.50	70.	11.50
F009	<1.	0.00	5.3	5.50	2.7	3.00	8.7	3.00	3.5	2.00	64. L	3.00
F010	<0.3	0.00	6.8	23.00	3.5	25.50	11.0	28.00	4.7	25.00	68.	8.00
F011	<0.2	0.00	5.9	10.50	3.1	12.50	2.6 EL	1.00	4.2	16.50	67.2	5.00
F012	<5.	0.00	10. VH	33.00	5. EH	31.50	15. EH	34.00	7. EH	34.00	117. EH	37.00
F014	<1.0	0.00	6.3	20.00	3.3	19.50	10.1	21.00	4.1	13.00	72.2	18.00
F015	<0.5	0.00	7.	26.00	3.4	22.00	11.2	31.50	4.6	24.00	71.4	15.00
F019	<30.	0.00	<30.	0.00	<30.	0.00	<30.	0.00	<30.	0.00	70.	11.50
F024	<2.	0.00	6.	15.00	<2.	0.00	10.	16.00	4.	10.00	74.	27.50
F025	<0.3	0.00	5.9	10.50	3.1	12.50	9.3	5.50	3.9	6.00	73.9	25.50
F026	<2.	0.00	7.4963	29.00	3.6210	28.00	10.79	26.00	4.877	26.00	74.14	29.00
F031	<1.	0.00	7.	26.00	4.	29.50	11.	28.00	5.	29.00	87. VH	34.00
F032	<11.	0.00	<11.	0.00	<11.	0.00	<11.	0.00	<11.	0.00	72.8	20.00
F032b	<0.5	0.00	6.39	21.00	3.45	24.00	9.6	10.50	4.21	18.00	67.5	6.50
F037	0.3668	10.00	6.148	18.00	3.189	15.00	10.1	21.00	4.156	14.00	74.52	30.00
F038	0.2	7.50	5.9	10.50	3.11	14.00	9.38	7.00	3.92	7.00	72.4	19.00
F046	0.17	6.00	5.56	7.00	2.96	5.00	8.64	2.00	3.65	3.00	73.1	23.00
F048	<1.0	0.00	6.00	15.00	3.05	10.00	9.71	12.00	3.99	8.00	71.82	16.00
F060	<2.	0.00	7.	26.00	4.	29.50	10.	16.00	4.	10.00	73.	21.50
F093	<1.1	0.00	5.6	8.00	2.8	4.00	9.3	5.50	3.3	1.00	69.4	9.00
F094	0.3	9.00	6.5	22.00	3.5	25.50	10.3	24.50	4.3	20.50	73.8	24.00
F095	0.6	13.00	5.3	5.50	3.2	16.50	11.1	30.00	3.7	4.00	67.5	6.50
F096	<1.	0.00	6.28	19.00	3.24	18.00	10.1	21.00	4.26	19.00	72.0	17.00
F131	0.57	12.00	5.07	3.00	3.08	11.00	9.41	9.00	4.36	22.00	71.10	14.00
F133	<2.	0.00	6.	15.00	2.	1.50	10.	16.00	4.	10.00	73.	21.50
F134	0.53	11.00	7.72	30.00	3.00	7.00	11.66	33.00	4.99	27.00	86.53 VH	33.00
F136	<0.5	0.00	5.10	4.00	3.30	19.50	8.88	4.00	4.17	15.00	67.1	4.00
F137	0.2	7.50	6.9	24.00	3.6	27.00	11.	28.00	4.5	23.00	75.	31.00
F138	0.132	5.00	5.98	13.00	3.04	9.00	9.60	10.50	4.02	12.00	69.7	10.00
F141	<5.	0.00	<5.	0.00	5. EH	31.50	<5. EL	0.00	5.	29.00	74.	27.50
F142a	0.	2.50	3. VL	1.00	3.	7.00	10.	16.00	11. EH	35.00	98. EH	36.00
F142b	0.	2.50	8. H	31.00	3.	7.00	10.	16.00	5.	29.00	76.	32.00
F142c	0.	2.50	10. VH	33.00	7. EH	33.50	10.	16.00	6. H	32.50	62. VL	1.50
F142d	0.	2.50	10. VH	33.00	7. EH	33.50	10.	16.00	6. H	32.50	62. VL	1.50
F143	<1.	0.00	7.4	28.00	3.4	22.00	10.3	24.50	5.4	31.00	95.6 VH	35.00
F145	<2.	0.00	4. L	2.00	2.	1.50	11.2	31.50	3.8	5.00	73.9	25.50
MEDIAN	0.2000		6.1240		3.2200		10.0000		4.2100		72.4000	
1CRIT	1.5000		1.7774		1.6032		2.0100		1.6626		5.7540	
N	12		33		30		32		33		34	
MEAN	0.2057		6.5619		3.3747		10.0616		4.4789		73.8415	
3STDEV	0.5801		4.0733		1.5727		2.2418		2.2356		21.8403	

PARAMETER: 82095 Lead ug/L

SAMPLE LAB NO	7 = TMDA-53.2 REPORTED VALUE	RANK	8 = TMDA-61t REPORTED VALUE	RANK	9 = TMDA-62t REPORTED VALUE	RANK	10 = TMDA-63t REPORTED VALUE	RANK
F002	358.0	20.00	63.0	24.50	102.0	25.00	215.0	28.00
F003	352.	15.00	60.	11.50	95.	8.00	201.	9.50
F009	324. L	3.00	53. VL	4.00	88. VL	2.00	186. L	2.00
F010	321. VL	2.00	57.	7.00	99.	15.00	194.	4.00
F011	339.	5.50	58.5	10.00	93.9	6.00	203.	12.50
F012	539. EH	37.00	93. EH	37.00	151. EH	37.00	296. EH	37.00
F014	350.	12.50	61.5	20.00	99.5	16.00	206.	17.50
F015	340.	7.00	66.5 H	33.00	100.	18.00	210.	23.50
F019	360.	21.00	40. EL	1.00	100.	18.00	190. L	3.00
F024	378.	30.00	63.	24.50	102.	25.00	220. H	32.00
F025	458. EH	36.00	63.8	28.00	103.	28.50	252. EH	36.00
F026	357.17	19.00	52.33 VL	3.00	95.82	9.00	206.10	19.00
F031	350.	12.50	65.	31.00	115. VH	34.50	245. VH	35.00
F032	366.	25.50	60.3	14.00	98.1	14.00	201.	9.50
F032b	300. VL	1.00	50. VL	2.00	100.	18.00	210.	23.50
F037	365.	23.50	62.49	23.00	102.	25.00	209.	22.00
F038	356.	17.00	62.2	21.00	101.	21.00	207.	20.00
F046	366.	25.50	60.0	11.50	101.	21.00	213.	26.00
F048	362.6	22.00	60.92	15.00	97.91	13.00	208.9	21.00
F060	379.	31.00	64.	29.00	103.	28.50	219.	31.00
F093	356.1	18.00	58.1	9.00	96.5	10.00	205.2	16.00
F094	368.	28.00	63.1	26.00	102.	25.00	213.	26.00
F095	344.	9.50	57.8	8.00	94.5	7.00	203.	12.50
F096	344.0	9.50	62.3	22.00	96.6	11.00	196.0	5.50
F131	366.9	27.00	63.28	27.00	101.0	21.00	200.9	8.00
F133	339.	5.50	61.	17.50	102.	25.00	200.	7.00
F134	397.50 VH	34.00	71.29 VH	35.00	121.70 VH	36.00	235.77 VH	34.00
F136	332. L	4.00	55.2 L	5.00	87.5 VL	1.00	196.	5.50
F137	365.	23.50	68. H	34.00	105.	30.50	213.	26.00
F138	354.	16.00	60.2	13.00	97.5	12.00	206.	17.50
F141	398. VH	35.00	61.	17.50	113. VH	33.00	227. VH	33.00
F142a	386. H	32.00	87. EH	36.00	106.	32.00	217.	29.00
F142b	343.	8.00	66.	32.00	115. VH	34.50	205.	15.00
F142c	350.	12.50	61.	17.50	92. L	4.50	203.	12.50
F142d	350.	12.50	61.	17.50	92. L	4.50	203.	12.50
F143	387. H	33.00	56.3	6.00	89.5 L	3.00	181. VL	1.00
F145	377.3	29.00	64.1	30.00	105.	30.50	217.3	30.00
MEDIAN	357.1700		61.0000		100.0000		206.1000	
1CRIT	22.8402		5.0700		7.4100		13.7760	
N	35		35		35		35	
MEAN	361.1306		61.7203		100.7294		209.6334	
3STDEV	73.9487		18.2383		21.0900		41.0222	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	183.50	20.389	9					AAS
F003	116.50	12.944	9					ICP-OES
F009	27.50	3.056	9	L L VLVLL	BIASED LOW	-9.23	-1.0363	
F010	137.50	15.278	9	VL				GFAA, ICP-OES
F011	79.50	8.833	9	EL				
F012	317.50	35.278	9	VHEHEHEHEHEHEHEHEH	BIASED HIGH	49.14	1.0813	ICPMS
F014	157.50	17.500	9					ICP-MS
F015	200.00	22.222	9	H				GFAA, ICP
F019	54.50	10.900	5	EL L				ICP
F024	180.00	22.500	8	H				ICP-AES
F025	188.50	20.944	9	EH EH				ICP-MS
F026	188.00	20.889	9	VL				GFAAS, ICP
F031	259.50	28.833	9	VH VHVH	BIASED HIGH*	1.76	6.0404	GFAAS
F032	83.00	16.600	5					ICP-AES
F032b	124.50	13.833	9	VLVL				ICP-MS
F037	201.50	20.150	10					ICP-MS
F038	144.00	14.400	10					ICPMS
F046	130.00	13.000	10					ICP-MS
F048	132.00	14.667	9					ICP
F060	222.50	24.722	9					ICP
F093	80.50	8.944	9					ICP
F094	230.50	23.050	10					ICP-MS
F095	112.50	11.250	10					ICP - USN
F096	142.00	15.778	9					ICP-MS
F131	154.00	15.400	10					GFAA
F133	119.00	13.222	9					ICP-MS
F134	280.00	28.000	10	VHVHVHVHVH	BIASED HIGH	11.90	2.2633	GFAAS
F136	62.00	6.889	9	L L VL	BIASED LOW	-6.57	-0.7857	ICP
F137	254.50	25.450	10	H				ICP-MS
F138	118.00	11.800	10					ICP-MS
F141	206.50	29.500	7	EHEL VH VHVH	BIASED HIGH	11.64	-2.0994	AAS
F142a	226.50	22.650	10	VL EHEHH EH				Flame AAS
F142b	207.00	20.700	10	H VH				Flame AAS
F142c	166.00	16.600	10	VHEH H VL L				Flame AAS
F142d	166.00	16.600	10	VHEH H VL L				Flame AAS
F143	183.50	20.389	9	VHH L VL				ICP
F145	185.00	20.556	9	L				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 17.973

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F009	27.50	3.056	9	LLVLVLL	BIASED LOW	-9.23	-1.0363	
F136	62.00	6.889	9	LLVL	BIASED LOW	-6.57	-0.7857	ICP
F011	79.50	8.833	9	EL				ICP
F093	80.50	8.944	9					ICP
F019	54.50	10.900	5	ELL				ICP - USN
F095	112.50	11.250	10					ICP-MS
F138	118.00	11.800	10					ICP-OES
F003	116.50	12.944	9					ICP-MS
F046	130.00	13.000	10					ICP-MS
F133	119.00	13.222	9					ICP-MS
F032b	124.50	13.833	9	VLVL				ICPMS
F038	144.00	14.400	10					ICP
F048	132.00	14.667	9					GFAA, ICP-OES
F010	137.50	15.278	9	VL				GFAA
F131	154.00	15.400	10					ICP-MS
F096	142.00	15.778	9					ICP-AES
F032	83.00	16.600	5					Flame AAS
F142c	166.00	16.600	10	VHEHHVLL				Flame AAS
F142d	166.00	16.600	10	VHEHHVLL				ICP-MS
F014	157.50	17.500	9					ICP-MS
F037	201.50	20.150	10					AAS
F002	183.50	20.389	9					ICP
F143	183.50	20.389	9	VHHLVL				ICP-AES
F145	185.00	20.556	9	L				Flame AAS
F142b	207.00	20.700	10	HVH				GFAAS, ICP
F026	188.00	20.889	9	VL				ICP-MS
F025	188.50	20.944	9	EHEH				GFAA, ICP
F015	200.00	22.222	9	H				ICP-AES
F024	180.00	22.500	8	H				Flame AAS
F142a	226.50	22.650	10	VLEHEHHEH				ICP-MS
F094	230.50	23.050	10					ICP
F060	222.50	24.722	9					ICP-MS
F137	254.50	25.450	10	H				GFAAS
F134	280.00	28.000	10	VHVHVHVHVH	BIASED HIGH	11.90	2.2633	GFAAS
F031	259.50	28.833	9	VHVHVH	BIASED HIGH*	1.76	6.0404	AAS
F141	206.50	29.500	7	EHELVHVHVH	BIASED HIGH	11.64	-2.0994	ICPMS
F012	317.50	35.278	9	VHEHEHEHEHEHEHEHEH	BIASED HIGH	49.14	1.0813	

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

OVERALL AVERAGE
RANK IS 17.973

Lead

PARAMETER: 93095 Lithium ug/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Elements

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

SAMPLE	1 = TM-FSKEN		2 = TM-24.2		3 = TM-27.2		4 = TM-26.2		5 = TM-28.2		6 = TMDA-51.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F010	23. EH	7.00	13. EH	9.00	14. EH	9.00	12. EH	9.00	8. EH	9.00	19. VH	8.00
F011	1.5	4.00	5.1	5.00	3.8	4.00	3.2 VL	2.00	3.5	5.00	15.7	3.00
F012	<5.	0.00	<5.	0.00	<5.	0.00	<5. VL	0.00	<5.	0.00	14. VL	1.50
F025	<1.	0.00	4. EL	1.00	2. EL	1.00	1. EL	1.00	5. VH	8.00	21. VH	10.00
F038	2.	5.50	5.	3.00	4.	7.00	7.	7.50	3.	2.00	20. VH	9.00
F048	1.23	2.00	5.32	7.00	3.84	5.00	6.75	6.00	3.25	4.00	17.06	7.00
F060	2.	5.50	6. H	8.00	4.	7.00	7.	7.50	4.	7.00	17.	6.00
F094	<3.	0.00	5.	3.00	4.	7.00	6.	3.50	3.	2.00	16.	5.00
F137	1.	1.00	5.	3.00	3. L	2.00	6.	3.50	3.	2.00	14. VL	1.50
F139	1.49	3.00	5.157	6.00	3.71	3.00	6.51	5.00	3.53	6.00	15.89	4.00
MEDIAN	1.5000		5.1000		3.8400		6.5100		3.5000		16.5000	
1CRIT	0.5600		0.7760		0.7004		0.8606		0.6800		1.4600	
N	5		7		7		7		8		7	
MEAN	1.6440		5.2253		3.7643		6.0657		3.5350		17.2357	
3STDEV	-		1.0026		0.9890		3.6973		1.9278		4.6111	

SAMPLE	7 = TMDA-53.2		8 = TMDA-61t		9 = TMDA-62t		10 = TMDA-63t	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F010	14. VH	10.00	31. VL	1.00	42. EL	1.00	101.	4.00
F011	10.6	6.00	34.	3.50	56.	3.00	98.8	2.00
F012	8. VL	2.00	37.	7.50	61.	8.00	114. H	9.00
F025	6. EL	1.00	42. VH	10.00	70. EH	10.00	117. VH	10.00
F038	10.	3.50	40. VH	9.00	60.	7.00	110.	7.00
F048	11.97 H	8.00	36.30	6.00	59.54	6.00	107.1	6.00
F060	12. H	9.00	37.	7.50	62.	9.00	112. H	8.00
F094	11.	7.00	34.	3.50	58.	5.00	103.	5.00
F137	10.	3.50	32. L	2.00	53. L	2.00	92. VL	1.00
F139	10.52	5.00	34.15	5.00	56.22	4.00	99.19	3.00
MEDIAN	10.5600		35.2250		58.7700		105.0500	
1CRIT	1.1036		2.5835		3.9962		6.7730	
N	8		8		8		8	
MEAN	10.5113		35.5563		58.2200		105.6362	
3STDEV	3.5844		7.0305		8.4288		16.7159	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F010	67.00	6.700	10	EHEHEHEHEHVHVHVLEL				FLAA
F011	37.50	3.750	10	VL				
F012	28.00	5.600	5	VL VLVL H				ICPMS
F025	52.00	5.778	9	ELELELVHVHELVHEHVH				ICP
F038	60.50	6.050	10	VH VH				ICPMS
F048	57.00	5.700	10	H				ICP
F060	74.50	7.450	10	H H H				ICP
F094	41.00	4.556	9					ICP-MS
F137	21.50	2.150	10	L VL L L VL	BIASED LOW	-11.85	0.1667	ICP-MS
F139	44.00	4.400	10					ICP-MS

OVERALL AVERAGE
RANK IS 5.194

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F137	21.50	2.150	10	LVLLLVL	BIASED LOW	-11.85	0.1667	ICP-MS
F011	37.50	3.750	10	VL				
F139	44.00	4.400	10					ICP-MS
F094	41.00	4.556	9					ICP-MS
F012	28.00	5.600	5	VLVLVLH				ICPMS
F048	57.00	5.700	10	H				ICP
F025	52.00	5.778	9	ELELELVHVHELVHEHVH				ICP
F038	60.50	6.050	10	VHVH				ICPMS
F010	67.00	6.700	10	EHEHEHEHEHVHVHVLEL				FLAA
F060	74.50	7.450	10	HHH				ICP

OVERALL AVERAGE
RANK IS 5.194

Lithium

PARAMETER: 25095 Manganese ug/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Elements

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.5000 BASIC ACCEPTABLE ERROR= 1.5000 CONCENTRATION ERROR INCREMENT= 0.0600

SAMPLE	1 = TM-FSKEN		2 = TM-24.2		3 = TM-27.2		4 = TM-26.2		5 = TM-28.2		6 = TMDA-51.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	<10.0	0.00	<10.0	0.00	<10.0	0.00	16.0	13.50	<10.0	0.00	83.0	19.50
F003	1.0	8.50	8.2	20.00	2.5	15.50	16.0	13.50	7.0	16.50	81.2	15.00
F009	0.8	3.00	7.	3.50	2.1	8.00	14. L	4.50	6.	5.00	70. VL	1.00
F010	0.9	5.00	8.2	20.00	2.4	13.50	16.6	22.00	7.0	16.50	84.	25.50
F011	1.	8.50	8.1	16.00	2.6	20.50	16.2	16.00	7.	16.50	78.1	6.00
F012	<5.	0.00	10.	35.00	<5.	0.00	18.	35.50	8.	33.50	87.	37.00
F014	<10.	0.00	<10.	0.00	<10.	0.00	17.	26.50	<10.	0.00	84.	25.50
F015	1.	8.50	8.	13.00	2.	4.50	16.	13.50	7.	16.50	83.	19.50
F019	<1.	0.00	6. L	1.00	<1. EL	0.00	13. L	2.00	4. EL	2.00	80.	10.50
F024	<1.	0.00	8.	13.00	2.	4.50	17.	26.50	7.	16.50	86.	34.50
F025	1.	8.50	12. EH	38.00	4. EH	33.00	15.	6.50	6.	5.00	85.	31.50
F026	2.79 EH	27.00	7.74	8.00	3.40	32.00	16.60	22.00	6.93	13.00	78.95	8.00
F031	0.9	5.00	7.8	9.00	2.4	13.50	15.0	6.50	6.5	10.00	74.6 L	5.00
F032	<1.	0.00	8.83	29.00	2.7	24.00	17.4	33.00	7.6	27.50	84.2	28.00
F032b	1.22	21.00	8.81	28.00	2.79	26.00	17.	26.50	7.75	31.00	83.9	22.50
F036	2.T	26.00	8.	13.00	3.T	30.00	17.	26.50	8.	33.50	81.	14.00
F037	1.347	25.00	9.414	32.00	2.38	11.50	19.08 H	39.00	7.708	30.00	95.63 VH	39.00
F038	1.14	16.00	8.17	17.00	2.54	18.00	16.3	17.50	7.04	20.00	84.	25.50
F046	1.26	22.50	9.75	33.00	2.09	7.00	19.6 H	40.00	8.32	36.00	82.6	18.00
F048	<1.0	0.00	7.56	5.00	1.77	2.00	15.90	10.50	6.34	8.00	79.87	9.00
F060	1.1	14.50	8.2	20.00	2.5	15.50	16.4	19.00	7.0	16.50	83.2	21.00
F093	1.1	14.50	8.5	24.00	2.8	27.50	16.5	20.00	7.1	21.00	80.5	12.00
F094	1.2	18.50	8.7	26.00	2.8	27.50	17.2	30.00	7.6	27.50	83.9	22.50
F095	1.2	18.50	8.9	30.00	2.6	20.50	17.1	29.00	7.3	23.50	82.4	17.00
F096	<2.	0.00	8.2	20.00	2.7	24.00	17.3	31.00	7.3	23.50	84.5	29.00
F131	<2.0	0.00	6.6	2.00	2.0	4.50	13.5 L	3.00	6.0	5.00	71.1 VL	2.00
F133	1.20	18.50	8.38	23.00	2.60	20.50	16.65	24.00	7.15	22.00	80.7	13.00
F134	1.04	13.00	8.56	25.00	2.52	17.00	17.32	32.00	7.63	29.00	89.76 H	38.00
F135	<2.	0.00	9.8	34.00	3.3	31.00	18.9	38.00	8.2	35.00	102.1 EH	40.00
F136	1.26	22.50	8.79	27.00	2.82	29.00	16.3	17.50	7.59	26.00	86.1	36.00
F137	1.2	18.50	9.0	31.00	2.7	24.00	18.	35.50	7.5	25.00	85.	31.50
F138	1.01	11.00	7.98	10.00	2.38	11.50	15.5	9.00	6.73	12.00	72.6 VL	4.00
F139	1.02	12.00	7.57	6.00	2.30	9.50	15.14	8.00	6.59	11.00	72.40 VL	3.00
F141	<3.	0.00	8.	13.00	<3.	0.00	12. EL	1.00	6.	5.00	86.	34.50
F142a	0. EL	1.50	7.	3.50	0. EL	1.00	14. L	4.50	3. EL	1.00	80.	10.50
F142b	0. EL	1.50	8.	13.00	2.	4.50	16.	13.50	6.	5.00	84.	25.50
F142c	5. EH	28.50	11. H	36.50	5. EH	34.50	18.	35.50	12. EH	37.50	85.	31.50
F142d	5. EH	28.50	11. H	36.50	5. EH	34.50	18.	35.50	12. EH	37.50	85.	31.50
F143	0.9	5.00	7.7	7.00	2.3	9.50	15.9	10.50	6.4	9.00	78.6	7.00
F145	1.3	24.00	8.2	20.00	2.6	20.50	16.6	22.00	7.8	32.00	81.7	16.00
MEDIAN	1.1000		8.2000		2.5400		16.5500		7.0200		83.1000	
1CRIT	1.5000		1.9020		1.5624		2.4030		1.8312		6.3960	
N	25		36		32		38		35		38	
MEAN	1.1955		8.4348		2.5497		16.4050		7.0022		82.3292	
3STDEV	1.1871		2.8830		1.3405		4.0159		2.4897		13.7509	

PARAMETER: 25095 Manganese ug/L

SAMPLE	7 = TMDA-53.2		8 = TMDA-61t		9 = TMDA-62t		10 = TMDA-63t	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	367.0	21.00	75.0	15.50	107.0	24.50	206.0	23.00
F003	366.	19.50	75.3	19.00	104.	11.00	201.	16.00
F009	328. VL	3.00	62. VL	1.00	88. VL	1.00	174. VL	1.00
F010	371.	25.50	75.	15.50	106.	19.50	205.	20.50
F011	352.	7.00	73.4	12.00	104.	11.00	191. L	7.00
F012	369.	23.00	80.	34.50	110.	33.50	209.	27.50
F014	371.	25.50	80.	34.50	113.	36.00	211.	31.00
F015	364.	17.50	75.	15.50	107.	24.50	209.	27.50
F019	364.	17.50	73.	10.00	105.	14.50	200.	12.50
F024	390. H	36.50	78.	28.50	110.	33.50	220. H	36.00
F025	381.	33.00	78.	28.50	109.	30.50	210.	29.00
F026	345.02	5.00	68.23 L	7.00	95.88 L	7.00	182.46 VL	4.00
F031	331. VL	4.00	67.8 L	6.00	92.9 VL	5.00	181. VL	3.00
F032	376.	29.00	75.9	21.00	106.	19.50	202.	17.50
F032b	394. H	38.00	80.1	36.00	113.	36.00	221. H	37.00
F036	357.	12.00	75.	15.50	106.	19.50	206.	23.00
F037	413. VH	40.00	86.48 VH	38.00	121. VH	39.00	234. VH	39.00
F038	366.	19.50	77.9	26.00	107.	24.50	207.	25.00
F046	369.	23.00	76.4	23.00	106.	19.50	205.	20.50
F048	354.0	9.00	73.25	11.00	101.2	8.00	194.5	9.00
F060	378.	31.00	76.2	22.00	107.	24.50	213.	33.00
F093	361.4	16.00	72.8	9.00	103.1	9.00	200.9	15.00
F094	372.	27.00	76.6	24.00	109.	30.50	478. EH	40.00
F095	390. H	36.50	75.2	18.00	105.	14.50	206.	23.00
F096	377.8	30.00	78.0	28.50	109.1	32.00	210.9	30.00
F131	316.8 VL	1.00	65.2 VL	2.00	90.0 VL	2.00	176.1 VL	2.00
F133	358.	13.00	75.7	20.00	105.3	17.00	192.8	8.00
F134	400.28 H	39.00	88.70 VH	39.00	118.81 VH	38.00	223.43 H	38.00
F135	388.3	35.00	93.9 EH	40.00	125.0 VH	40.00	217.3	35.00
F136	382.	34.00	77.6	25.00	108.	28.00	213.	33.00
F137	353.	8.00	78.	28.50	104.	11.00	200.	12.50
F138	359.	14.00	67.7 L	5.00	91.5 VL	4.00	185. L	5.00
F139	324.83 VL	2.00	67.55 L	4.00	95.23 L	6.00	185.3 L	6.00
F141	379.	32.00	81.	37.00	113.	36.00	213.	33.00
F142a	369.	23.00	71.	8.00	105.	14.50	203.	19.00
F142b	360.	15.00	74.	13.00	105.	14.50	202.	17.50
F142c	355.	10.50	79.	32.50	107.	24.50	200.	12.50
F142d	355.	10.50	79.	32.50	107.	24.50	200.	12.50
F143	346.	6.00	66.0 VL	3.00	90.7 VL	3.00	199.	10.00
F145	374.8	28.00	78.1	31.00	108.5	29.00	208.8	26.00
MEDIAN	366.5000		75.8000		106.0000		205.0000	
1CRIT	23.4000		5.9580		7.7700		13.7100	
N	38		38		38		38	
MEAN	365.7481		75.5555		105.4268		203.8024	
3STDEV	51.1473		14.8804		20.2871		35.9370	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	117.00	19.500	6					AAS
F003	154.50	15.450	10					ICP-OES
F009	31.00	3.100	10	L VLVLVLVLVL	BIASED LOW	-11.33	-2.1173	
F010	183.50	18.350	10					ICP-OES
F011	120.50	12.050	10	L				
F012	259.50	32.438	8		BIASED HIGH*	0.35	2.4756	ICPMS
F014	179.00	29.833	6					ICP-MS
F015	160.50	16.050	10					ICP
F019	70.00	8.750	8	L ELL EL				ICP
F024	229.50	25.500	9	H H				ICP-AES
F025	243.50	24.350	10	EHEH				ICP
F026	133.00	13.300	10	EH L L VL				ICP
F031	67.00	6.700	10	L VLL VLVL	BIASED LOW	-10.15	-0.3402	ICP
F032	228.50	25.389	9					ICP-AES
F032b	302.00	30.200	10	H H				ICP-MS
F036	213.00	21.300	10					Colourimetry
F037	332.50	33.250	10	H VHVHVHVHVH	BIASED HIGH	12.98	0.5064	ICP-MS
F038	209.00	20.900	10					ICPMS
F046	242.50	24.250	10	H				ICP-MS
F048	71.50	7.944	9		BIASED LOW*	-3.62	-0.5336	ICP
F060	217.00	21.700	10					ICP
F093	168.00	16.800	10					ICP
F094	273.50	27.350	10	EH				ICP-MS
F095	230.50	23.050	10	H				ICP - USN
F096	248.00	27.556	9					ICP
F131	23.50	2.611	9	L VLVLVLVLVL	BIASED LOW	-13.55	-0.6052	ICP
F133	179.00	17.900	10					ICP-MS
F134	308.00	30.800	10	H H VHVHH	BIASED HIGH	9.27	0.5451	GFAAS
F135	328.00	36.444	9	EH EHVH	BIASED HIGH	5.36	5.4883	AAS-ETA
F136	278.00	27.800	10					GFAAS, FAAS
F137	225.50	22.550	10					ICP-MS
F138	85.50	8.550	10	VL L VLL	BIASED LOW*	-3.57	-3.1259	ICP-MS
F139	67.50	6.750	10	VLVLL L L	BIASED LOW	-11.08	0.2756	ICP-MS
F141	191.50	23.938	8	EL				ICP-OES
F142a	86.50	8.650	10	EL ELL EL	BIASED LOW*	1.14	-2.9729	Flame AAS
F142b	123.00	12.300	10	EL				Flame AAS
F142c	284.00	28.400	10	EHH EH EH				Flame AAS
F142d	284.00	28.400	10	EHH EH EH				Flame AAS
F143	70.00	7.000	10	VLVL	BIASED LOW	-5.15	-1.3411	ICP
F145	248.50	24.850	10					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 19.650

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F131	23.50	2.611	9	LVLVLVLVLVL	BIASED LOW	-13.55	-0.6052	ICP
F009	31.00	3.100	10	LVLVLVLVLVL	BIASED LOW	-11.33	-2.1173	
F031	67.00	6.700	10	LVLLVLVL	BIASED LOW	-10.15	-0.3402	ICP
F139	67.50	6.750	10	VLVLLLL	BIASED LOW	-11.08	0.2756	ICP-MS
F143	70.00	7.000	10	VLVL	BIASED LOW	-5.15	-1.3411	ICP
F048	71.50	7.944	9		BIASED LOW*	-3.62	-0.5336	ICP
F138	85.50	8.550	10	VLLVLL	BIASED LOW*	-3.57	-3.1259	ICP-MS
F142a	86.50	8.650	10	ELELLEL	BIASED LOW*	1.14	-2.9729	Flame AAS
F019	70.00	8.750	8	LELLEL				ICP
F011	120.50	12.050	10	L				Flame AAS
F142b	123.00	12.300	10	EL				ICP
F026	133.00	13.300	10	EHLLVL				ICP-OES
F003	154.50	15.450	10					ICP
F015	160.50	16.050	10					ICP
F093	168.00	16.800	10					ICP-MS
F133	179.00	17.900	10					ICP-OES
F010	183.50	18.350	10					AAS
F002	117.00	19.500	6					ICPMS
F038	209.00	20.900	10					Colourimetry
F036	213.00	21.300	10					ICP
F060	217.00	21.700	10					ICP-MS
F137	225.50	22.550	10					ICP - USN
F095	230.50	23.050	10	H				ICP-OES
F141	191.50	23.938	8	EL				ICP-MS
F046	242.50	24.250	10	H				ICP
F025	243.50	24.350	10	EHEH				ICP-AES
F145	248.50	24.850	10					ICP-AES
F032	228.50	25.389	9					ICP-AES
F024	229.50	25.500	9	HH				ICP-MS
F094	273.50	27.350	10	EH				ICP
F096	248.00	27.556	9					GFAAS, FAAS
F136	278.00	27.800	10					Flame AAS
F142c	284.00	28.400	10	EHHEHEH				Flame AAS
F142d	284.00	28.400	10	EHHEHEH				ICP-MS
F014	179.00	29.833	6					ICP-MS
F032b	302.00	30.200	10	HH				GFAAS
F134	308.00	30.800	10	HHVHVHH	BIASED HIGH	9.27	0.5451	ICPMS
F012	259.50	32.438	8		BIASED HIGH*	0.35	2.4756	ICP-MS
F037	332.50	33.250	10	HVHVHVHVHVH	BIASED HIGH	12.98	0.5064	AAS-ETA
F135	328.00	36.444	9	EHEHVH	BIASED HIGH	5.36	5.4883	

* 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 19.650

Manganese

PARAMETER: 42095 Molybdenum ug/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Elements

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.5000 BASIC ACCEPTABLE ERROR= 1.5000 CONCENTRATION ERROR INCREMENT= 0.0600

SAMPLE	1 = TM-FSKEN		2 = TM-24.2		3 = TM-27.2		4 = TM-26.2		5 = TM-28.2		6 = TMDA-51.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	0.2	3.00	5.9	15.50	2.5	11.00	8.9	14.00	4.2	11.00	60.	20.50
F009	1.2 EH	13.00	6.6	20.00	3.	19.00	10.3	22.00	4.9	18.00	68. EH	27.00
F010	<2.	0.00	5.	1.50	2.	3.00	9.	17.50	4.	7.00	60.	20.50
F011	0.4	10.00	5.6	10.00	2.5	11.00	8.8	12.00	4.2	11.00	58.	10.00
F012	<5.	0.00	10. EH	22.00	6. EH	20.00	13. EH	23.50	8. EH	21.00	66. H	26.00
F015	<10.	0.00	<10.	0.00	<10.	0.00	10.	21.00	<10.	0.00	60.	20.50
F019	<5.	0.00	8. H	21.00	<5.	0.00	7. EL	1.00	5.	19.00	57.	6.50
F024	<1.	0.00	<1. EL	0.00	<1.	0.00	<1. EL	0.00	<1. EL	0.00	55.	4.00
F025	<3.	0.00	15. EH	23.00	8. EH	21.00	13. EH	23.50	12. EH	22.00	58.	10.00
F032	<1.	0.00	5.17	4.00	1.79	1.00	7.91	2.00	3.33	1.00	58.4	12.00
F032b	<5.	0.00	6.07	18.00	<5.	0.00	9.	17.50	<5.	0.00	61.	25.00
F038	0.18	1.00	5.16	3.00	2.33	7.00	8.07	4.00	3.9	4.00	59.	15.00
F046	0.24	6.00	5.31	6.00	2.32	6.00	8.12	5.00	3.97	5.00	54.7	3.00
F048	<1.0	0.00	5.92	17.00	2.73	17.00	8.96	16.00	4.44	17.00	59.34	17.00
F060	<1.	0.00	5.	1.50	2.	3.00	8.	3.00	4.	7.00	57.	6.50
F093	0.4	10.00	5.6	10.00	2.6	14.00	8.7	11.00	4.2	11.00	58.5	13.00
F094	0.2	3.00	5.9	15.50	2.6	14.00	8.9	14.00	4.4	15.50	60.6	23.50
F095	0.4	10.00	6.2	19.00	2.0	3.00	8.9	14.00	3.4	2.00	60.6	23.50
F096	<1.	0.00	5.79	14.00	2.61	16.00	9.09	19.00	4.39	14.00	60.0	20.50
F133	0.3	8.00	5.2	5.00	2.2	5.00	8.4	6.00	4.0	7.00	56.1	5.00
F134	0.71	12.00	5.56	8.00	2.80	18.00	8.54	7.00	5.13	20.00	59.22	16.00
F137	0.2	3.00	5.6	10.00	2.5	11.00	8.6	9.00	4.4	15.50	58.	10.00
F138	0.25	7.00	5.66	12.00	2.46	9.00	8.67	10.00	4.27	13.00	57.8	8.00
F139	0.206	5.00	5.54	7.00	2.39	8.00	8.55	8.00	4.17	9.00	58.86	14.00
F141	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00	43. EL	1.00
F143	<1.	0.00	5.7	13.00	2.6	14.00	9.7	20.00	3.6	3.00	59.4	18.00
F145	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	49.9 EL	2.00
MEDIAN	0.2500		5.6600		2.5000		8.8500		4.2000		58.8600	
1CRIT	1.5000		1.7496		1.5600		1.9410		1.6620		4.9416	
N	11		20		19		21		20		25	
MEAN	0.3187		6.0240		2.6389		8.8148		4.4285		58.4968	
3STDEV	0.4424		3.2908		2.5037		1.7928		2.7522		8.3765	

PARAMETER: 42095 Molybdenum ug/L

SAMPLE	7 = TMDA-53.2		8 = TMDA-61t		9 = TMDA-62t		10 = TMDA-63t	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	216.	15.50	76.	10.00	101.	18.00	173.	13.00
F009	244. EH	27.00	86. EH	26.50	111. EH	27.00	190. EH	27.00
F010	219.	18.50	78.	18.00	101.	18.00	174.	15.50
F011	212.	7.50	74.8	7.00	98.3	7.00	164.	3.00
F012	221.	23.00	83.	25.00	106.	24.50	173.	13.00
F015	210.	6.00	80.	22.00	100.	14.00	170.	7.50
F019	213.	10.00	74.	3.00	101.	18.00	170.	7.50
F024	220.	21.00	74.	3.00	96.	3.00	180.	25.00
F025	206.	4.00	86. EH	26.50	106.	24.50	175.	18.50
F032	216.	15.50	74.9	8.00	97.5	6.00	165.	4.00
F032b	212.	7.50	77.4	15.00	103.	22.50	178.	22.00
F038	215.	13.50	78.	18.00	98.8	8.00	173.	13.00
F046	205.	3.00	71.4	1.00	92.1 L	1.00	172.	11.00
F048	213.1	11.00	76.8	12.50	99.40	10.00	171.7	10.00
F060	220.	21.00	75.	9.00	99.	9.00	175.	18.50
F093	214.9	12.00	76.8	12.50	99.8	13.00	170.8	9.00
F094	220.	21.00	78.5	21.00	103.	22.50	176.	20.50
F095	219.	18.50	77.6	16.00	99.7	11.50	174.	15.50
F096	215.0	13.50	78.4	20.00	101.0	18.00	176.0	20.50
F133	203.	1.00	74.2	5.00	99.7	11.50	162.0	1.00
F134	238.39 EH	26.00	81.99	24.00	102.30	21.00	179.79	24.00
F137	208.	5.00	77.	14.00	101.	18.00	169.	6.00
F138	217.	17.00	74.6	6.00	95.8	2.00	163.	2.00
F139	212.74	9.00	76.47	11.00	100.62	15.00	174.05	17.00
F141	222.	24.00	78.	18.00	108. H	26.00	181.	26.00
F143	225.	25.00	74.	3.00	97.	5.00	179.	23.00
F145	203.8	2.00	80.2	23.00	96.2	4.00	167.6	5.00
MEDIAN	215.0000		77.0000		100.0000		173.0000	
1CRIT	14.3100		6.0300		7.4100		11.7900	
N	25		24		25		25	
MEAN	215.7572		77.0692		100.4448		172.9576	
3STDEV	21.1435		7.3218		9.0788		14.2592	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	131.50	13.150	10					ICP-OES
F009	226.50	22.650	10	EH EHEHEHEHEH	BIASED HIGH	11.82	0.3399	
F010	119.50	13.278	9					ICP-OES
F011	88.50	8.850	10					
F012	198.00	22.000	9	EHEHEHEHH	BIASED HIGH*	-0.15	4.6570	ICPMS
F015	91.00	15.167	6					ICP
F019	86.00	10.750	8	H EL				ICP
F024	56.00	11.200	5	EL ELEL				ICP-AES
F025	173.00	19.222	9	EHEHEHEH EH				ICP
F032	53.50	5.944	9		BIASED LOW*	-1.10	-0.8857	ICP-AES
F032b	127.50	18.214	7					ICP-MS
F038	86.50	8.650	10					ICPMS
F046	47.00	4.700	10	L	BIASED LOW*	-3.43	-0.8036	ICP-MS
F048	127.50	14.167	9					ICP
F060	78.50	8.722	9					ICP
F093	115.50	11.550	10					ICP
F094	170.50	17.050	10					ICP-MS
F095	133.00	13.300	10					ICP - USN
F096	155.50	17.278	9					ICP-MS
F133	54.50	5.450	10		BIASED LOW	-5.46	0.4998	ICP-MS
F134	176.00	17.600	10	EH				GFAAS
F137	101.50	10.150	10					ICP-MS
F138	86.00	8.600	10					ICP-MS
F139	103.00	10.300	10					ICP-MS
F141	95.00	19.000	5	EL H				ICP-OES
F143	124.00	13.778	9					ICP
F145	36.00	7.200	5	EL				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 12.777

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F046	47.00	4.700	10	L	BIASED LOW*	-3.43	-0.8036	ICP-MS
F133	54.50	5.450	10		BIASED LOW	-5.46	0.4998	ICP-MS
F032	53.50	5.944	9		BIASED LOW*	-1.10	-0.8857	ICP-AES
F145	36.00	7.200	5	EL				ICP-AES
F138	86.00	8.600	10					ICP-MS
F038	86.50	8.650	10					ICPMS
F060	78.50	8.722	9					ICP
F011	88.50	8.850	10					ICP-MS
F137	101.50	10.150	10					ICP-MS
F139	103.00	10.300	10					ICP
F019	86.00	10.750	8	HEL				ICP-AES
F024	56.00	11.200	5	ELELEL				ICP
F093	115.50	11.550	10					ICP-OES
F003	131.50	13.150	10					ICP-OES
F010	119.50	13.278	9					ICP - USN
F095	133.00	13.300	10					ICP
F143	124.00	13.778	9					ICP
F048	127.50	14.167	9					ICP
F015	91.00	15.167	6					ICP-MS
F094	170.50	17.050	10					ICP-MS
F096	155.50	17.278	9					GFAAS
F134	176.00	17.600	10	EH				ICP-MS
F032b	127.50	18.214	7					ICP-OES
F141	95.00	19.000	5	ELH				ICP
F025	173.00	19.222	9	EHEHEHEHEH				ICPMS
F012	198.00	22.000	9	EHEHEHEHH	BIASED HIGH*	-0.15	4.6570	
F009	226.50	22.650	10	EHEHEHEHEHEH	BIASED HIGH	11.82	0.3399	

* 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 12.777

Molybdenum

PARAMETER: 28095 Nickel ug/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Elements

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.5000 BASIC ACCEPTABLE ERROR= 1.5000 CONCENTRATION ERROR INCREMENT= 0.0600

SAMPLE	1 = TM-FSKEN		2 = TM-24.2		3 = TM-27.2		4 = TM-26.2		5 = TM-28.2		6 = TMDA-51.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	<2.0	0.00	5.2	17.50	2.7	19.00	10.4	22.50	12.0	25.50	67.0	16.00
F003	0.7	5.50	4.9	8.50	2.5	13.00	9.6	11.00	10.5	7.50	66.	11.00
F009	0.6	3.50	4.7	5.00	2.3	10.00	9.3	8.00	10.5	7.50	65.	8.00
F010	1.1	12.00	5.0	11.50	2.5	13.00	9.8	16.00	11.5	19.50	68.	20.50
F011	0.8	7.00	5.	11.50	2.5	13.00	9.7	13.00	10.6	9.50	63.1	5.00
F012	<5.	0.00	8. EH	31.00	6. EH	30.00	13. VH	31.00	15. EH	33.00	73.	34.00
F014	<10.	0.00	<10.	0.00	<10.	0.00	10.	18.50	12.	25.50	70.	28.50
F015	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00	70.	28.50
F019	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	70.	28.50
F024	<1.	0.00	4.	2.00	2.	6.50	9.	6.00	11.	14.50	68.	20.50
F025	1.1	12.00	5.5	21.50	3.5	26.50	10.4	22.50	12.7	31.00	68.0	20.50
F026	9.31 EH	21.00	7.24 H	30.00	7.27 EH	31.00	12.39 H	30.00	12.98	32.00	66.47	13.00
F032	<2.	0.00	4.81	7.00	2.68	18.00	10.3	21.00	12.1	29.50	66.9	14.00
F032b	<1.	0.00	5.17	16.00	2.73	20.00	10.2	20.00	11.6	21.00	67.0	16.00
F038	0.7	5.50	5.	11.50	2.5	13.00	9.6	11.00	10.9	12.50	68.	20.50
F046	0.93	9.00	5.58	23.00	2.89	22.00	10.8	27.00	12.1	29.50	70.6	31.00
F048	<1.0	0.00	5.02	14.00	2.66	17.00	9.72	15.00	10.80	11.00	64.78	7.00
F060	1.	10.00	6.	25.50	4.	29.00	11.	29.00	12.	25.50	72.	33.00
F093	<1.2	0.00	5.3	19.00	3.8	28.00	9.4	9.00	10.6	9.50	65.6	9.00
F094	2.3 H	17.00	6.1	28.00	3.5	26.50	10.8	27.00	12.	25.50	68.5	24.00
F095	0.6	3.50	5.1	15.00	2.6	16.00	10.8	27.00	11.4	17.50	68.1	23.00
F096	<8.	0.00	<8.	0.00	<8.	0.00	<8.	0.00	8.7 L	1.00	67.2	18.00
F131	0.58	2.00	3.8	1.00	2.2	8.00	8.8	5.00	11.0	14.50	65.7	10.00
F133	1.7	14.00	5.2	17.50	3.0	23.50	10.5	25.00	11.4	17.50	66.1	12.00
F134		0.00	4.18	3.00	1.34	4.00	8.71	4.00	10.44	6.00	61.88 L	3.00
F136	<1.0	0.00	4.73	6.00	1.91	5.00	9.71	14.00	10.9	12.50	71.6	32.00
F137	1.10	12.00	5.38	20.00	2.78	21.00	9.88	17.00	11.5	19.50	69.2	26.00
F138	0.5	1.00	4.57	4.00	2.25	9.00	9.04	7.00	9.97	4.00	58.9 VL	1.00
F139	1.897	15.00	5.50	21.50	3.13	25.00	10.42	24.00	11.87	22.00	68.70	25.00
F141	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00	20. EH	34.00	83. EH	36.00
F142a	3. VH	19.00	7. H	29.00	1. L	2.00	16. EH	32.00	10.	5.00	75. H	35.00
F142b	2.	16.00	6.	25.50	3.	23.50	10.	18.50	9. L	2.00	59. VL	2.00
F142c	3. VH	19.00	6.	25.50	1. L	2.00	8.	1.50	12.	25.50	70.	28.50
F142d	3. VH	19.00	6.	25.50	1. L	2.00	8.	1.50	12.	25.50	67.	16.00
F143	<0.5	0.00	4.9	8.50	2.0	6.50	8.2	3.00	9.4	3.00	61.9 L	4.00
F145	0.9	8.00	5.	11.50	2.5	13.00	9.6	11.00	11.1	16.00	64.4	6.00
MEDIAN OR *TARGET CONC.	*0.6000		5.1700		2.6000		9.8400		11.4000		67.6000	
1CRIT	1.5000		1.7202		1.5660		2.0004		2.0940		5.4660	
N	19		29		30		29		32		34	
MEAN	1.4214		5.3131		2.6157		10.0369		11.3394		67.4626	
3STDEV	2.5167		2.1323		2.9093		2.9673		3.3249		9.7073	

PARAMETER: 28095 Nickel ug/L

SAMPLE	7 = TMDA-53.2		8 = TMDA-61t		9 = TMDA-62t		10 = TMDA-63t	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	320.0	17.00	61.0	31.50	101.0	26.50	199.0	24.00
F003	318.	11.50	57.	14.00	97.	13.00	189.	13.50
F009	311.	8.50	54.	6.00	94.	6.00	183.	5.50
F010	321.	21.50	57.	14.00	99.	18.00	194.	20.00
F011	315.	10.00	54.4	7.00	95.	8.00	183.	5.50
F012	320.	17.00	63. H	33.00	104.	32.00	199.	24.00
F014	325.	24.50	64. H	34.00	102.	29.00	201.	29.50
F015	330.	29.50	60.	29.50	100.	23.00	200.	27.00
F019	320.	17.00	60.	29.50	100.	23.00	200.	27.00
F024	335.	32.00	58.	19.50	100.	23.00	200.	27.00
F025	399. EH	36.00	59.4	27.00	103.	31.00	224. EH	36.00
F026	304.72	2.00	58.43	23.00	95.73	9.00	179.78 L	3.00
F032	325.	24.50	56.2	10.00	97.6	14.00	188.	11.50
F032b	320.	17.00	56.6	11.00	90.0 L	3.00	201.	29.50
F038	328.	27.50	59.	25.00	98.	15.00	193.	18.50
F046	327.	26.00	59.7	28.00	101.	26.50	199.	24.00
F048	307.7	5.00	55.6	8.50	94.6	7.00	186.9	10.00
F060	349. H	35.00	61.	31.50	105.	33.00	209. H	33.50
F093	320.5	20.00	53.6	4.00	95.9	10.00	191.2	17.00
F094	319.	13.00	58.4	21.50	100.	23.00	196.	21.00
F095	338.	33.00	59.2	26.00	98.7	17.00	206. H	32.00
F096	322.5	23.00	55.6	8.50	96.5	12.00	190.4	16.00
F131	310.7	7.00	58.4	21.50	99.8	20.00	180.6	4.00
F133	311.	8.50	57.0	14.00	101.5	28.00	178.3 L	2.00
F134	306.99	3.00	53.82	5.00	89.26 L	2.00	186.42	9.00
F136	328.	27.50	71.6 EH	36.00	109. H	35.00	198.	22.00
F137	321.	21.50	57.7	18.00	99.4	19.00	193.	18.50
F138	318.	11.50	50.6 L	1.00	86.7 VL	1.00	169. VL	1.00
F139	332.31	31.00	58.88	24.00	102.58	30.00	201.84	31.00
F141	341. H	34.00	58.	19.50	113. EH	36.00	212. H	35.00
F142a	330.	29.50	67. VH	35.00	107. H	34.00	209. H	33.50
F142b	301.	1.00	53.	2.00	93.	4.00	186.	8.00
F142c	309.	6.00	57.	14.00	100.	23.00	188.	11.50
F142d	307.	4.00	57.	14.00	96.	11.00	184.	7.00
F143	320.	17.00	53.1	3.00	93.7	5.00	189.	13.50
F145	319.1	14.00	57.2	17.00	98.3	16.00	190.2	15.00
MEDIAN OR *TARGET CONC.	320.0000		57.8500		99.2000		193.0000	
1CRIT	20.6100		4.8810		7.3620		12.9900	
N	34		34		34		34	
MEAN	321.4859		57.9185		98.7521		193.6659	
3STDEV	30.3101		9.1108		12.8540		26.1231	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	199.50	22.167	9					AAS
F003	108.50	10.850	10					ICP-OES
F009	68.00	6.800	10		BIASED LOW*	-3.22	-0.8610	
F010	166.00	16.600	10					ICP-OES
F011	89.50	8.950	10					
F012	265.00	29.444	9	EHEHVHEH H	BIASED HIGH*	-0.58	4.3067	ICPMS
F014	189.50	27.071	7	H				ICP-MS
F015	137.50	27.500	5					ICP
F019	125.00	25.000	5					ICP
F024	151.00	16.778	9					ICP-AES
F025	264.00	26.400	10	EH EH				ICP-MS
F026	194.00	19.400	10	EHH EHH L				ICP
F032	149.50	16.611	9					ICP-AES
F032b	153.50	17.056	9	L				ICP-MS
F038	160.00	16.000	10					ICPMS
F046	246.00	24.600	10					ICP-MS
F048	94.50	10.500	9					ICP
F060	285.00	28.500	10	H H	BIASED HIGH	8.78	-0.5191	ICP
F093	125.50	13.944	9					ICP
F094	226.50	22.650	10	H				ICP-MS
F095	210.00	21.000	10	H				ICP - USN
F096	78.50	13.083	6	L				ICP
F131	93.00	9.300	10					GFAA
F133	162.00	16.200	10	L				ICP-MS
F134	39.00	4.333	9	L L	BIASED LOW*	-3.63	-1.7535	GFAAS
F136	190.00	21.111	9	EHH				GFAAS, FAAS
F137	192.50	19.250	10					ICP-MS
F138	40.50	4.050	10	VL L VLVL	BIASED LOW*	-3.12	-3.4295	ICP-MS
F139	248.50	24.850	10					ICP-MS
F141	194.50	32.417	6	EHEHH EHH	BIASED HIGH*	4.95	6.8059	ICP-OES
F142a	254.00	25.400	10	VHH L EH H VHH H				Flame AAS
F142b	102.50	10.250	10	L VL				Flame AAS
F142c	156.50	15.650	10	VH L				Flame AAS
F142d	125.50	12.550	10	VH L				Flame AAS
F143	63.50	7.056	9	L	BIASED LOW*	0.07	-2.7768	ICP
F145	127.50	12.750	10					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 17.252

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F138	40.50	4.050	10	VLLVLVL	BIASED LOW*	-3.12	-3.4295	ICP-MS
F134	39.00	4.333	9	LL	BIASED LOW*	-3.63	-1.7535	GFAAS
F009	68.00	6.800	10		BIASED LOW*	-3.22	-0.8610	
F143	63.50	7.056	9	L	BIASED LOW*	0.07	-2.7768	ICP
F011	89.50	8.950	10					GFAA
F131	93.00	9.300	10					Flame AAS
F142b	102.50	10.250	10	LVL				ICP
F048	94.50	10.500	9					ICP-OES
F003	108.50	10.850	10					Flame AAS
F142d	125.50	12.550	10	VHL				ICP-AES
F145	127.50	12.750	10					ICP
F096	78.50	13.083	6	L				ICP
F093	125.50	13.944	9					Flame AAS
F142c	156.50	15.650	10	VHL				ICPMS
F038	160.00	16.000	10					ICP-MS
F133	162.00	16.200	10	L				ICP-OES
F010	166.00	16.600	10					ICP-AES
F032	149.50	16.611	9					ICP-AES
F024	151.00	16.778	9					ICP-MS
F032b	153.50	17.056	9	L				ICP-MS
F137	192.50	19.250	10					ICP
F026	194.00	19.400	10	EHHEHHL				ICP - USN
F095	210.00	21.000	10	H				GFAAS, FAAS
F136	190.00	21.111	9	EHH				AAS
F002	199.50	22.167	9					ICP-MS
F094	226.50	22.650	10	H				ICP-MS
F046	246.00	24.600	10					ICP-MS
F139	248.50	24.850	10					ICP
F019	125.00	25.000	5					Flame AAS
F142a	254.00	25.400	10	VHHLEHHVHHH				ICP-MS
F025	264.00	26.400	10	EHEH				ICP-MS
F014	189.50	27.071	7	H				ICP
F015	137.50	27.500	5					ICP
F060	285.00	28.500	10	HH	BIASED HIGH	8.78	-0.5191	ICPMS
F012	265.00	29.444	9	EHEHVHEHH	BIASED HIGH*	-0.58	4.3067	ICP-OES
F141	194.50	32.417	6	EHEHHEHH	BIASED HIGH*	4.95	6.8059	

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

OVERALL AVERAGE
RANK IS 17.252

Nickel

PARAMETER: 34095 Selenium ug/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Elements

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

SAMPLE	1 = TM-FSKEN		2 = TM-24.2		3 = TM-27.2		4 = TM-26.2		5 = TM-28.2		6 = TMDA-51.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	0.1	4.50	3.7	18.00	1.7	14.00	5.3	16.50	4.0	16.00	11.8	9.00
F009	0.1	4.50	3.1	12.50	1.6	10.50	5.2	15.00	3.8	12.00	12.	14.00
F010	<1.	0.00	4. H	21.50	2.	18.50	6. H	20.50	5. H	21.00	13.	19.00
F011	<1.	0.00	3.	7.00	1. L	1.50	5.	9.50	3. L	1.50	12.	14.00
F012	24. EH	8.00	24. EH	24.00	18. EH	24.00	25. EH	25.00	18. EH	24.00	28. EH	26.00
F014	<1.0	0.00	3.3	16.00	1.7	14.00	5.1	14.00	3.7	10.50	11.4	8.00
F015	<1.	0.00	3.3	16.00	1.2	4.00	5.0	9.50	3.7	10.50	11.9	11.00
F025	<0.2	0.00	2.9	4.00	1.4	6.00	4.8	4.00	3.6	8.00	10.5 L	5.00
F031	<3.	0.00	3.	7.00	4. VH	22.50	5.	9.50	3. L	1.50	12.	14.00
F032	<0.5	0.00	3.	7.00	1.5T	9.00	5.	9.50	3.5	5.50	12.	14.00
F037	<1.0	0.00	3.709	19.00	1.608	12.00	5.998 H	19.00	4.387	19.00	13.86 H	22.00
F038	<1.	0.00	3.	7.00	2.	18.50	5.	9.50	4.	16.00	10. L	3.00
F046	0.22	7.00	3.74	20.00	1.95	17.00	5.96 H	18.00	4.56	20.00	13.7 H	21.00
F048	<1.0	0.00	5.63 EH	23.00	3.34 VH	21.00	7.60 VH	23.00	5.53 VH	22.00	16.23 VH	25.00
F060	<4.	0.00	<4.	0.00	4. VH	22.50	5.	9.50	<4.	0.00	13.	19.00
F093	<2.0	0.00	3.0	7.00	<2.0	0.00	<2.0 EL	0.00	<2.0 VL	0.00	12.3	17.00
F094	<0.4	0.00	3.2	14.00	1.8	16.00	4.5	1.00	3.5	5.50	11.	7.00
F095	<6.0	0.00	<6.0	0.00	<6.0	0.00	7.7 VH	24.00	7.2 EH	23.00	14.1 H	23.00
F096	<1.	0.00	2.67	1.00	1.39	5.00	4.58	3.00	3.47	4.00	10.7	6.00
F131	0.12	6.00	2.73	2.00	1.16	3.00	6.02 H	22.00	4.21	18.00	14.54 VH	24.00
F133	<1.	0.00	4. H	21.50	1. L	1.50	6. H	20.50	4.	16.00	13.	19.00
F134	0.01	2.00	3.07	11.00	1.41	7.00	5.04	13.00	3.56	7.00	11.81	10.00
F137	-0.2 EL	1.00	3.3	16.00	1.6	10.50	5.3	16.50	3.9	13.50	12.	14.00
F138	0.07	3.00	3.05	10.00	1.44	8.00	4.82	5.00	3.64	9.00	6.08 EL	1.00
F141	<0.4	0.00	3.1	12.50	1.7	14.00	4.9	6.00	3.9	13.50	10.3 L	4.00
F143	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10. L	0.00
F145	<1.	0.00	2.79	3.00	2.06	20.00	4.53	2.00	3.18	3.00	9.88 L	2.00
MEDIAN	0.1000		3.1000		1.6540		5.0400		3.8500		12.0000	
1CRIT	0.5000		0.7080		0.5923		0.8632		0.7680		1.4200	
N	6		22		21		23		21		24	
MEAN	0.1033		3.3463		1.9313		5.4282		4.1113		12.2092	
3STDEV	0.1887		1.8408		2.4032		2.4630		2.6190		4.4964	

PARAMETER: 34095 Selenium ug/L

SAMPLE	7 = TMDA-53.2		8 = TMDA-61t		9 = TMDA-62t		10 = TMDA-63t	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	22.8	18.00	39.3	15.00	47.7 L	4.00	100.	10.50
F009	22.	14.50	39.	14.00	53.	12.00	104.	17.00
F010	19. L	5.50	37.	10.00	52.	10.50	103.	15.00
F011	22.	14.50	36.	5.50	52.	10.50	95.	4.50
F012	38. EH	27.00	44. H	22.50	58.	20.50	89. VL	3.00
F014	21.9	12.00	38.1	13.00	54.2	13.00	105.	18.00
F015	22.2	17.00	43.0 H	20.00	58.0	20.50	101.	13.00
F025	20.0	7.50	37.0	10.00	57.0	18.00	74.0 VL	1.00
F031	19. L	5.50	32. VL	4.00	43. VL	1.00	86. VL	2.00
F032	22.	14.50	40.	17.00	56.	17.00	110.	20.00
F037	26.85 VH	24.00	47.21 VH	25.00	65.2 VH	25.00	130. VH	25.00
F038	20.	7.50	40.	17.00	50.	6.50	100.	10.50
F046	25.3 H	23.00	43.9 H	21.00	61.4 H	24.00	119. VH	24.00
F048	28.86 VH	26.00	49.53 VH	27.00	68.43 VH	27.00	134.44 VH	27.00
F060	23.	19.50	42.	19.00	59.	22.00	115. VH	22.00
F093	15.1 VL	2.00	27.0 VL	2.00	54.5	14.00	97.9	7.00
F094	20.1	9.00	36.	5.50	50.2	9.00	98.3	8.00
F095	18.8 L	4.00	48.6 VH	26.00	57.1	19.00	116. VH	23.00
F096	20.5	10.00	36.7	8.00	48.5 L	5.00	95.8	6.00
F131	27.74 VH	25.00	46.90 VH	24.00	67.80 VH	26.00	130.3 VH	26.00
F133	24.	21.00	44. H	22.50	61. H	23.00	111. H	21.00
F134	15.81 VL	3.00	38.07	12.00	55.20	16.00	100.40	12.00
F137	23.	19.50	40.	17.00	55.	15.00	107.	19.00
F138	21.3	11.00	36.4	7.00	50.1	8.00	99.5	9.00
F141	22.	14.50	37.	10.00	50.	6.50	95.	4.50
F143	24.2	22.00	31.8 VL	3.00	45.6 VL	3.00	102.	14.00
F145	12.22 EL	1.00	26.31 VL	1.00	43.2 VL	2.00	103.2	16.00
MEDIAN	22.0000		39.0000		54.5000		102.0000	
1CRIT	2.2200		3.5800		4.8200		8.6200	
N	25		25		25		25	
MEAN	21.8984		39.2392		54.4680		104.5360	
3STDEV	9.5663		14.8336		17.2264		32.1616	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	125.50	12.550	10	L				HYDRIDE - ICP-OES
F009	126.00	12.600	10					
F010	141.50	15.722	9	H H H L				Hydride AAS
F011	68.50	7.611	9	L L				
F012	204.00	20.400	10	EHEHEHEHEHEHEHH VL	BIASED HIGH	-32.44	20.1652	ICPMS
F014	118.50	13.167	9					ICP-MS
F015	121.50	13.500	9	H				GFAA
F025	63.50	7.056	9	L VL				AA HYDRIDE
F031	67.00	7.444	9	VH L L VLVLVL				ICP
F032	113.50	12.611	9					FAAS
F037	190.00	21.111	9	H H VHVHVHVH	BIASED HIGH	26.57	-0.9908	ICP-MS
F038	95.50	10.611	9	L				ICPMS
F046	195.00	19.500	10	H H H H H VH				ICP-MS
F048	221.00	24.556	9	EHVHVHVHVHVHVHVHVH	BIASED HIGH	29.37	0.5601	ICP
F060	133.50	19.071	7	VH VH				ICP
F093	49.00	8.167	6	ELVL VLVL				ICP - Hydride
F094	75.00	8.333	9					ICP-MS
F095	142.00	20.286	7	VHEHH L VH VH				ICP - USN
F096	48.00	5.333	9	L	BIASED LOW	-6.60	-0.3097	ICP-MS
F131	176.00	17.600	10	H VHVHVHVHVH				Hydride Psa AAF
F133	166.00	18.444	9	H L H H H H				ICP-MS
F134	93.00	9.300	10	VL				FIAS AAS
F137	142.00	14.200	10	EL				ICP-MS
F138	71.00	7.100	10	EL				HG-AFS
F141	85.50	9.500	9	L				Hydride, AAS
F143	42.00	10.500	4	L VLVL	INSUFFICIENT DATA			ICP
F145	50.00	5.556	9	L ELVLVL	BIASED LOW*	-2.97	-3.1713	HG-AAS

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

OVERALL AVERAGE
RANK IS 13.071

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F096	48.00	5.333	9	L	BIASED LOW	-6.60	-0.3097	ICP-MS
F145	50.00	5.556	9	LELVLVL	BIASED LOW*	-2.97	-3.1713	HG-AAS
F025	63.50	7.056	9	LVL				AA HYDRIDE
F138	71.00	7.100	10	EL				HG-AFS
F031	67.00	7.444	9	VHLLVLVLVL				ICP
F011	68.50	7.611	9	LL				ICP - Hydride
F093	49.00	8.167	6	ELVLVLVL				ICP-MS
F094	75.00	8.333	9					FIAS AAS
F134	93.00	9.300	10	VL				Hydride, AAS
F141	85.50	9.500	9	L				ICP
F143	42.00	10.500	4	LVLVL	INSUFFICIENT DATA			ICPMS
F038	95.50	10.611	9	L				HYDRIDE - ICP-OES
F003	125.50	12.550	10	L				
F009	126.00	12.600	10					FAAS
F032	113.50	12.611	9					ICP-MS
F014	118.50	13.167	9					GFAA
F015	121.50	13.500	9	H				ICP-MS
F137	142.00	14.200	10	EL				Hydride AAS
F010	141.50	15.722	9	HHHL				Hydride Psa AAF
F131	176.00	17.600	10	HVHVHVHVHVH				ICP-MS
F133	166.00	18.444	9	HLHHHH				ICP
F060	133.50	19.071	7	VHVH				ICP-MS
F046	195.00	19.500	10	HHHHHVH				ICP - USN
F095	142.00	20.286	7	VHEHHLVHVH				ICPMS
F012	204.00	20.400	10	EHEHEHEHEHEHEHHVL	BIASED HIGH	-32.44	20.1652	ICP-MS
F037	190.00	21.111	9	HHVHVHVHVH	BIASED HIGH	26.57	-0.9908	ICP
F048	221.00	24.556	9	EHVHVHVHVHVHVHVHVH	BIASED HIGH	29.37	0.5601	

* 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 13.071

Selenium

PARAMETER: 47095 Silver ug/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Elements

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

SAMPLE	1 = TM-FSKEN		2 = TM-24.2		3 = TM-27.2		4 = TM-26.2		5 = TM-28.2		6 = TMDA-51.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	<0.1	0.00	3.7	12.00	2.1	13.00	7.0	17.50	3.4	14.00	13.	12.00
F009	<0.1	0.00	3.1	3.50	1.8	3.00	5.6 L	3.00	2.8	3.00	11.3 L	4.00
F010	<0.3	0.00	4.0	17.00	2.2	14.00	6.7	10.00	3.4	14.00	13.0	12.00
F011	<0.1	0.00	3.5	6.00	2.	9.00	6.7	10.00	3.3	11.00	13.	12.00
F012	<5.	0.00	196. EH	21.00	189. EH	22.00	446. EH	23.00	365. EH	22.00	584. EH	23.00
F015	<0.5	0.00	3.1	3.50	1.8	3.00	6.7	10.00	3.	5.00	13.	12.00
F025	<0.1	0.00	3.9	16.00	1.7	1.00	5.8	4.00	3.0	5.00	12.1	5.00
F032	<0.6	0.00	3.66	11.00	1.86	5.00	6.65	8.00	3.57	17.00	12.9	9.00
F037	<0.2	0.00	3.76	15.00	2.204	15.00	7.17	19.00	3.5	16.00	13.82	18.00
F038	<0.01	0.00	3.6	8.50	2.01	11.00	6.56	7.00	3.11	8.00	12.6	7.00
F046	<0.1	0.00	3.72	13.00	2.09	12.00	6.99	16.00	3.40	14.00	13.4	16.00
F048	<1.0	0.00	3.59	7.00	1.92	6.00	6.94	15.00	3.23	9.00	13.68	17.00
F060	<1.	0.00	3.	2.00	2.	9.00	6.	6.00	3.	5.00	11. L	3.00
F093	<2.1	0.00	2.80 L	1.00	3.16 EH	21.00	5.56 L	2.00	3.60	18.00	12.6	7.00
F094	<0.2	0.00	<0.2 EL	0.00	1.8	3.00	4.9 VL	1.00	2.2 EL	1.00	9.7 VL	1.00
F095	0.7 H	3.00	3.3	5.00	2.3	16.00	5.9	5.00	3.1	7.00	10.4 VL	2.00
F096	<0.1	0.00	3.61	10.00	2.00	9.00	6.77	13.00	3.37	12.00	13.0	12.00
F133	<0.05	0.00	4.63 H	20.00	2.60	19.50	8.55 VH	22.00	4.13 H	21.00	15.98 VH	21.00
F134	0.02	2.00	3.75	14.00	2.32	17.00	6.83	14.00	3.69	19.00	13.86	19.00
F137	-0.2	1.00	4.1	18.00	2.6	19.50	8.1 H	21.00	4.1 H	20.00	16. VH	22.00
F138	<0.006	0.00	3.6	8.50	1.99	7.00	6.74	12.00	3.26	10.00	12.6	7.00
F141	<5.	0.00	<5.	0.00	<5.	0.00	7.	17.50	<5.	0.00	14.	20.00
F145	<0.8	0.00	4.4	19.00	2.4	18.00	7.3	20.00	2.7	2.00	13.1	15.00
MEDIAN OR *TARGET CONC.	*0.0100		3.6600		2.0500		6.7400		3.3350		13.0000	
1CRIT	0.5000		0.7528		0.6240		0.9992		0.7268		1.5000	
N	1		19		20		21		20		21	
MEAN	0.0200		3.6853		2.1577		6.7410		3.3330		13.0638	
3STDEV	-		1.2116		0.9874		2.1459		1.0940		3.9164	

PARAMETER: 47095 Silver ug/L

SAMPLE	7 = TMDA-53.2		8 = TMDA-61t		9 = TMDA-62t		10 = TMDA-63t	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	19.	16.50	33. VH	16.00	43. VH	22.00	38. VH	19.50
F009	15.5 L	5.00	12.7 VL	7.00	8.7 VL	4.00	8.2 VL	2.00
F010	17.2	8.00	12.0 VL	4.50	9.7 VL	6.00	28.2	13.00
F011	18.	11.00	35. VH	19.00	30.5 VH	17.00	28.6	14.00
F012	1108. EH	23.00	665. EH	23.00	572. EH	23.00	1613. EH	23.00
F015	18.	11.00	34. VH	17.00	33. VH	19.00	40. VH	21.00
F025	15.8 L	6.00	11.2 VL	3.00	8.4 VL	3.00	26.2	9.00
F032	18.1	14.00	34.2 VH	18.00	35.6 VH	20.00	30.2	16.00
F037	19.03	18.00	12.37 VL	6.00	10.06 VL	7.00	30.68	17.00
F038	18.3	15.00	22.6	13.00	23. H	15.00	27.6	11.00
F046	19.0	16.50	35.1 VH	20.00	31.7 VH	18.00	28.0	12.00
F048	18.08	13.00	13.12 VL	8.00	12.77 VL	9.00	29.44	15.00
F060	15. VL	4.00	12. VL	4.50	9. VL	5.00	38. VH	19.50
F093	17.0	7.00	18.0 VL	11.00	21.1	13.00	24.8 L	8.00
F094	14.3 VL	3.00	8. VL	1.00	6.6 VL	1.00	7.1 VL	1.00
F095	0.7 EL	1.00	30.7 VH	15.00	27.6 VH	16.00	15.4 VL	5.00
F096	18.0	11.00	24.9 H	14.00	22.4	14.00	26.4	10.00
F133	23.3 VH	22.00	17.98 VL	10.00	10.60 VL	8.00	24.5 L	7.00
F134	21.04 VH	21.00	21.75	12.00	20.36	12.00	14.79 VL	4.00
F137	13. VL	2.00	8.7 VL	2.00	7.4 VL	2.00	13. VL	3.00
F138	17.6	9.00	35.2 VH	21.00	18.6	11.00	44.4 VH	22.00
F141	20. H	20.00	37. VH	22.00	38. VH	21.00	31. H	18.00
F145	19.8	19.00	17.6 VL	9.00	14.1 VL	10.00	18. VL	6.00
MEDIAN OR *TARGET								
CONC.	18.0000		21.7500		20.3600		28.0000	
1CRIT	1.9000		2.2000		2.0888		2.7000	
N	21		21		21		21	
MEAN	17.8595		22.8152		20.7424		26.9243	
3STDEV	6.8004		29.4768		32.7267		26.9198	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	142.50	15.833	9	VHVHVH				ICP-OES
F009	34.50	3.833	9	L L L VLVLVL	BIASED LOW	-63.12	2.9547	
F010	98.50	10.944	9	VLVL				ICP-OES
F011	109.00	12.111	9	VHVH				
F012	203.00	22.556	9	EHEHEHEHEHEHEHEHEH	BIASED HIGH	4009.93	103.7446	ICPMS
F015	101.50	11.278	9	VHVHVH				GFAA, ICP
F025	52.00	5.778	9	L VLVL				ICP-MS
F032	118.00	13.111	9	VHVH				ICP-AES
F037	131.00	14.556	9	VLVL				ICP-MS
F038	95.50	10.611	9	H				ICPMS
F046	137.50	15.278	9	VHVH				ICP-MS
F048	99.00	11.000	9	VLVL				ICP
F060	58.00	6.444	9	L VLVLVLVH				ICP
F093	88.00	9.778	9	L EHL VL L				ICP
F094	12.00	1.500	8	EL VLELVLVLVLVLVL	BIASED LOW	-74.00	3.1442	ICP-MS
F095	75.00	7.500	10	H VLELVHVHVL				ICP - OES
F096	105.00	11.667	9	H				ICP-MS
F133	150.50	16.722	9	H VHH VHVHVLVLL				ICP-MS
F134	134.00	13.400	10	VH VL				GFAAS
F137	110.50	11.050	10	H H VHVLVLVLVL				ICP-MS
F138	107.50	11.944	9	VH VH				ICP-MS
F141	118.50	19.750	6	H VHVHH	BIASED HIGH	44.90	-1.5460	AAS
F145	118.00	13.111	9	VLVLVL				ICP-AES

OVERALL AVERAGE
RANK IS 11.646

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F094	12.00	1.500	8	ELVLELVLVLVLVLVL	BIASED LOW	-74.00	3.1442	ICP-MS
F009	34.50	3.833	9	LLLVLVLVL	BIASED LOW	-63.12	2.9547	
F025	52.00	5.778	9	LVLVL				ICP-MS
F060	58.00	6.444	9	LVLVLVLVH				ICP
F095	75.00	7.500	10	HVLELVHVHVL				ICP - OES
F093	88.00	9.778	9	LEHLVLL				ICP
F038	95.50	10.611	9	H				ICPMS
F010	98.50	10.944	9	VLVL				ICP-OES
F048	99.00	11.000	9	VLVL				ICP
F137	110.50	11.050	10	HHVHVLVLVLVL				ICP-MS
F015	101.50	11.278	9	VHVHVH				GFAA, ICP
F096	105.00	11.667	9	H				ICP-MS
F138	107.50	11.944	9	VHVH				ICP-MS
F011	109.00	12.111	9	VHVH				
F032	118.00	13.111	9	VHVH				ICP-AES
F145	118.00	13.111	9	VLVLVL				ICP-AES
F134	134.00	13.400	10	VHVL				GFAAS
F037	131.00	14.556	9	VLVL				ICP-MS
F046	137.50	15.278	9	VHVH				ICP-MS
F003	142.50	15.833	9	VHVHVH				ICP-OES
F133	150.50	16.722	9	HVHHVHVHVLVLL				ICP-MS
F141	118.50	19.750	6	HVHVHH	BIASED HIGH	44.90	-1.5460	AAS
F012	203.00	22.556	9	EHEHEHEHEHEHEHEHEH	BIASED HIGH	4009.93	103.7446	ICPMS

OVERALL AVERAGE
RANK IS 11.646

PARAMETER: 38095 Strontium ug/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Elements

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

SAMPLE	1 = TM-FSKEN		2 = TM-24.2		3 = TM-27.2		4 = TM-26.2		5 = TM-28.2		6 = TMDA-51.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	28.6	13.50	69.7	17.00	54.0	16.50	100.0	16.50	49.7	14.00	121.	15.00
F009	28.	9.50	66.	9.00	52.	9.00	95.	11.00	49.	11.00	114.	4.50
F010	27.	4.00	64.	3.00	50.	4.00	91.	4.00	46.	4.00	111.	2.50
F011	27.9	7.50	64.4	6.00	51.	5.00	92.2	5.00	47.1	5.00	115.	7.00
F015	30.	21.00	73.	22.00	57.	21.00	104. H	21.50	53.	21.00	127.	20.00
F024	28.	9.50	69.	15.50	55.	18.00	100.	16.50	50.	16.00	120.	14.00
F025	29.	17.00	69.	15.50	54.	16.50	102.	20.00	55. H	22.00	129. H	21.00
F032	29.	17.00	71.4	19.00	55.5	19.00	101.	18.00	52.6	19.50	122.	17.00
F032b	29.	17.00	71.9	21.00	57.1	22.00	104. H	21.50	52.6	19.50	122.	17.00
F038	28.6	13.50	67.2	12.00	52.4	11.00	94.4	8.50	48.2	8.00	122.	17.00
F046	27.6	5.00	66.7	10.00	52.0	9.00	95.9	12.00	48.4	9.00	117.	9.50
F048	29.42	19.00	71.42	20.00	55.66	20.00	101.9	19.00	51.89	18.00	123.5	19.00
F060	30.1	22.00	65.5	8.00	51.6	6.00	93.2	7.00	48.6	10.00	114.	4.50
F094	27.9	7.50	67.8	13.00	53.	13.50	98.5	15.00	49.5	12.00	118.	11.50
F095	28.1	11.00	66.8	11.00	52.0	9.00	94.5	10.00	47.7	6.50	115.	7.00
F096	28.8	15.00	68.5	14.00	53.4	15.00	97.7	14.00	49.9	15.00	118.2	13.00
F131	0.09 EL	1.00	3.42 EL	1.00	1.20 EL	1.00	6.20 EL	1.00	1.46 EL	1.00	24.54 EL	1.00
F133	29.5	20.00	70.5	18.00	53.0	13.50	97.3	13.00	50.3	17.00	118.0	11.50
F136	27.7	6.00	64.5	7.00	51.8	7.00	94.4	8.50	47.7	6.50	117.	9.50
F137	28.5	12.00	64.2	4.00	52.9	12.00	90.7	3.00	49.6	13.00	115.	7.00
F138	26.9	3.00	64.3	5.00	48.8	3.00	92.5	6.00	45.8	3.00	111.	2.50
F139	24.3 EL	2.00	58.4 L	2.00	45.38 L	2.00	82.4 VL	2.00	42.36 L	2.00	1147. EH	22.00
MEDIAN	28.3000		67.0000		52.6500		95.4500		49.2500		118.0000	
1CRIT	4.0480		6.3700		5.5090		8.0770		5.3050		9.4300	
N	20		20		20		19		20		20	
MEAN	28.1910		67.0610		52.5220		95.5053		48.9975		118.4850	
3STDEV	3.5703		9.6692		7.5418		14.0193		7.5406		14.1922	

PARAMETER: 38095 Strontium ug/L

SAMPLE	7 = TMDA-53.2		8 = TMDA-61t		9 = TMDA-62t		10 = TMDA-63t	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	389.	18.00	70.2	17.00	565.	16.00	1380.	15.50
F009	383.	13.00	66.	8.00	570.	19.00	1390.	17.00
F010	345. L	2.00	64.	4.00	512. L	4.00	1.29 VL	1.00
F011	362.	4.00	65.4	6.00	522.	6.00	1340.	10.00
F015	398.	21.00	73.	22.00	588. H	22.00	1450. H	22.00
F024	380.	12.00	70.	16.00	560.	14.50	1400.	18.00
F025	392.	19.00	71.	18.50	583.	21.00	1.46 VL	2.00
F032	384.	14.00	69.1	14.00	547.	10.00	1310.	6.00
F032b	395.4	20.00	72.5	21.00	576.	20.00	1374.	14.00
F038	372.	10.00	71.	18.50	545.	8.00	1350.	11.00
F046	388.	16.00	66.5	9.00	568.	17.00	1408.	20.00
F048	388.9	17.00	71.68	20.00	568.2	18.00	1403.2	19.00
F060	366.	6.00	67.8	10.00	552.	11.50	1380.	15.50
F094	371.	8.00	69.2	15.00	560.	14.50	1370.	13.00
F095	365.	5.00	65.7	7.00	53.4 EL	1.00	1318.	7.00
F096	371.4	9.00	68.9	12.00	545.7	9.00	1352.	12.00
F131	118.1 EL	1.00	62.66	3.00	97.35 EL	2.00	164.1 VL	4.00
F133	387.	15.00	69.0	13.00	557.	13.00	1335.	9.00
F136	367.	7.00	68.1	11.00	526.	7.00	1326.	8.00
F137	346. L	3.00	64.9	5.00	517.	5.00	1290.	5.00
F138	374.	11.00	61.7 L	2.00	552.	11.50	1411.	21.00
F139	465.4 EH	22.00	59.3 L	1.00	311.6 VL	3.00	100.7 VL	3.00
MEDIAN	377.0000		68.5000		552.0000		1351.0000	
1CRIT	24.9700		6.4600		35.4700		83.4100	
N	20		20		20		20	
MEAN	376.2350		67.7670		516.7425		-	
3STDEV	43.8365		8.9038		333.2921		-	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	159.00	15.900	10					ICP-OES
F009	111.00	11.100	10					
F010	32.50	3.250	10	L L VL	BIASED LOW	-94.27	115.3209	ICP-OES
F011	61.50	6.150	10					
F015	213.50	21.350	10	H H H	BIASED HIGH	7.17	-0.4055	ICP
F024	150.00	15.000	10					ICP-AES
F025	172.50	17.250	10	H H VL				ICP
F032	153.50	15.350	10					ICP-AES
F032b	193.00	19.300	10	H	BIASED HIGH*	1.76	4.6794	ICP-MS
F038	117.50	11.750	10					ICPMS
F046	116.50	11.650	10					ICP-MS
F048	189.00	18.900	10		BIASED HIGH*	3.66	0.5743	ICP
F060	100.50	10.050	10					ICP
F094	123.00	12.300	10					ICP-MS
F095	74.50	7.450	10	EL				ICP - OES
F096	128.00	12.800	10					ICP
F131	16.00	1.600	10	ELELELELELELEL ELVL	BIASED LOW	-87.35	13.0146	GFAA
F133	143.00	14.300	10					ICP-MS
F136	77.50	7.750	10					ICP
F137	69.00	6.900	10	L				ICP-MS
F138	68.00	6.800	10	L				ICP-MS
F139	61.00	6.100	10	ELL L VLL EHEHL VLVL				ICP-OES

* 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 11.500

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F131	16.00	1.600	10	ELELELELELELELELVL	BIASED LOW	-87.35	13.0146	GFAA
F010	32.50	3.250	10	LLVL	BIASED LOW	-94.27	115.3209	ICP-OES
F139	61.00	6.100	10	ELLLVLLEHEHLVLVL				ICP-OES
F011	61.50	6.150	10					
F138	68.00	6.800	10	L				ICP-MS
F137	69.00	6.900	10	L				ICP-MS
F095	74.50	7.450	10	EL				ICP - OES
F136	77.50	7.750	10					ICP
F060	100.50	10.050	10					ICP
F009	111.00	11.100	10					
F046	116.50	11.650	10					ICP-MS
F038	117.50	11.750	10					ICPMS
F094	123.00	12.300	10					ICP-MS
F096	128.00	12.800	10					ICP
F133	143.00	14.300	10					ICP-MS
F024	150.00	15.000	10					ICP-AES
F032	153.50	15.350	10					ICP-AES
F003	159.00	15.900	10					ICP-OES
F025	172.50	17.250	10	HHVL				ICP
F048	189.00	18.900	10		BIASED HIGH*	3.66	0.5743	ICP
F032b	193.00	19.300	10	H	BIASED HIGH*	1.76	4.6794	ICP-MS
F015	213.50	21.350	10	HHH	BIASED HIGH	7.17	-0.4055	ICP

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

OVERALL AVERAGE
RANK IS 11.500

PARAMETER: 81095 Thallium ug/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Elements

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

SAMPLE	1 = TM-FSKEN		2 = TM-24.2		3 = TM-27.2		4 = TM-26.2		5 = TM-28.2		6 = TMDA-51.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	0.004	3.00	3.80	6.00	1.78	7.00	4.93	4.00	3.64	5.00	19.7	6.00
F011	<0.1	0.00	3.6	4.00	1.7	2.50	9.2 EH	15.00	3.5	3.00	18.4	3.00
F012	<5.	0.00	7. EH	15.00	<5.	0.00	8. VH	14.00	6. EH	13.00	32. EH	15.00
F014	<1.0	0.00	3.8	6.00	1.8	8.00	5.1	9.00	3.8	9.00	20.0	10.00
F025	<1.	0.00	4.	11.50	2.	12.00	5.	7.00	4.	12.00	20.	10.00
F038	<0.05	0.00	3.87	8.00	1.83	9.00	4.97	6.00	3.68	6.50	19.8	7.00
F046	<0.1	0.00	3.50	2.00	1.70	2.50	4.43	1.00	3.34	1.00	17.0 EL	1.00
F048	<1.0	0.00	3.46	1.00	1.45 EL	1.00	4.69	3.00	3.37	2.00	19.33	5.00
F060	<4.	0.00	4.	11.50	<4.	0.00	6.	12.00	<4.	0.00	22.	14.00
F093	1.5 VH	4.00	4.9 EH	14.00	3.5 EH	13.00	7.3 VH	13.00	6.1 EH	14.00	20.8	13.00
F094	<0.05	0.00	4.07	13.00	1.87	11.00	5.18	10.00	3.91	11.00	20.2	12.00
F096	<1.	0.00	3.92	10.00	1.84	10.00	5.19	11.00	3.84	10.00	20.0	10.00
F133	<0.05	0.00	3.88	9.00	1.73	5.00	5.03	8.00	3.68	6.50	19.88	8.00
F137	-0.005	1.00	3.57	3.00	1.72	4.00	4.68	2.00	3.60	4.00	18.3	2.00
F138	0.002	2.00	3.8	6.00	1.75	6.00	4.96	5.00	3.71	8.00	19.2	4.00
MEDIAN	0.0030		3.8700		1.7800		5.0300		3.6950		19.8800	
1CRIT	0.7500		0.9996		0.8324		1.0924		0.9856		2.2804	
N	2		13		11		13		12		13	
MEAN	0.0030		3.9008		1.7927		5.4638		3.8942		19.8162	
3STDEV	-		0.9983		0.2575		2.9743		1.9681		2.7501	

SAMPLE	7 = TMDA-53.2		8 = TMDA-61t		9 = TMDA-62t		10 = TMDA-63t	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	15.8	7.00	36.8	4.50	53.0	7.50	97.4	5.00
F011	14.6	2.00	35.	3.00	49.6	3.00	93.8	3.00
F012	26. EH	15.00	58. EH	15.00	82. EH	15.00	139. EH	15.00
F014	16.0	8.00	37.0	6.50	53.0	7.50	98.0	7.00
F025	15.	3.00	38.	10.50	55.	13.00	113. VH	14.00
F038	16.1	9.50	38.5	13.00	53.9	9.00	99.3	11.00
F046	14.0 L	1.00	31.1 EL	1.00	43.2 EL	1.00	79.3 VL	1.00
F048	15.41	5.00	36.80	4.50	52.23	4.00	97.67	6.00
F060	25. EH	14.00	39.	14.00	57.	14.00	109. H	13.00
F093	17.6	13.00	37.9	9.00	54.9	11.50	99.2	10.00
F094	16.5	12.00	38.2	12.00	54.9	11.50	102.	12.00
F096	16.1	9.50	38.0	10.50	52.3	5.00	95.9	4.00
F133	16.18	11.00	37.3	8.00	54.0	10.00	98.6	9.00
F137	15.1	4.00	33.9	2.00	46.2 L	2.00	84.0 VL	2.00
F138	15.7	6.00	37.0	6.50	52.6	6.00	98.3	8.00
MEDIAN	16.0000		37.3000		53.0000		98.3000	
1CRIT	1.9700		3.6740		4.9300		8.5540	
N	13		13		13		13	
MEAN	16.5454		37.1846		52.9715		98.9361	
3STDEV	7.6369		4.0622		7.8080		19.9123	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	55.00	5.500	10					ICP-MS
F011	38.50	4.278	9	EH				
F012	117.00	14.625	8	EH VHEHEHEHEHEHEH	BIASED HIGH	41.93	2.6891	ICPMS
F014	71.00	7.889	9					ICP-MS
F025	93.00	10.333	9	VH				ICP-MS
F038	79.00	8.778	9					ICPMS
F046	11.50	1.278	9	ELL ELELVL	BIASED LOW	-19.65	0.6283	ICP-MS
F048	31.50	3.500	9	EL	BIASED LOW*	-0.35	-0.4008	ICP
F060	92.50	13.214	7	EH H	BIASED HIGH*	8.33	1.3099	ICP
F093	114.50	11.450	10	VHEHEHVHEH	BIASED HIGH*	-0.81	1.6774	ICP
F094	104.50	11.611	9		BIASED HIGH*	3.68	-0.0912	ICP-MS
F096	80.00	8.889	9					ICP-MS
F133	74.50	8.278	9					ICP-MS
F137	26.00	2.600	10	L VL	BIASED LOW	-14.42	0.6643	ICP-MS
F138	57.50	5.750	10					ICP-MS

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

OVERALL AVERAGE
RANK IS 7.691

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F046	11.50	1.278	9	ELLELELVL	BIASED LOW	-19.65	0.6283	ICP-MS
F137	26.00	2.600	10	LVL	BIASED LOW	-14.42	0.6643	ICP-MS
F048	31.50	3.500	9	EL	BIASED LOW*	-0.35	-0.4008	ICP
F011	38.50	4.278	9	EH				
F003	55.00	5.500	10					ICP-MS
F138	57.50	5.750	10					ICP-MS
F014	71.00	7.889	9					ICP-MS
F133	74.50	8.278	9					ICP-MS
F038	79.00	8.778	9					ICPMS
F096	80.00	8.889	9					ICP-MS
F025	93.00	10.333	9	VH				ICP-MS
F093	114.50	11.450	10	VHEHEHVHEH	BIASED HIGH*	-0.81	1.6774	ICP
F094	104.50	11.611	9		BIASED HIGH*	3.68	-0.0912	ICP-MS
F060	92.50	13.214	7	EHH	BIASED HIGH*	8.33	1.3099	ICP
F012	117.00	14.625	8	EHVHEHEHEHEHEHEH	BIASED HIGH	41.93	2.6891	ICPMS

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

OVERALL AVERAGE
RANK IS 7.691

PARAMETER: 92095 Uranium ug/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Elements

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

SAMPLE	1 = TM-FSKEN		2 = TM-24.2		3 = TM-27.2		4 = TM-26.2		5 = TM-28.2		6 = TMDA-51.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	0.014	3.00	4.40	8.00	1.98	7.00	7.58	7.00	5.72	8.00	30.3	7.00
F009	<1.	0.00	3.6 L	1.00	1.7	3.00	6.4 L	1.00	4.8 L	2.00	25. VL	3.00
F010	<5.	0.00	6. EH	14.00	<5.	0.00	8.	13.00	7. EH	14.00	28. L	4.00
F011	<0.1	0.00	4.3	7.00	1.9	5.00	6.6 L	4.00	5.6	7.00	28.7	6.00
F014	<0.5	0.00	4.5	9.00	2.1	11.50	7.9	11.00	6.0	10.50	30.8	9.00
F024	<0.5	0.00	3.75	2.00	1.6	2.00	6.55 L	3.00	4.75 L	1.00	24. VL	2.00
F025	<0.4	0.00	4.2	6.00	2.0	8.50	7.7	8.00	5.5	5.00	31.4	12.00
F038	0.01	1.00	4.79	13.00	2.12	13.00	8.31	14.00	6.	10.50	31.7	14.00
F046	<0.05	0.00	3.86	3.00	1.80	4.00	6.47 L	2.00	5.00	3.00	23.9 VL	1.00
F048	<1.0	0.00	3.89	4.00	1.40 EL	1.00	7.20	6.00	5.40	4.00	30.50	8.00
F060	<50.	0.00	<50.	0.00	<50.	0.00	<50.	0.00	<50.	0.00	<50.	0.00
F094	<0.1	0.00	4.6	12.00	2.1	11.50	7.9	11.00	6.1	13.00	31.2	11.00
F133	<0.05	0.00	4.58	11.00	2.00	8.50	7.83	9.00	5.83	9.00	31.0	10.00
F137	0.012	2.00	4.19	5.00	1.93	6.00	7.10	5.00	5.54	6.00	28.2	5.00
F138	0.017	4.00	4.57	10.00	2.06	10.00	7.90	11.00	6.05	12.00	31.5	13.00
MEDIAN	0.0130		4.3500		1.9800		7.6400		5.6600		30.4000	
1CRIT	0.5000		0.7310		0.5888		0.9284		0.8096		2.2940	
N	2		12		11		12		12		12	
MEAN	0.0130		4.3025		1.9245		7.3942		5.6283		29.2167	
3STDEV	-		0.9556		0.4668		1.6824		1.1886		7.2559	

SAMPLE	7 = TMDA-53.2		8 = TMDA-61t		9 = TMDA-62t		10 = TMDA-63t	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	32.6	6.00	36.8	8.00	52.8	7.00	95.9	8.00
F009	28. VL	3.00	30. VL	2.00	44. VL	2.50	81. VL	3.00
F010	34.	13.00	31. VL	3.50	47. VL	5.00	89. L	5.00
F011	31.3	5.00	35.4	7.00	50.4	6.00	91.2	7.00
F014	33.5	9.00	37.5	10.00	54.0	9.00	97.0	10.00
F024	26. VL	1.00	31. VL	3.50	44. VL	2.50	79.5 VL	2.00
F025	34.3	14.00	35.1	6.00	55.1	12.00	111. VH	15.00
F038	33.9	11.50	38.5	13.50	54.3	10.00	98.3	11.00
F046	26.2 VL	2.00	27.8 VL	1.00	38.4 VL	1.00	70.3 EL	1.00
F048	33.62	10.00	37.58	11.00	53.71	8.00	99.54	13.00
F060	<50.	0.00	<50.	0.00	<50.	0.00	90.	6.00
F094	33.4	8.00	37.8	12.00	54.6	11.00	98.7	12.00
F133	33.0	7.00	37.3	9.00	55.5	14.00	96.7	9.00
F137	30.5 L	4.00	33.7	5.00	44.8 VL	4.00	82.5 VL	4.00
F138	33.9	11.50	38.5	13.50	55.3	13.00	101.	14.00
MEDIAN	33.2000		36.1000		53.2550		95.9000	
1CRIT	2.4620		2.6360		3.6653		6.2240	
N	12		11		12		13	
MEAN	31.9933		34.8345		50.8342		92.3339	
3STDEV	7.3380		8.4773		13.1684		21.4468	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	69.00	6.900	10					ICP-MS
F009	20.50	2.278	9	L L L VLVLVLVLVL	BIASED LOW	-15.87	-0.1534	
F010	71.50	8.938	8	EH EHL VLVLL				ICP-AES
F011	54.00	6.000	9	L				
F014	89.00	9.889	9					ICP-MS
F024	19.00	2.111	9	L L VLVLVLVLVL	BIASED LOW	-17.25	-0.1129	Phosphorimetry
F025	86.50	9.611	9	VH				ICP-MS
F038	111.50	11.150	10		BIASED HIGH*	2.31	0.3222	ICPMS
F046	18.00	2.000	9	L VLVLVLVLEL	BIASED LOW	-27.58	1.0324	ICP-MS
F048	65.00	7.222	9	EL				ICP
F060	6.00	6.000	1		INSUFFICIENT DATA			ICP
F094	101.50	11.278	9		BIASED HIGH*	2.71	0.0717	ICP-MS
F133	86.50	9.611	9					ICP-MS
F137	46.00	4.600	10	L VLVL				ICP-MS
F138	112.00	11.200	10		BIASED HIGH	5.04	-0.1226	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 7.354

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F046	18.00	2.000	9	LVLVLVLVLEL	BIASED LOW	-27.58	1.0324	ICP-MS
F024	19.00	2.111	9	LLVLVLVLVLVL	BIASED LOW	-17.25	-0.1129	Phosphorimetry
F009	20.50	2.278	9	LLLVLVLVLVLVL	BIASED LOW	-15.87	-0.1534	
F137	46.00	4.600	10	LVLVL				ICP-MS
F060	6.00	6.000	1		INSUFFICIENT DATA			ICP
F011	54.00	6.000	9	L				
F003	69.00	6.900	10					ICP-MS
F048	65.00	7.222	9	EL				ICP
F010	71.50	8.938	8	EHEHLVLVLL				ICP-AES
F133	86.50	9.611	9					ICP-MS
F025	86.50	9.611	9	VH				ICP-MS
F014	89.00	9.889	9					ICP-MS
F038	111.50	11.150	10		BIASED HIGH*	2.31	0.3222	ICPMS
F138	112.00	11.200	10		BIASED HIGH	5.04	-0.1226	ICP-MS
F094	101.50	11.278	9		BIASED HIGH*	2.71	0.0717	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 7.354

PARAMETER: 23095 Vanadium ug/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Elements

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.5000 BASIC ACCEPTABLE ERROR= 1.5000 CONCENTRATION ERROR INCREMENT= 0.0600

SAMPLE	1 = TM-FSKEN		2 = TM-24.2		3 = TM-27.2		4 = TM-26.2		5 = TM-28.2		6 = TMDA-51.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	0.2	4.00	6.9	11.00	2.4	7.00	12.2	13.00	2.4	6.50	48.	15.50
F009	<1.	0.00	5.9	2.00	2.1	4.00	11.	3.50	2.1	3.00	43. L	3.00
F010	<0.3	0.00	6.8	9.50	2.6	10.50	12.4	16.50	2.6	13.50	48.	15.50
F011	0.2	4.00	6.8	9.50	2.6	10.50	12.3	15.00	2.5	9.50	44.7	6.00
F012	<5.	0.00	13. VH	24.00	6. VH	22.00	17. EH	25.00	<5.	0.00	56. VH	27.00
F014	<1.0	0.00	7.0	15.50	2.8	16.50	14.1	24.00	2.5	9.50	55.2 VH	26.00
F015	<10.	0.00	<10.	0.00	<10.	0.00	<10. L	0.00	<10.	0.00	40. VL	1.00
F019	<5.	0.00	7.	15.50	<5.	0.00	13.	19.00	<5.	0.00	46.	8.00
F024	<1.	0.00	6.	3.00	1. L	1.00	11.	3.50	1. L	1.00	47.	11.00
F025	<2.	0.00	35. EH	26.00	26. EH	24.00	8. EL	1.00	11. EH	22.00	48.	15.50
F032	<1.	0.00	6.59	6.00	2.57	9.00	12.4	16.50	3.04	19.00	48.	15.50
F032b	<1.	0.00	6.96	12.00	2.62	13.00	13.1	20.00	2.6	13.50	48.7	19.00
F038	<1.	0.00	7.	15.50	2.	2.50	12.	10.00	2.	2.00	50.	22.00
F046	0.18	2.00	7.29	20.00	2.61	12.00	13.2	21.00	2.57	12.00	50.4	23.00
F048	<1.0	0.00	6.66	7.00	2.29	5.00	12.25	14.00	2.17	4.00	48.20	18.00
F060	<1.	0.00	7.	15.50	2.	2.50	12.	10.00	3.	17.50	47.	11.00
F093	<1.6	0.00	7.3	21.00	4.3 H	21.00	11.9	8.00	2.5	9.50	46.2	9.00
F094	0.1	1.00	6.7	8.00	2.5	8.00	12.1	12.00	2.5	9.50	47.3	13.00
F095	0.5	7.00	7.4	22.50	2.9	18.00	13.4	22.00	2.8	16.00	49.7	21.00
F096	<3.	0.00	4.2 VL	1.00	<3.	0.00	11.5	6.00	<3.	0.00	45.1	7.00
F131	23.0 EH	9.00	23.3 EH	25.00	19.2 EH	23.00	18.3 EH	26.00	20.2 EH	23.00	41.9 L	2.00
F133	<1.	0.00	7.	15.50	3.	19.00	12.	10.00	3.	17.50	47.	11.00
F137	0.23	6.00	7.27	19.00	2.65	14.00	12.6	18.00	2.70	15.00	51.9	24.00
F138	0.2	4.00	6.49	5.00	2.32	6.00	11.6	7.00	2.32	5.00	44.5	4.50
F139	<0.86	0.00	6.03	4.00	3.08	20.00	8.98 VL	2.00	3.16	21.00	165.4 EH	28.00
F141	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00	54. H	25.00
F143	<2.0	0.00	7.0	15.50	2.8	16.50	11.2	5.00	2.4	6.50	44.5	4.50
F145	0.6	8.00	7.4	22.50	2.7	15.00	13.8	23.00	3.1	20.00	49.3	20.00
MEDIAN	0.2000		7.0000		2.6150		12.2250		2.5700		48.0000	
1CRIT	1.5000		1.8300		1.5669		2.1435		1.5642		4.2900	
N	7		24		22		24		21		26	
MEAN	0.3014		7.7829		3.5473		12.3763		2.9981		48.0615	
3STDEV	0.4801		10.4539		10.5493		4.2393		5.4519		10.1659	

PARAMETER: 23095 Vanadium ug/L

SAMPLE	7 = TMDA-53.2		8 = TMDA-61t		9 = TMDA-62t		10 = TMDA-63t	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	300.	16.50	73.	17.00	112.	12.50	191.	17.00
F009	270. L	3.00	65. L	4.00	101. L	2.00	173. L	3.00
F010	301.	19.00	72.	15.00	112.	12.50	190.	14.50
F011	292.	8.00	70.	10.50	114.	18.00	192.	18.50
F012	305.	22.00	78. H	24.00	118.	23.00	199.	21.50
F014	337. VH	28.00	79. H	25.00	120.	25.00	203. H	25.00
F015	300.	16.50	60. VL	1.00	110.	8.50	190.	14.50
F019	289.	6.00	69.	9.00	112.	12.50	183.	6.50
F024	300.	16.50	71.	12.00	110.	8.50	190.	14.50
F025	331. VH	27.00	103. EH	28.00	117.	20.50	179.	4.50
F032	303.	20.50	71.2	13.00	110.	8.50	185.	10.00
F032b	300.	16.50	75.4	20.00	113.	16.50	196.	20.00
F038	290.	7.00	70.	10.50	110.	8.50	190.	14.50
F046	294.	10.50	76.3	22.00	117.	20.50	199.	21.50
F048	296.7	13.00	73.15	19.00	112.3	15.00	189.4	12.00
F060	309.	23.50	73.	17.00	116.	19.00	200.	23.00
F093	293.5	9.00	66.9	5.00	106.7	4.00	183.6	8.00
F094	298.	14.00	71.6	14.00	112.	12.50	188.	11.00
F095	309.	23.50	75.6	21.00	118.	23.00	201.	24.00
F096	294.4	12.00	68.5	8.00	107.8	6.00	184.3	9.00
F131	266.2 VL	2.00	60.6 VL	2.00	90.7 EL	1.00	168.7 VL	2.00
F133	286.	5.00	73.	17.00	113.	16.50	183.	6.50
F137	294.	10.50	76.8	23.00	118.	23.00	192.	18.50
F138	275. L	4.00	67.8	6.00	102. L	3.00	179.	4.50
F139	96.9 EL	1.00	62.3 VL	3.00	249.7 EH	28.00	42.9 EL	1.00
F141	310.	25.00	85. VH	27.00	127. VH	27.00	206. H	28.00
F143	303.	20.50	68.1	7.00	107.	5.00	205. H	27.00
F145	317.9	26.00	79.4 H	26.00	121. H	26.00	203.2 H	26.00
MEDIAN	299.0000		71.8000		112.1500		190.0000	
1CRIT	19.3500		5.7180		8.1390		12.8100	
N	26		26		26		26	
MEAN	297.2192		71.9865		112.9538		189.8923	
3STDEV	40.3173		16.0273		16.9926		27.4788	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	120.00	12.000	10					ICP-OES
F009	27.50	3.056	9	L L L L L	BIASED LOW	-9.43	-0.2218	
F010	126.50	14.056	9					ICP-OES
F011	109.50	10.950	10					
F012	188.50	23.562	8	VHVHEH VH H	BIASED HIGH*	0.69	5.5110	ICPMS
F014	194.50	21.611	9	VHVHH H	BIASED HIGH	11.15	-0.8729	ICP-MS
F015	41.50	8.300	5	L VL VL				ICP
F019	76.50	10.929	7					ICP
F024	71.00	7.889	9	L L				ICP-AES
F025	168.50	18.722	9	EHEHELEH VHEH				ICP
F032	118.00	13.111	9					ICP-AES
F032b	150.50	16.722	9					ICP-MS
F038	92.50	10.278	9					ICPMS
F046	164.50	16.450	10					ICP-MS
F048	107.00	11.889	9					ICP
F060	139.00	15.444	9					ICP
F093	94.50	10.500	9	H				ICP
F094	103.00	10.300	10					ICP-MS
F095	198.00	19.800	10					ICP - USN
F096	49.00	7.000	7	VL				ICP
F131	115.00	11.500	10	EHEHEHEHEHL VLVLELVL				ICP
F133	118.00	13.111	9					ICP-MS
F137	171.00	17.100	10					ICP-MS
F138	49.00	4.900	10	L L	BIASED LOW	-7.57	0.2077	ICP-MS
F139	108.00	12.000	9	VL EHELVLEHEL				ICP-OES
F141	132.00	26.400	5	H VHVHH	BIASED HIGH*	1.03	10.7281	ICP-OES
F143	107.50	11.944	9	H				ICP
F145	212.50	21.250	10	H H H	BIASED HIGH	6.48	0.4517	ICP-AES

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

OVERALL AVERAGE
RANK IS 13.520

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F009	27.50	3.056	9	LLLLL	BIASED LOW	-9.43	-0.2218	
F138	49.00	4.900	10	LL	BIASED LOW	-7.57	0.2077	ICP-MS
F096	49.00	7.000	7	VL				ICP
F024	71.00	7.889	9	LL				ICP-AES
F015	41.50	8.300	5	LVLVL				ICP
F038	92.50	10.278	9					ICPMS
F094	103.00	10.300	10					ICP-MS
F093	94.50	10.500	9	H				ICP
F019	76.50	10.929	7					ICP
F011	109.50	10.950	10					
F131	115.00	11.500	10	EHEHEHEHEHLVLVLELVL				ICP
F048	107.00	11.889	9					ICP
F143	107.50	11.944	9	H				ICP
F003	120.00	12.000	10					ICP-OES
F139	108.00	12.000	9	VLEHELVLEHEL				ICP-OES
F032	118.00	13.111	9					ICP-AES
F133	118.00	13.111	9					ICP-MS
F010	126.50	14.056	9					ICP-OES
F060	139.00	15.444	9					ICP
F046	164.50	16.450	10					ICP-MS
F032b	150.50	16.722	9					ICP-MS
F137	171.00	17.100	10					ICP-MS
F025	168.50	18.722	9	EHEHELEHVHEH				ICP
F095	198.00	19.800	10					ICP - USN
F145	212.50	21.250	10	HHH	BIASED HIGH	6.48	0.4517	ICP-AES
F014	194.50	21.611	9	VHVHHH	BIASED HIGH	11.15	-0.8729	ICP-MS
F012	188.50	23.562	8	VHVHEHVHH	BIASED HIGH*	0.69	5.5110	ICPMS
F141	132.00	26.400	5	HVHVHH	BIASED HIGH*	1.03	10.7281	ICP-OES

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PERCENT SLOPE USED FOR CAUTION COMPARISON= 5.00

OVERALL AVERAGE
RANK IS 13.520

Vanadium

PARAMETER: 30095 Zinc ug/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Elements

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 2.0000 BASIC ACCEPTABLE ERROR= 2.0000 CONCENTRATION ERROR INCREMENT= 0.0800

SAMPLE	1 = TM-FSKEN		2 = TM-24.2		3 = TM-27.2		4 = TM-26.2		5 = TM-28.2		6 = TMDA-51.2	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	<10.0	0.00	20.0	22.00	10.0	5.50	30.0	8.00	12.0	9.50	107.0	20.00
F003	2.8	3.00	18.6	11.00	11.3	15.50	30.5	10.00	13.3	19.50	105.	14.00
F009	2.9	4.00	17.3	6.00	14.	30.50	31.	15.00	11.5	8.00	97.	3.50
F010	<5.	0.00	15. L	3.00	6. VL	1.00	29.	4.00	12.	9.50	106.	18.50
F011	2.5	1.50	21.	26.50	10.8	10.00	32.7	21.00	12.3	12.50	102.	9.00
F012	5.	17.00	25. VH	33.50	15. H	33.00	38. H	32.00	16.	28.50	114.	32.00
F014	<10.0	0.00	18.8	12.50	11.0	12.00	30.6	11.00	12.6	14.00	103.	10.00
F015	<2.	0.00	16. L	4.00	8. L	2.00	28.	2.50	8. VL	1.50	104.	11.50
F019	<5.	0.00	19.	14.50	11.	12.00	32.	18.00	26. EH	36.00	108.	21.00
F024	<5.	0.00	17.	5.00	11.	12.00	31.	15.00	10. L	4.50	110.	26.00
F025	<1. L	0.00	20.	22.00	9.	3.00	28.	2.50	9. L	3.00	106.	18.50
F026	<5.	0.00	17.82	8.00	11.11	14.00	29.46	6.00	12.09	11.00	99.27	7.00
F031	<5.	0.00	18.	9.00	10.	5.50	26. L	1.00	10. L	4.50	91. VL	1.00
F032	2.91	5.00	18.8	12.50	11.3	15.50	30.9	13.00	13.2	17.50	104.	11.50
F032b	4.18	13.00	19.9	19.00	12.8	28.00	32.5	20.00	13.8	23.00	105.	14.00
F037	4.447	15.00	13.65 VL	2.00	11.46	17.00	34.2	27.00	13.45	21.00	115.	33.00
F038	4.	11.00	20.	22.00	12.	21.50	33.	23.00	13.	15.50	110.	26.00
F046	4.21	14.00	23.7 H	32.00	14.5	32.00	39.5 VH	34.00	16.2 H	30.00	129. VH	38.00
F048	6.93 H	21.00	22.89	29.00	13.81	29.00	38.84 VH	33.00	15.81	27.00	139.6 EH	39.00
F060	3.9	10.00	25.0 VH	33.50	12.0	21.50	37.2 H	31.00	13.2	17.50	111.	29.00
F093	<1.6 L	0.00	19.0	14.50	9.3	4.00	30.7	12.00	10.6	6.00	105.9	17.00
F094	6.	19.50	21.	26.50	14.	30.50	34.	25.50	15.	26.00	111.	29.00
F095	4.6	16.00	19.8	17.50	12.4	25.50	32.2	19.00	13.9	24.00	105.	14.00
F096	5.3	18.00	18.5	10.00	12.4	25.50	33.8	24.00	14.9	25.00	111.6	31.00
F131	<7.9	0.00	20.0	22.00	12.5	27.00	29.7	7.00	17.1 H	31.00	94.7 L	2.00
F133	3.3	8.00	19.8	17.50	12.0	21.50	34.3	28.00	13.5	22.00	110.0	26.00
F134		0.00		0.00		0.00		0.00		0.00	105.3	16.00
F135	<25.	0.00	<25.	0.00	<25.	0.00	30.3	9.00	<25.	0.00	98.1	5.00
F136	3.66	9.00	20.4	25.00	11.5	18.00	31.8	17.00	12.3	12.50	109.	23.50
F137	4.1	12.00	23.	30.50	12.	21.50	37. H	30.00	13.	15.50	101.	8.00
F138	3.25	7.00	17.8	7.00	10.7	9.00	29.1	5.00	19.4 VH	33.00	97.0	3.50
F139	<58.	0.00	<58.	0.00	<58.	0.00	<58.	0.00	<58.	0.00	122.6 H	37.00
F141	<3.	0.00	20.	22.00	12.	21.50	34.	25.50	16.	28.50	116.	34.00
F142a	11. VH	23.00	26. VH	35.00	26. EH	35.00	40. VH	35.00	22. VH	34.50	118. H	35.00
F142b	6.	19.50	23.	30.50	12.	21.50	49. EH	37.00	18. VH	32.00	109.	23.50
F142c	13. EH	24.00	29. EH	36.00	21. VH	34.00	42. VH	36.00	22. VH	34.50	121. H	36.00
F142d	10. VH	22.00	0. EL	1.00	33. EH	36.00	36.	29.00	8. VL	1.50	111.	29.00
F143	2.5	1.50	21.6	28.00	10.2	7.00	31.	15.00	10.7	7.00	98.6	6.00
F145	3.1	6.00	19.3	16.00	10.5	8.00	32.8	22.00	13.3	19.50	108.2	22.00
MEDIAN	4.1400		19.8500		11.7500		32.2000		13.2500		107.0000	
1CRIT	2.1712		3.4280		2.7800		4.4160		2.9000		10.4000	
N	21		34		34		35		33		37	
MEAN	4.8375		19.9018		12.3112		33.0029		13.9742		107.7911	
3STDEV	6.4149		8.1562		9.7030		10.6109		9.2041		22.0320	

PARAMETER: 30095 Zinc ug/L

SAMPLE	7 = TMDA-53.2		8 = TMDA-61t		9 = TMDA-62t		10 = TMDA-63t	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	366.0	13.50	70.0	22.50	109.0	21.00	203.0	23.50
F003	361.	9.50	70.	22.50	105.	13.00	196.	14.50
F009	342.	3.00	63.	6.00	94. L	2.00	176. L	4.50
F010	378.	24.50	60. L	2.00	99.	9.00	194.	11.50
F011	367.	15.00	62. L	3.50	107.	19.00	201.	20.50
F012	379.	27.00	76.	31.50	115.	31.50	209.	28.00
F014	370.	17.50	84.3 VH	38.00	137. VH	38.00	248. EH	37.00
F015	371.	19.00	68.	12.50	106.	15.00	199.	17.00
F019	379.	27.00	71.	25.00	111.	24.50	203.	23.50
F024	395.	33.00	70.	22.50	110.	22.50	210.	29.00
F025	377.	23.00	69.	16.00	107.	19.00	197.	16.00
F026	342.48	4.00	62.39	5.00	94.05 L	3.00	172.74 VL	1.00
F031	343.	5.00	58. VL	1.00	89. VL	1.00	176. L	4.50
F032	363.	11.00	67.8	11.00	102.	11.00	186.	7.00
F032b	369.	16.00	68.6	15.00	98.9	8.00	174. VL	3.00
F037	398.	34.50	72.3	26.00	112.	26.00	217.	34.00
F038	370.	17.50	70.	22.50	110.	22.50	200.	18.00
F046	378.	24.50	83.1 VH	36.00	115.	31.50	201.	20.50
F048	467.4 EH	39.00	95.91 EH	39.00	123.5 VH	36.00	250.2 EH	38.00
F060	403.	36.50	73.7	28.00	114.	30.00	215.	31.50
F093	374.9	21.00	69.8	19.50	106.4	16.00	200.8	19.00
F094	376.	22.00	74.	29.00	111.	24.50	206.	25.00
F095	359.	8.00	69.2	17.00	105.	13.00	192.	10.00
F096	389.9	31.00	76.0	31.50	113.7	29.00	211.1	30.00
F131	328.1 L	2.00	63.1	7.00	94.8 L	4.00	173.7 VL	2.00
F133	372.	20.00	72.8	27.00	112.8	28.00	191.5	9.00
F134	364.5	12.00	69.8	19.50	106.6	17.00	201.9	22.00
F135	348.6	6.00	66.1	10.00	101.0	10.00	187.6	8.00
F136	379.	27.00	69.7	18.00	105.	13.00	196.	14.50
F137	361.	9.50	68.	12.50	107.	19.00	194.	11.50
F138	366.	13.50	65.2	8.00	98.8	7.00	178. L	6.00
F139	69.5 EL	1.00	80.8 H	35.00	219.2 EH	39.00	<58. EL	0.00
F141	403.	36.50	77.	33.50	117.	33.00	219. H	35.00
F142a	389.	30.00	77.	33.50	118. H	34.00	216.	33.00
F142b	382.	29.00	66.	9.00	120. H	35.00	208.	27.00
F142c	398.	34.50	84. VH	37.00	131. VH	37.00	222. H	36.00
F142d	350.	7.00	62. L	3.50	97.	5.00	195.	13.00
F143	414. H	38.00	68.2	14.00	98.3	6.00	215.	31.50
F145	390.8	32.00	74.6	30.00	112.6	27.00	206.1	26.00
MEDIAN	372.0000		69.8000		107.0000		200.9000	
1CRIT	31.6000		7.4240		10.4000		17.9120	
N	37		37		37		36	
MEAN	372.8995		70.6619		108.7960		200.5195	
3STDEV	56.4546		18.2155		28.4062		45.3556	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	145.50	16.167	9					AAS
F003	132.50	13.250	10					ICP-OES
F009	82.50	8.250	10	L L	BIASED LOW	-9.00	-0.4811	
F010	83.00	9.222	9	L VL L				ICP-OES
F011	138.50	13.850	10	L				
F012	294.00	29.400	10	VHH H	BIASED HIGH*	1.30	4.1939	ICPMS
F014	190.00	21.111	9	VHVHEH				ICP-MS
F015	85.00	9.444	9	L L VL				ICP
F019	201.50	22.389	9	EH				ICP
F024	169.50	18.833	9	L				ICP-AES
F025	123.00	13.667	9	L L				ICP
F026	59.00	6.556	9	L VL	BIASED LOW	-8.92	-1.0013	ICP
F031	32.50	3.611	9	L L VL VLVLL	BIASED LOW	-7.95	-4.2803	ICP
F032	115.00	11.500	10					ICP-AES
F032b	159.00	15.900	10	VL				ICP-MS
F037	235.50	23.550	10	VL				ICP-MS
F038	199.50	19.950	10					ICPMS
F046	292.50	29.250	10	H VHH VH VH				ICP-MS
F048	330.00	33.000	10	H VH EHEHEHVHEH	BIASED HIGH	25.42	-0.1425	ICP
F060	268.50	26.850	10	VH H				ICP
F093	129.00	14.333	9	L				ICP
F094	257.50	25.750	10					ICP-MS
F095	164.00	16.400	10					ICP - USN
F096	255.00	25.500	10					ICP
F131	104.00	11.556	9	H L L L VL				ICP
F133	207.00	20.700	10					ICP-MS
F134	86.50	17.300	5					Flame AAS
F135	48.00	8.000	6					AAS-ETA
F136	177.50	17.750	10					GFAAS, FAAS
F137	170.00	17.000	10	H				ICP-MS
F138	99.00	9.900	10	VH L				ICP-MS
F139	112.00	28.000	4	H ELH EHEL	INSUFFICIENT DATA			ICP-OES
F141	269.50	29.944	9	H	BIASED HIGH	8.51	0.0880	ICP-OES
F142a	328.00	32.800	10	VHVHEHVHVHH H	BIASED HIGH*	2.53	8.1404	Flame AAS
F142b	264.00	26.400	10	EHVH H				Flame AAS
F142c	345.00	34.500	10	EHEHVHVHVHH VHVHH	BIASED HIGH	5.08	9.7426	Flame AAS
F142d	147.00	14.700	10	VHELEH VL L				Flame AAS
F143	154.00	15.400	10	H				ICP
F145	208.50	20.850	10					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 18.904

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F031	32.50	3.611	9	LLVLVLVLL	BIASED LOW	-7.95	-4.2803	ICP
F026	59.00	6.556	9	LVL	BIASED LOW	-8.92	-1.0013	ICP
F135	48.00	8.000	6					AAS-ETA
F009	82.50	8.250	10	LL	BIASED LOW	-9.00	-0.4811	
F010	83.00	9.222	9	LVLL				ICP-OES
F015	85.00	9.444	9	LLVL				ICP
F138	99.00	9.900	10	VHL				ICP-MS
F032	115.00	11.500	10					ICP-AES
F131	104.00	11.556	9	HLLLVL				ICP
F003	132.50	13.250	10					ICP-OES
F025	123.00	13.667	9	LL				ICP
F011	138.50	13.850	10	L				
F093	129.00	14.333	9	L				ICP
F142d	147.00	14.700	10	VHELEHVLL				Flame AAS
F143	154.00	15.400	10	H				ICP
F032b	159.00	15.900	10	VL				ICP-MS
F002	145.50	16.167	9					AAS
F095	164.00	16.400	10					ICP - USN
F137	170.00	17.000	10	H				ICP-MS
F134	86.50	17.300	5					Flame AAS
F136	177.50	17.750	10					GFAAS, FAAS
F024	169.50	18.833	9	L				ICP-AES
F038	199.50	19.950	10					ICPMS
F133	207.00	20.700	10					ICP-MS
F145	208.50	20.850	10					ICP-AES
F014	190.00	21.111	9	VHVHEH				ICP-MS
F019	201.50	22.389	9	EH				ICP
F037	235.50	23.550	10	VL				ICP-MS
F096	255.00	25.500	10					ICP
F094	257.50	25.750	10					ICP-MS
F142b	264.00	26.400	10	EHVHH				Flame AAS
F060	268.50	26.850	10	VHH				ICP
F139	112.00	28.000	4	HELHEHEL	INSUFFICIENT DATA			ICP-OES
F046	292.50	29.250	10	HVHHVHVH				ICP-MS
F012	294.00	29.400	10	VHHH	BIASED HIGH*	1.30	4.1939	ICPMS
F141	269.50	29.944	9	H	BIASED HIGH	8.51	0.0880	ICP-OES
F142a	328.00	32.800	10	VHVHEHVHVHHH	BIASED HIGH*	2.53	8.1404	Flame AAS
F048	330.00	33.000	10	HVHEHEHEHVHEH	BIASED HIGH	25.42	-0.1425	ICP
F142c	345.00	34.500	10	EHEHVHVHVHHVHVHH	BIASED HIGH	5.08	9.7426	Flame AAS

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

OVERALL AVERAGE
RANK IS 18.904

PARAMETER: 80095 Mercury ug/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
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 = HG73-1		2 = HG73-2		3 = HG73-3		4 = HG73-4		5 = HG73-5		6 = HG73-6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	<0.02	0.00	0.09	14.00	0.14	13.50	0.12	13.50	0.19	13.00	0.23	10.00
F003	<0.005	0.00	0.071	11.00	0.133	12.00	0.115	11.00	0.184	12.00	0.232	11.00
F010	<0.02	0.00	0.03 L	1.00	0.12	7.00	0.10	7.50	0.16	6.50	0.20	5.50
F015	0.072 VH	9.00	0.153 EH	17.00	0.160 H	16.00	0.146 H	16.00	0.206 H	16.00	0.241	14.00
F016	<0.06	0.00	0.057T	4.00	0.065 EL	1.00	0.098	6.00	0.155	3.00	0.199	4.00
F024	<0.05	0.00	0.07	10.00	0.14	13.50	0.12	13.50	0.20	15.00	0.25	15.00
F025	<0.05	0.00	0.05	2.00	0.10	2.00	0.10	7.50	0.15	1.00	0.18 L	1.00
F032a	0.02W	0.00	0.06T	7.00	0.11	5.00	0.09T	1.00	0.16	6.50	0.20	5.50
F036	0.0197	5.00	0.0765	13.00	0.125	10.50	0.119	12.00	0.161	8.00	0.233	12.00
F037	0.02	6.00	0.068	9.00	0.125	10.50	0.105	9.00	0.166	10.00	0.234	13.00
F042	0.002	1.00	0.056	3.00	0.104	3.00	0.092	2.00	0.151	2.00	0.185	2.00
F046	0.034 VH	7.00	0.093	15.00	0.150	15.00	0.144 H	15.00	0.196	14.00	0.254	16.00
F093	0.06 VH	8.00	0.14 EH	16.00	0.36 EH	17.00	0.22 EH	17.00	0.33 EH	17.00	0.49 EH	17.00
F116	0.0046	4.00	0.0632	8.00	0.1208	8.00	0.0925	3.00	0.1633	9.00	0.2058	8.00
F138	0.0039	3.00	0.0595	6.00	0.1095	4.00	0.0967	4.00	0.1558	4.00	0.2013	7.00
F145	<0.05	0.00	0.074	12.00	0.122	9.00	0.109	10.00	0.173	11.00	0.228	9.00
F148	0.0027	2.00	0.0589	5.00	0.1105	6.00	0.0972	5.00	0.1568	5.00	0.1951	3.00
MEDIAN OR *TARGET CONC.	*0.0030		0.0680		0.1220		0.1050		0.1633		0.2280	
1CRIT	0.0200		0.0260		0.0327		0.0306		0.0379		0.0460	
N	7		15		15		15		15		15	
MEAN	0.0207		0.0725		0.1247		0.1103		0.1719		0.2192	
3STDEV	0.0577		0.0646		0.0499		0.0496		0.0533		0.0639	

PARAMETER: 80095 Mercury ug/L

SAMPLE	7 = HG73-7		8 = HG73-8		9 = HG73-9		10 = HG73-10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	0.29	11.00	0.21	10.00	0.38	13.00	0.44	9.00
F003	0.294	12.00	0.234	14.00	0.401	14.00	0.476	14.00
F010	0.26	5.50	0.20	7.50	0.36	10.00	0.43	8.00
F015	0.304	13.00	0.223	13.00	0.379	12.00	0.459	13.00
F016	0.256	4.00	0.187	2.00	0.329	4.00	0.421	5.00
F024	0.32	14.00	0.24	15.00	0.44 H	16.00	0.56 VH	16.00
F025	0.28	8.00	0.20	7.50	0.34	5.50	0.45	11.00
F032a	0.26	5.50	0.19	3.00	0.34	5.50	0.41	3.00
F036	0.281	9.00	0.218	12.00	0.346	7.00	0.417	4.00
F037	0.325	15.00	0.216	11.00	0.364	11.00	0.451	12.00
F042	0.246	1.00	0.182	1.00	0.309	1.00	0.382	2.00
F046	0.337 H	16.00	0.267 H	16.00	0.430 H	15.00	0.508	15.00
F093	0.68 EH	17.00	0.46 EH	17.00	0.83 EH	17.00	0.99 EH	17.00
F116	0.2517	2.00	0.1946	5.00	0.3503	8.00	0.4250	7.00
F138	0.2613	7.00	0.1986	6.00	0.3286	3.00	0.4240	6.00
F145	0.282	10.00	0.209	9.00	0.356	9.00	0.447	10.00
F148	0.2531	3.00	0.1918	4.00	0.3203	2.00	0.3788	1.00
MEDIAN OR *TARGET CONC.	0.2810		0.2090		0.3560		0.4400	
1CRIT	0.0526		0.0436		0.0620		0.0725	
N	15		15		15		15	
MEAN	0.2837		0.2119		0.3643		0.4467	
3STDEV	0.0805		0.0637		0.1042		0.1249	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	107.00	11.889	9					Cold vapor AA
F003	111.00	12.333	9					CVAA
F010	58.50	6.500	9	L				Cold vapor AA
F015	139.00	13.900	10	VHEHH H H	BIASED HIGH	-11.75	0.0585	Fluoresence
F016	33.00	3.667	9	EL	BIASED LOW*	-0.84	-0.0210	AA,Di.ColdVap
F024	128.00	14.222	9	H VH	BIASED HIGH	28.75	-0.0221	CVAA
F025	45.50	5.056	9	L				CVAA
F032a	42.00	4.667	9					CV AAS
F036	92.50	9.250	10					Purge and Trap
F037	106.50	10.650	10					CVT
F042	18.00	1.800	10		BIASED LOW	-11.49	-0.0054	EPA 1631
F046	144.00	14.400	10	VH H H H H	BIASED HIGH	13.50	0.0152	CV AAF
F093	160.00	16.000	10	VHEHEHEHEHEHEHEHEHEH	BIASED HIGH	126.83	0.0041	Perkin Elmer FIMS
F116	62.00	6.200	10					
F138	50.00	5.000	10					EPA-1631, CVAFS
F145	89.00	9.889	9					CV-AA ERA 245.5
F148	36.00	3.600	10		BIASED LOW	-11.32	-0.0001	CVAFS, BrCl

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

OVERALL AVERAGE
RANK IS 8.778

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F042	18.00	1.800	10		BIASED LOW	-11.49	-0.0054	EPA 1631
F148	36.00	3.600	10		BIASED LOW	-11.32	-0.0001	CVAFS, BrCl
F016	33.00	3.667	9	EL	BIASED LOW*	-0.84	-0.0210	AA,Di.ColdVap
F032a	42.00	4.667	9					CV AAS
F138	50.00	5.000	10					EPA-1631, CVAFS
F025	45.50	5.056	9	L				CVAA
F116	62.00	6.200	10					
F010	58.50	6.500	9	L				Cold vapor AA
F036	92.50	9.250	10					Purge and Trap
F145	89.00	9.889	9					CV-AA ERA 245.5
F037	106.50	10.650	10					CVT
F002	107.00	11.889	9					Cold vapor AA
F003	111.00	12.333	9					CVAA
F015	139.00	13.900	10	VHEHHHH	BIASED HIGH	-11.75	0.0585	Fluoresence
F024	128.00	14.222	9	HVH	BIASED HIGH	28.75	-0.0221	CVAA
F046	144.00	14.400	10	VHHHHH	BIASED HIGH	13.50	0.0152	CV AAF
F093	160.00	16.000	10	VHEHEHEHEHEHEHEHEHEH	BIASED HIGH	126.83	0.0041	Perkin Elmer FIMS

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

OVERALL AVERAGE
RANK IS 8.778