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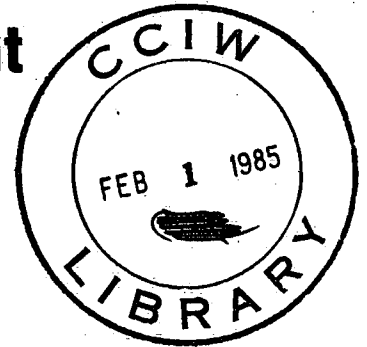


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Summary Report IRQC Studies - Major Ions,
Nutrients, Physical Parameters and Trace
Metals in Spiked Water Samples (IR114-115,
IR116-117, IR118-119)

H. Alkema

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Inland Waters Directorate **Direction Générale
des Eaux Intérieures**

MANUSCRIPT NO. 117-AMD-6-84-HA

Summary Report IRQC Studies - Major Ions,
Nutrients, Physical Parameters and Trace
Metals in Spiked Water Samples (IR114-115,
IR116-117, IR118-119)

H. Alkema

Executive Summary IRQC 114-119

At the request of WQ headquarters, the interregional quality control program (IRQC) was initiated to assess comparability of analysis data generated by the five regional laboratories.

Six studies were distributed bi-monthly between March 1984 and August 1984. The studies dealt with the analysis of trace (heavy) metals, major ions, nutrients and physical parameters in spiked water samples.

In this second semi-annual report, data is presented and performance evaluated for some 40 parameters involving some 100 analytical procedures.

Generally, analyses were performed very well, nevertheless a number of key analyses were identified to be out of control and subsequently brought to the attention of lab managers to help improve the quality of the data and to alert them to re-evaluate their internal quality control.

RÉSUMÉ ADMINISTRATIF - PICQ 114-119

À la demande de l'administration centrale du Conseil de la qualité de l'eau, nous avons mis sur pied le Programme interrégional de contrôle de la qualité (PICQ) afin d'évaluer l'uniformité des résultats d'analyse provenant des cinq laboratoires régionaux.

Nous avons mené six études à deux mois d'intervalle, de mars à août 1984. Les études avaient pour but de contrôler le dépistage des métaux lourds, des principaux ions, des substances nutritives et des paramètres physiques des échantillons d'eau dont le titre a été modifié en laboratoire.

Dans ce second rapport semestriel, nous présentons les données et nous évaluons les résultats du contrôle de la qualité relatifs à environ 40 paramètres mesurés au moyen d'une centaine de méthodes d'analyse.

En général, on a procédé correctement sauf dans le cas de certaines analyses clé dont les résultats ne concordaient pas avec les valeurs de contrôle. Nous en avons informé les directeurs des laboratoires concernés afin qu'ils réévaluent au besoin leurs méthodes de contrôle internes de la qualité et qu'ils améliorent la qualité de leurs données.

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MEMORANDUM

NOTE DE SERVICE

TO
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Distribution

FROM
DE

H. Alkema
Quality Assurance and Methods Section
AMD, NWRI
Burlington

SUBJECT
OBJET Summary Report on IRQC Studies 114 and 115

I have enclosed the final report mentioned above.

Harry A.
H. Alkema

SECURITY - CLASSIFICATION - DE SÉCURITÉ
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DATE 7 August 1984

Résumé final des études
IRQC 114 et 115

Vous trouverez le résumé
final des études IR susmentionnées

SUMMARY REPORT
IRQC STUDIES 114 AND 115
FOR MARCH AND APRIL, 1984

**Major Ions, Nutrients, Physical Parameters
and Trace Metals in Spiked Water Samples**

by

H. Alkema

June 1984

Analytical Methods Division
National Water Research Institute
Canada Centre for Inland Waters
Burlington, Ontario

L7R 4A6

This report summarizes the WQB IRQC interlaboratory quality control studies IR 114 and 115, for the months of March and April, 1984. These studies dealt with medium to high levels of trace metals, major ions, nutrients and physical parameters in spiked water samples.

Sample Particulars

Two samples were for trace metals and two were for the remaining parameters. The four samples contained the following parameters:

IRQC 114 - Sample 1 - 125 mL, D/A* of trace metals
(3% HNO₃).

Sample 2 - up to 1 L, major ions etc., stored
at 4°C.

IRQC 115 - Sample 3 - 1 L, S/E* of trace metals
(0.2% HNO₃).

Sample 4 - up to 1 L, major ions etc., stored
at 4°C.

Data Analysis

Routine analyses performed by each lab were reported on the report sheets submitted with the IRQC samples. All of the reported

* For definitions see Appendix I.

data, combined data and their resulting statistics are presented in Tables 1-4. This is the final summary report. Preliminary data summaries were sent to the reporting labs to provide immediate notification of anomalies. These summaries were sent on May 4 and June 1, 1984. The last set of data was received late - May 25. To rectify any errors in compilation of data summaries, the labs were given three weeks.

Data for each parameter were accumulated under a mixed method or combined method code ending in either 90 or 99. Under these codes, data for each parameter were combined for statistical comparison. Trace metal results were reported by only two labs.

Performance Indicators

Deviant results are circled in the data tables, and a % deviation from the mean is noted in the comments. Flagged results, those with an R or L, are not used in the statistical calculations. Performance indicators are fully explained in Appendix II.

Comments on Lab Performance

In these two studies, 114 and 115, the labs performed well. There were, however, a greater number of rejectable results and non-comparable analyses than in previous studies.

The data for Ammonia, DOC, and Al by S/E had a high coefficient of variation (non-comparable).

Individual circled results for each lab are listed below:

- Lab 2 - a low result for Fe by S/E, -48%
- a high result for Cr by D/A, +19% (R)*
- Lab 3 - a high result for K, +98% (R); and Mn, +77% (R)
- a low result for Alkalinity, -12%; Si, -16%; Na, -49% (R); and Cl, -14% (R)
- Lab 4 - a high result for $\text{NO}_3\text{-NO}_2$, +11%
- a high detection limit for NH_3
- Lab 5 - high results for F, +24% and +42% (R)
- Lab 7 - a low bias for conductivity, -19% (R and R)
- high results for K, +23%, and +10%
- high results for turbidity

WQB labs average number of anomalies per sample is 3/4.

* Rejectable by Grubb's procedure for statistical calculations.

Appendix I

Definitions of Types of Metals Analysis

1. D/A - Direct Aspiration

Without sample pretreatment, samples are aspirated by Atomic Absorption Spectrophotometry (AAS) or Inductively Coupled (Argon) Plasma (ICAP or ICP). Standards should contain the acid equivalent of the sample.

2. S/E - Code for low level analysis.

Analysis is presently carried out by one of the following methods:

1. Solvent extraction sample concentration followed by AAS.
2. Digestion and concentration of aqueous phase followed by ICAP.
3. Digestion of aqueous phase followed by ICAP.
4. Graphite tube (flameless) AAS.

Appendix II

Performance Indicators

1. Unacceptable results are circled. A result is deemed unacceptable when it deviates more than 10 percent from the mean result. Near the detection limit a greater deviation is usually allowed. Presently, deviant results are mostly compared to the mean of the parameter in the study, but may also be compared to a mean value from a previous study if it is available. In the future, the design values will be known for certified reference samples and an absolute comparison will be made. When there is a high % CV or when only a few results are reported for a parameter and a previously analysed mean is used, a footnote will indicate the previous mean.
2. When a high detection limit occurs, compared to the other labs, this is marked with a "HDL" to indicate lack of comparability.
3. In the case of systematic anomaly, when two analyses of a parameter have the same % deviation from the mean, this is noted by the word "biased" high or low.
4. A percent deviation is written to show the severity of the anomaly. Generally the comments indicate differences from the mean above 10%.
5. The "R" flag beside a result in the tables or in the comments indicates that this result is an outlier according to Grubbs* and is rejected in statistical calculations.

* Reference: Frank E. Grubbs, Technometrics, 1969, P.1

SUMMARY

INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 1

STUDY NO. 114 DATE 01/03/84
SOURCE OF SAMPLE SPIKED SAMPLE.

DATE DISTRIBUTED 120384

TRACE METALS	D/A.	LAB 1	LAB 2	LAB 3	LAB 4	LAB 5	LAB 7	MEAN	STDEV	RELAT SPIKE STDEV	BGD	XREC	ST BIAS	
SAMPLE 1 = TRACE METALS 3 X HNO3 D/A.														
13302	AL EXTRBL UF D/A	MG/L	N/A	2.600	2.800	N/A	N/A	N/A	2.700	.141	5.2	N/A	N/A	0.0
13999	AL MIXED METHODS	MG/L AL*	N/A	2.6000	2.8000	N/A	N/A	N/A	2.7000	.1414	5.2	N/A	N/A	0.0
23301	V EXTRBL UF D/A	MG/L	N/A	N/A	2.500	N/A	N/A	N/A	2.5000	0.0000	0.0	N/A	N/A	0.0
23999	VANADIUM MIX MET	MG/L V*	N/A	N/A	2.5000	N/A	N/A	N/A	2.5000	0.0000	0.0	N/A	N/A	0.0
24302	CR EXTRBL UF D/A	MG/L	N/A	N/A	2.290	N/A	N/A	N/A	2.2900	0.0000	0.0	N/A	N/A	0.0
24303	CR EXTRBL UF S/E	MG/L	N/A	3507R	N/A	N/A	N/A	N/A	0.0000	0.0000	0.0	N/A	N/A	0.0
24999	CHROMIUM MIX MET	MG/L CR*	N/A	3507R	.2900	N/A	N/A	N/A	0.2900	0.0000	0.0	N/A	N/A	0.0
25304	MN EXTRBL UF D/A	MG/L	N/A	287	.280	N/A	N/A	N/A	0.2800	0.0000	0.0	N/A	N/A	0.0
25999	MANGANESE MIX MT	MG/L MN*	N/A	2800	.280	N/A	N/A	N/A	0.2800	0.0000	0.0	N/A	N/A	0.0
26304	FE EXTRBL UF D/A	MG/L	N/A	1.100	1.120	N/A	N/A	N/A	1.1100	0.0141	1.3	N/A	N/A	0.0
26999	IRON MIXED METH	MG/L FE*	N/A	1.1000	1.1200	N/A	N/A	N/A	1.1100	.0141	1.3	N/A	N/A	0.0
27301	CO EXTRBL UF D/A	MG/L	N/A	1.100	1.070	N/A	N/A	N/A	1.0850	.0212	2.0	N/A	N/A	0.0
27999	COBALT MIX METH	MG/L CO*	N/A	1.1000	1.0700	N/A	N/A	N/A	1.0850	.0212	2.0	N/A	N/A	0.0
28301	NI EXTRBL UF D/A	MG/L	N/A	1.2000	1.2600	N/A	N/A	N/A	1.2300	.0424	3.4	N/A	N/A	0.0
28999	NICKEL MIX METH	MG/L NI*	N/A	1.2000	1.2600	N/A	N/A	N/A	1.2300	.0424	3.4	N/A	N/A	0.0
29306	CU EXTRBL UF D/A	MG/L	N/A	.290	.290	N/A	N/A	N/A	0.2900	0.0000	0.0	N/A	N/A	0.0
29999	COPPER MIX METH	MG/L CU*	N/A	.2900	.2900	N/A	N/A	N/A	0.2900	0.0000	0.0	N/A	N/A	0.0
30304	ZN EXTRBL UF D/A	MG/L	N/A	.320	.310	N/A	N/A	N/A	0.3150	.0071	2.2	N/A	N/A	0.0
30999	ZINC MIXED METH	MG/L ZN*	N/A	.3200	.3100	N/A	N/A	N/A	0.3150	.0071	2.2	N/A	N/A	0.0
38301	SR EXTRBL UF D/A	MG/L	N/A	N/A	.400	N/A	N/A	N/A	0.4000	0.0000	0.0	N/A	N/A	0.0
38999	STRONTIUM MIX MT	MG/L SR*	N/A	N/A	.4000	N/A	N/A	N/A	0.4000	0.0000	0.0	N/A	N/A	0.0
42301	MO EXTRBL UF D/A	MG/L	N/A	N/A	3.940	N/A	N/A	N/A	3.9400	0.0000	0.0	N/A	N/A	0.0
42999	MOLYBDFNUM MIX M	MG/L MO*	N/A	N/A	3.9400	N/A	N/A	N/A	3.9400	0.0000	0.0	N/A	N/A	0.0
48301	CD EXTRBL UF D/A	MG/L	N/A	N/A	2.30	N/A	N/A	N/A	2.350	.0071	3.0	N/A	N/A	0.0
48999	CADMIUM MIXED MT	MG/LCD*	N/A	2400	.230	N/A	N/A	N/A	0.2350	.0071	3.0	N/A	N/A	0.0
56301	BA EXTRBL UF D/A	MG/L	N/A	N/A	2.800	N/A	N/A	N/A	2.8000	0.0000	0.0	N/A	N/A	0.0
56999	BARIUM MIXED MET	MG/L BA*	N/A	N/A	2.800	N/A	N/A	N/A	2.8000	0.0000	0.0	N/A	N/A	0.0
62301	PB EXTRBL UF D/A	MG/L	N/A	1.300	1.330	N/A	N/A	N/A	1.3150	.0212	1.6	N/A	N/A	0.0
62999	LEAD MIXED METH	MG/L PB*	N/A	1.3000	1.3300	N/A	N/A	N/A	1.3150	.0212	1.6	N/A	N/A	0.0

* also previously analysed.

SUMMARY

INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 2

STUDY NO. 114 DATE: 01/03/84
SOURCE OF SAMPLE SPOIKED SAMPLE.

DATE DISTRIBUTED 120384

MAJOR IONS & C.	LAB 1	LAB 2	LAB 3	LAB 4	LAB 5	LAB 7	MEAN	STDEV	RELAT SPIKE STOEV	BGD	XREC	ST BIAS
SAMPLE 2 = MAJOR IONS - UNPRESERVED - STORE AT 4 C.												
00110 IONIC BALNCE PCT	N/A	-2.250	.843	N/A	3.110	N/A	5.568	2.691	474.0	N/A	N/A	0.0
00120 SUM OF CATIONS	MEQ/L	8.0216	8.5733	N/A	8.5500	N/A	8.3816	.3120	3.7	N/A	N/A	2.691
00125 SUM OF ANIONS	MEQ/L	8.3900	8.4300	N/A	8.0300	N/A	8.2833	.2203	2.7	N/A	N/A	.3120
02011 COLOUR APPARENT	REL UNIT	5.0L	N/A	N/A	5.0L	N/A	0.0	0.0	0.0	N/A	N/A	.2203
02021 COLOUR TRUE	REL UNIT	N/A	N/A	5.0L	N/A	N/A	0.0	0.0	0.0	N/A	N/A	0.0
02041 SPECIFIC COND 25	USIE/CM	890.0	919.1	883.0	832.0	725.0R	881.0	36.2	4.1	N/A	N/A	0.0
02073 TURBIDITY	JTU	2.0	N/A	2.1	1.0	5.9	0.0	.22	78.5	N/A	N/A	36.2
02190 COLOR MIX METHOD	REL UNIT	5.0L	N/A	5.0L	5.0L	0.0	0.0	0.0	0.0	N/A	N/A	.22
02290 SPECIFIC COND MM	USIE/CM	890.0	919.1	883.0	832.0	725.0R	881.0	36.2	4.1	N/A	N/A	0.0
02390 TURBIDITY MIX MT	JTU/NTU	2.0	N/A	2.1	1.0	5.9	0.0	.22	78.5	N/A	N/A	36.2
05105 B DISVO COLRMTY	MG/L	N/A	N/A	.21	N/A	N/A	.070	0.000	0.0	N/A	N/A	.22
05190 BORON MIXED METH	MG/L	N/A	N/A	.070	N/A	N/A	.070	0.000	0.0	N/A	N/A	0.000
06104 DISS ORG CARBON	MG/L	N/A	N/A	1.2	N/A	N/A	1.0	.3	28.3	N/A	N/A	0.000
06152 DIC IR DEFCT CO2	MG/L	N/A	N/A	14.1	N/A	N/A	14.1	0.0	0.0	N/A	N/A	.3
06153 DIC IR CO2 EVLN	MG/L	N/A	N/A	13.0	N/A	N/A	13.0	0.0	0.0	N/A	N/A	0.0
06290 DOC MIXED METHOD	MG/L	N/A	N/A	1.20	N/A	N/A	1.00	.28	28.3	N/A	N/A	.28
06490 DIC MIXED METHOD	MG/L	N/A	N/A	14.10	13.00	N/A	13.55	.78	5.7	N/A	N/A	.78
07010 TOT KJEH NITROGE	MG/L	N/A	N/A	.121	N/A	N/A	.121	0.000	0.0	N/A	N/A	0.000
07090 TKN MIXED METHOD	MG/L	N/A	N/A	.121	N/A	N/A	.121	0.000	0.0	N/A	N/A	0.000
07110 NO3+NO2 DIS AAZ	MG/L	N/A	N/A	.660	N/A	N/A	.614	.040	6.6	N/A	N/A	0.000
07112 NITRATE UNFIL	MG/L	N/A	N/A	.5620	N/A	N/A	.581	.027	4.6	N/A	N/A	.040
07190 NO3+NO2-N MIX MT	MG/L	N/A	N/A	.0070	N/A	N/A	.0070	0.000	0.0	N/A	N/A	.027
07505 NH3-N TOT COLRTY	MG/L	N/A	N/A	N/A	1.0L (HDL)	N/A	0.000	0.000	0.0	N/A	N/A	.0365
07506 AMMONIA-N TOT IS	MG/L	N/A	N/A	N/A	N/A	N/A	0.000	0.000	0.0	N/A	N/A	0.000
07557 DIS AMM N/INDOPH	MG/L	N/A	N/A	N/A	N/A	N/A	0.0135	.0092	68.1	N/A	N/A	0.000
07590 AMMONIA MIX METD	MG/L	N/A	N/A	.0070	.1000L	N/A	.0200	0.0000	0.0	N/A	N/A	.0092
07601 T NITROGEN UV/CY	MG/L	N/A	N/A	.6600	N/A	N/A	.6600	0.0000	0.0	N/A	N/A	0.0000
07651 TOT. N FIL UV/AA	MG/L	N/A	N/A	N/A	.6400	N/A	.6535	.0191	2.9	N/A	N/A	.0191
07690 TOTAL N COMBINED	MG/L	N/A	N/A	.6600	N/A	N/A	.6600	0.0000	0.0	N/A	N/A	0.0000
09105 DIS FLUORIDE (UF)	MG/L	N/A	N/A	.080	N/A	N/A	.080	0.0000	0.0	N/A	N/A	0.0000
09106 FLUOR FIL EL POT	MG/L	N/A	N/A	N/A	N/A	N/A	.115	0.0000	0.0	N/A	N/A	0.0000
09108 DIS FLUORIDE (F)	MG/L	N/A	N/A	.0800	N/A	N/A	.0800	0.0000	0.0	N/A	N/A	0.0000
09190 F DISS MIX METHD	MG/L	N/A	N/A	.080	N/A	N/A	.080	0.0000	0.0	N/A	N/A	0.0000
10101 TOT ALKLTY TITN	MG/L	N/A	N/A	60.20	N/A	N/A	62.10	.020	22.0	N/A	N/A	.020
10106 TOT ALKLTY CO2	MG/L	N/A	N/A	60.50	63.00	N/A	62.10	1.48	2.4	N/A	N/A	1.48
10190 T ALKLTY MIX MET	MG/L	N/A	N/A	60.20	N/A	N/A	60.50	0.00	0.0	N/A	N/A	0.00
10301 PH	UNITS	N/A	N/A	6.200	6.300	N/A	6.200	1.50	2.4	N/A	N/A	1.50
10390 PH MIXED METHODS	UNITS	N/A	N/A	8.120	7.800	N/A	7.900	.176	2.2	N/A	N/A	.176
10603 T HCNSS TITN CC	MG/L	N/A	N/A	8.200	7.800	N/A	7.900	.176	2.2	N/A	N/A	.176
10690 T HARDNSS MIXMET	MG/L	N/A	N/A	N/A	273.0	N/A	267.9	7.2	2.7	N/A	N/A	7.2

SUMMARY

INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 2 cont'd

STUDY NO. 114 DATE: 01/03/84
SOURCE OF SAMPLE SPIKED SAMPLE.

DATE DISTRIBUTED 120384

MAJOR IONS & C.	LAB 1	LAB 2	LAB 3	LAB 4	LAB 5	LAB 7	MEAN	STDEV	RELAT SPIKE STDEV	BGO	ZREC	ST BIAS
SAMPLE 2 = MAJOR IONS - UNPRESERVED - STORE AT 4 C.												
11103 SODIUM FILTERED MG/L *	N/A	60.000	N/A	N/A	60.000	N/A	60.000	0.000	0.0	N/A	N/A	0.0
11105 SODIUM DIS AA/DA MG/L *	N/A	N/A	N/A	N/A	N/A	N/A	62.9000	0.0000	0.0	N/A	N/A	0.0
11107 SODIUM UNFIL MG/L *	N/A	N/A	57.600	N/A	N/A	N/A	62.9000	0.0000	0.0	N/A	N/A	0.0
11190 NA MIXED METHODS MG/L *	N/A	60.000	57.600	N/A	60.000	62.900	60.125	2.169	3.6	N/A	N/A	0.0
12101 MG DISVLD CALD MG/L *	N/A	N/A	N/A	N/A	21.400	N/A	21.400	0.000	0.0	N/A	N/A	0.0
12102 MG FILTERED AA MG/L *	N/A	N/A	N/A	N/A	N/A	22.5000	22.5000	0.0000	0.0	N/A	N/A	0.0
12106 MG UNFIL MG/L *	N/A	N/A	21.800	N/A	N/A	N/A	21.800	0.000	0.0	N/A	N/A	0.0
12107 MG DISVLD AA AUT MG/L *	N/A	20.000	N/A	N/A	N/A	N/A	20.000	0.000	0.0	N/A	N/A	0.0
12190 MG MIXED METHODS MG/L MG*	N/A	20.0000	21.8000	N/A	21.4000	22.5000	21.4250	1.0532	4.9	N/A	N/A	1.0532
14102 SILICA-REAC SID2 MG/L *	N/A	16.000	N/A	N/A	N/A	N/A	16.000	0.000	0.0	N/A	N/A	0.0
14105 SILICATE FIL MG/L *	N/A	N/A	N/A	N/A	14.300	N/A	14.300	0.000	0.0	N/A	N/A	0.0
14106 SILICATE UNFIL MG/L *	N/A	N/A	14.530	N/A	N/A	N/A	14.530	0.000	0.0	N/A	N/A	0.0
14190 SID2 REACT MIXMT MG/L *	N/A	16.0000	14.5300	N/A	14.3000	N/A	14.9433	0.9223	6.2	N/A	N/A	0.0
15406 P TOTAL ASCOR AC MG/L *	N/A	N/A	N/A	.0030L	N/A	N/A	0.0000	0.0000	0.0	N/A	N/A	0.0
15413 T P AA SNCL MG/L P *	N/A	.0050	.0076	N/A	N/A	N/A	.0063	.0018	29.2	N/A	N/A	.0018
15490 TOTAL P MIX METH MG/L *	N/A	.0050	.0076	.0030L	N/A	N/A	.0063	.0018	29.2	N/A	N/A	.0018
16304 SULPHATE DISS MG/L *	N/A	72.00	N/A	N/A	N/A	N/A	72.00	0.00	0.0	N/A	N/A	0.0
16306 SULPHATE FILT MG/L *	N/A	N/A	N/A	N/A	65.00	73.00	69.00	5.66	6.2	N/A	N/A	0.0
16307 SULPHATE UNFIL MG/L *	N/A	N/A	73.80	N/A	N/A	N/A	73.80	0.00	0.0	N/A	N/A	5.66
16309 SULPHATE DIS IC MG/L SO*	N/A	71.00	N/A	N/A	N/A	N/A	71.00	0.00	0.0	N/A	N/A	0.0
16390 SULPHATE SO4 MMT MG/L *	N/A	71.50	73.80	N/A	65.00	73.00	70.83	4.00	5.6	N/A	N/A	0.0
17203 DISS CHLORIDE UF MG/L *	N/A	N/A	N/A	N/A	N/A	194.80	194.80	0.00	0.0	N/A	N/A	0.0
17205 DISS CL/ELECTROD MG/L *	N/A	200.00	N/A	N/A	N/A	N/A	200.00	0.00	0.0	N/A	N/A	0.0
17206 CHLORIDE FILT MG/L *	N/A	N/A	N/A	N/A	190.00	N/A	190.00	0.00	0.0	N/A	N/A	0.0
1720A CHLORIDE UNFIL MG/L *	N/A	N/A	189.40	N/A	N/A	N/A	189.40	0.00	0.0	N/A	N/A	0.0
17290 CHLORIDE MIX MET MG/L *	N/A	200.00	189.40	N/A	190.00	194.80	193.55	4.93	2.5	N/A	N/A	4.93
19102 K DISSOLVED AAS MG/L K *	N/A	N/A	N/A	N/A	N/A	22.500	22.500	0.000	0.0	N/A	N/A	0.0
19103 POTASSIUM FILT MG/L *	N/A	18.000	N/A	N/A	18.900	N/A	18.450	0.636	3.4	N/A	N/A	0.636
19107 POTASSIUM UNFIL MG/L *	N/A	N/A	36.2000	N/A	N/A	N/A	0.0000	0.000	0.0	N/A	N/A	0.0
19190 POTASSIUM MIX MT MG/L *	N/A	18.000	36.2000	N/A	18.900	22.500	19.800	2.381	12.0	N/A	N/A	2.381
20101 CALCIUM DIS TITN MG/L *	N/A	N/A	N/A	N/A	74.0000	N/A	74.0000	0.0000	0.0	N/A	N/A	0.0
20103 CA DISS AA MANUL MG/L *	N/A	N/A	N/A	N/A	N/A	N/A	73.60	0.00	0.0	N/A	N/A	0.0
2010A CALCIUM UNFIL MG/L *	N/A	N/A	67.100	N/A	N/A	N/A	67.100	0.000	0.0	N/A	N/A	0.0
20110 CA DISS AA AUTMD MG/L *	N/A	66.00	N/A	N/A	N/A	N/A	66.00	0.00	0.0	N/A	N/A	0.0
20190 CALCIUM MIX METH MG/L CA*	N/A	66.000	67.100	N/A	74.000	73.600	70.175	4.213	6.0	N/A	N/A	4.213

SUMMARY

INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 3

STUDY NO. 115 DATE: 01/04/84
SOURCE OF SAMPLE SPIKED SAMPLE.

DATE DISTRIBUTED 120384

TRACE METALS S/E.	LAB 1	LAB 2	LAB 3	LAB 4	LAB 5	LAB 7	MEAN	STDEV	RELAT SPIKE STDEV	BGD	XREC	ST BIAS
SAMPLE 3 = TRACE METALS 0.2% HNO3 S/E.												
13305 AL EXTRBL UF S/E MG/L AL*	N/A	.0350	.0240	N/A	N/A	N/A	.0295	.0078	26.4	N/A	N/A	0.0
13999 AL MIXED METHODS MG/L AL*	N/A	.0350	.0240	N/A	N/A	N/A	.0295	.0078	26.4	N/A	N/A	0.0
23302 V EXTRBL UF S/E MG/L V*	N/A	N/A	.0060	N/A	N/A	N/A	.0060	0.0000	0.0	N/A	N/A	0.0
23999 VANADIUM MIX MET MG/L V*	N/A	N/A	.0060	N/A	N/A	N/A	.0060	0.0000	0.0	N/A	N/A	0.0
24004 CR TTL GRA FRNCE MG/L CR*	N/A	.0140	N/A	N/A	N/A	N/A	.0140	0.0000	0.0	N/A	N/A	0.0
24303 CR EXTRBL UF S/E MG/L CR*	N/A	N/A	.0120	N/A	N/A	N/A	.0120	0.0000	0.0	N/A	N/A	0.0
24999 CHROMIUM MIX MET MG/L CR*	N/A	.0140	.0120	N/A	N/A	N/A	.0130	.0014	10.9	N/A	N/A	0.0
25304 MN EXTRBL UF D/A MG/L MN*	N/A	.010	.020	N/A	N/A	N/A	.010	0.0000	0.0	N/A	N/A	0.0
25999 MANGANESE MIX HT MG/L MN*	N/A	.0100	.0200	N/A	N/A	N/A	.0100	0.0000	0.0	N/A	N/A	0.0
26305 FE EXTRBL UF S/E MG/L FE*	N/A	.0160	.0250	N/A	N/A	N/A	.0205	.0064	31.0	N/A	N/A	0.0
26999 IRON MIXED METH MG/L FE*	N/A	.0160	.0250	N/A	N/A	N/A	.0205	.0064	31.0	N/A	N/A	0.0
27003 CO TTL GRA FRNCE MG/L CO*	N/A	.0130	N/A	N/A	N/A	N/A	.0130	0.0000	0.0	N/A	N/A	0.0
27302 CO EXTRBL UF S/E MG/L CO*	N/A	N/A	.0120	N/A	N/A	N/A	.0120	0.0000	0.0	N/A	N/A	0.0
27999 COBALT MIX METH MG/L CO*	N/A	.0130	.0120	N/A	N/A	N/A	.0125	.0007	5.7	N/A	N/A	0.0
28007 NI TOT AAS FRNCE MG/L NI*	N/A	.0140	N/A	N/A	N/A	N/A	.0140	0.0000	0.0	N/A	N/A	0.0
28302 NI EXTRBL UF S/E MG/L NI*	N/A	N/A	.0120	N/A	N/A	N/A	.0120	0.0000	0.0	N/A	N/A	0.0
28999 NICKEL MIX METH MG/L NI*	N/A	.0140	.0120	N/A	N/A	N/A	.0140	0.0000	0.0	N/A	N/A	0.0
29305 CU EXTRBL UF S/E MG/L CU*	N/A	.0120	.0130	N/A	N/A	N/A	.0130	.0014	10.9	N/A	N/A	0.0
29999 COPPER MIX METH MG/L CU*	N/A	.0120	.0130	N/A	N/A	N/A	.0125	.0007	5.7	N/A	N/A	0.0
30305 ZN EXTRBL UF S/E MG/L ZN*	N/A	N/A	.0130	N/A	N/A	N/A	.0130	0.0000	0.0	N/A	N/A	0.0
30999 ZINC MIXED METH MG/L ZN*	N/A	N/A	.0130	N/A	N/A	N/A	.0130	0.0000	0.0	N/A	N/A	0.0
34301 SR EXTRBL UF D/A MG/L SR*	N/A	N/A	.150	N/A	N/A	N/A	.150	0.0000	0.0	N/A	N/A	0.0
38999 STRONTIUM MIX HT MG/L SR*	N/A	N/A	.1500	N/A	N/A	N/A	.1500	0.0000	0.0	N/A	N/A	0.0
48302 CD EXTRBL UF S/E MG/L CD*	N/A	.0110	.0120	N/A	N/A	N/A	.0115	.0007	6.1	N/A	N/A	0.0
48999 CADMIUM MIXED HT MG/LCD*	N/A	.0110	.0120	N/A	N/A	N/A	.0115	.0007	6.1	N/A	N/A	0.0
56301 BA EXTRBL UF D/A MG/L BA*	N/A	N/A	.050L	N/A	N/A	N/A	0.0000	0.0000	0.0	N/A	N/A	0.0
56999 BARIUM MIXED MET MG/L BA*	N/A	N/A	.050L	N/A	N/A	N/A	0.0000	0.0000	0.0	N/A	N/A	0.0
82302 PB EXTRBL UF S/E MG/L PB*	N/A	.0100	.0110	N/A	N/A	N/A	.0105	.0007	6.7	N/A	N/A	0.0
82999 LEAD MIXED METH MG/L PB*	N/A	.0100	.0110	N/A	N/A	N/A	.0105	.0007	6.7	N/A	N/A	0.0

SUMMARY

INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 4

STUDY NO. 115 DATE: 01/04/84
SOURCE OF SAMPLE SPOIKED SAMPLE.

DATE DISTRIBUTED 120384

MAJOR IONS	4 C.	LAB 1	LAB 2	LAB 3	LAB 4	LAB 5	LAB 7	MEAN	STDEV	RELAT SPIKE	BGO	XREC	ST BIAS
SAMPLE 4 = MAJOR IONS - UNPRESERVED - STORE AT 4 C.													
00110	TONIC BALNCE PCT	N/A	.427	-.825	N/A	3.780	N/A	1.127	2.381	211.2	N/A	N/A	0.0
00120	SUM OF CATIONS	MEQ/L	5.7320	5.1143	N/A	6.0700	N/A	5.5388	.4846	8.6	N/A	N/A	0.0
00125	SUM OF ANIONS	MEQ/L	5.6830	5.1994	N/A	5.6300	N/A	5.5041	.2652	4.8	N/A	N/A	0.0
02011	COLOR APPARENT	REL UNIT	N/A	N/A	N/A	N/A	N/A	0.0	0.0	0.0	N/A	N/A	0.0
02021	COLOR TRUE	REL UNIT	5.0L	N/A	N/A	5.0L	N/A	0.0	0.0	0.0	N/A	N/A	0.0
02041	SPECIFIC COND 25	USIE/CM	N/A	N/A	N/A	N/A	N/A	0.0	0.0	0.0	N/A	N/A	0.0
02073	TURBIDITY	JTU	610.0	628.3	612.0	574.0	485.0R	606.1	22.9	3.8	N/A	N/A	0.0
02190	COLOR MIX METHOD	REL UNIT	5.0L	N/A	5.0L	5.0L	4.0	0.25	.11	41.6	N/A	N/A	0.0
02290	SPECIFIC COND MM	USIF/CM	N/A	N/A	N/A	N/A	N/A	0.0	0.0	0.0	N/A	N/A	0.0
02390	TURBIDITY MIX MT	JTU/NTU	610.0	628.3	612.0	574.0	485.0R	606.1	22.9	3.8	N/A	N/A	0.0
05105	R DISVD COLORMT	MG/L	.20	N/A	.25	.16	4.0	0.25	.11	41.6	N/A	N/A	0.0
05190	BORON MIXED METH	MG/L	N/A	N/A	.080	N/A	N/A	.080	0.000	0.0	N/A	N/A	0.0
06104	DISS ORG CARBON	MG/L	N/A	N/A	20.7	20.0	N/A	20.4	.5	2.4	N/A	N/A	0.0
06152	DIC IR DETCT CO2	MG/L	N/A	N/A	16.2	N/A	N/A	16.2	0.0	0.0	N/A	N/A	0.0
06290	DIC MIXED METHOD	MG/L	N/A	N/A	16.0	16.00	N/A	16.35	.49	2.4	N/A	N/A	0.0
06490	DIC MIXED METHOD	MG/L	N/A	N/A	16.20	16.00	N/A	16.10	.14	.9	N/A	N/A	0.0
07010	TOT KJEM NITROGE	MG/L	N/A	N/A	.808	N/A	N/A	.808	0.000	0.0	N/A	N/A	0.0
07090	TKN MIXED METHOD	MG/L	N/A	N/A	.808	N/A	N/A	.808	0.000	0.0	N/A	N/A	0.0
07110	NO3+NO2 DTS AA2	MG/L	2.000	N/A	2.000	2.030	N/A	2.010	.017	.9	N/A	N/A	0.0
07112	NITRATE UNFIL	MG/L	N/A	1.890	N/A	N/A	2.250	2.070	.255	12.3	N/A	N/A	0.0
07190	NO3+NO2-N MIX MT	MG/L	2.0000	1.8900	2.0000	2.0300	2.2500	2.0340	.1320	6.5	N/A	N/A	0.0
07505	NH3-N TOT COLRTY	MG/L	N/A	.0350	N/A	N/A	N/A	.0350	0.0000	0.0	N/A	N/A	0.0
07506	AMMONIA-N TOT IS	MG/L	N/A	N/A	.100L	N/A	N/A	.0070	0.0000	0.0	N/A	N/A	0.0
07557	DTS AMM N/INDOPH	MG/L	N/A	N/A	.0350	.1000L	N/A	.0210	.0198	94.3	N/A	N/A	0.0
07590	AMMONIA MIX METD	MG/L	N/A	N/A	.0350	.1000L	N/A	.0070	0.0000	0.0	N/A	N/A	0.0
07601	T NITROGEN UV/CY	MG/L	2.6000	N/A	N/A	N/A	N/A	2.6000	0.0000	0.0	N/A	N/A	0.0
07651	TOT N FIL UV/AA	MG/L	N/A	N/A	2.2000	2.4800	N/A	2.3400	.1980	8.5	N/A	N/A	0.0
07690	TOTAL N COMBINED	MG/L	2.6000	N/A	N/A	N/A	N/A	2.6000	0.0000	0.0	N/A	N/A	0.0
09105	DIS FLUORIDE (UF)	PG/L	1.100	N/A	N/A	N/A	N/A	1.100	0.0000	0.0	N/A	N/A	0.0
09106	FLUOR FIL EL POT	MG/L	N/A	N/A	N/A	N/A	N/A	1.100	0.0000	0.0	N/A	N/A	0.0
09108	DIS FLUORIDE (F)	MG/L	N/A	N/A	N/A	1.580R	N/A	0.0000	0.0000	0.0	N/A	N/A	0.0
09190	F DISS MIX METHD	MG/L	N/A	1.100	N/A	N/A	N/A	1.100	0.0000	0.0	N/A	N/A	0.0
10101	TOT ALKLTY TITN	MG/L	74.40	N/A	77.00	77.00	76.00	76.33	1.50	2.0	N/A	N/A	0.0
10106	TOT ALKLTY CO2	MG/L	N/A	68.10	N/A	N/A	N/A	68.10	0.00	0.0	N/A	N/A	0.0
10190	T ALKLTY MIX MET	MG/L	74.40	68.10	77.00	77.00	76.00	76.33	1.50	2.0	N/A	N/A	0.0
10301	PH	UNITS	8.100	8.150	7.500	7.500	7.600	7.770	.327	4.2	N/A	N/A	0.0
10390	PH MIXED METHODS	UNITS	8.100	8.150	7.500	7.500	7.600	7.770	.327	4.2	N/A	N/A	0.0
10603	T HARDNSS TITN CC	MG/L	8.100	8.150	7.500	7.500	7.600	7.770	.327	4.2	N/A	N/A	0.0
10690	T HARDNSS MIXMET	MG/L	N/A	N/A	N/A	200.0	198.3	199.2	1.2	.6	N/A	N/A	0.0

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MEMORANDUM

NOTE DE SERVICE

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Quality Assurance & Methods Section
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Burlington

SUBJECT / OBJET: Summary Report on IRQC Studies 116-117 / Résumé final des études IRQC 116 et 117

I have enclosed the final report mentioned above.

Vous trouverez le résumé final des études IR susmentionnées

Harry A.
H. Alkema

H. ALKEMA/IWD-NWRI/4645/jb	
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DATE	November 7, 1984.

SUMMARY REPORT
IRQC STUDIES 116 AND 117
FOR MAY AND JUNE, 1984

**Major Ions, Nutrients, Physical Parameters
and Trace Metals in Spiked Water Samples**

by

H. Alkema

October 1984

Analytical Methods Division
National Water Research Institute
Canada Centre for Inland Waters
Burlington, Ontario

L7R 4A6

This report summarizes the WQB IRQC interlaboratory quality control studies IR 116 and 117, for the months of May and June, 1984. The studies dealt mainly with high levels of trace metals, major ions, nutrients and physical parameters in spiked water samples.

Sample Particulars

Two samples were for trace metals and two were for the remaining parameters. The four samples contained the following parameters:

IRQC 116 - Sample 1 - 125 mL, D/A* of trace metals
(3% HNO₃).

Sample 2 - up to 1 L, major ions etc., stored
at 4°C.

IRQC 117 - Sample 3 - 1 L, S/E* of trace metals
(0.2% HNO₃).

Sample 4 - up to 1 L, major ions etc., stored
at 4°C.

Data Analysis

Routine analyses performed by each lab were reported on the report sheets submitted with the IRQC samples. All of the reported

* For definitions see Appendix I.

data, combined data and their resulting statistics are presented in Tables 1-4. This is the final summary report. Preliminary data summaries were sent to the reporting labs to provide immediate notification of anomalies. These summaries were sent on June 27 and Sept. 17, 1984. The last set of data was received late - Sept. 10. To rectify any errors in compilation of data summaries, the labs were given three weeks.

Data for each parameter were accumulated under a mixed method or combined method code ending in either 90 or 99. Under these codes, data for each parameter were combined for statistical comparison. Trace metal results were reported by only two WQB labs.

Performance Indicators

Deviant results are circled in the Tables 1-4, and a % deviation from the mean is noted in the comments. Flagged results, those with an R or L, are not used in the statistical calculations. Performance indicators were fully explained in the preceding report dated August 7, 1984.

One of the labs has reported ICP results for comparison purposes. These results were not used for calculation in the combined results. Because no NAQUADAT codes are given for these methods as yet, temporary codes were used. They were: 1) extractable, direct aspiration ICP, codes ending in 998; and 2) digested with ten times concentrations, codes ending in 997. These results are not only very

useful for comparison purposes, but also for the determination of design values for some of the samples used in the IRQC program.

A high coefficient of variation was observed for the low level analyses of DOC and ammonia.

Individually circled results (a deviation of greater than 10%) are listed below for each lab:

- Lab 2
 - a low result for Mn by SE, -15%
 - a high result for Ni by SE, +32%
 - Total P was slightly high at the detection limit (D.L).
- Lab 3
 - high results by DA for Zn, +34%; and Cd, 34%
 - high results by SE for V, +38%; and Mo, +30%
 - a high result for DOC, +42%
 - a rejectable* result for alkalinity.
- Lab 4
 - rejectable results for colour (one) and DOC (two)
 - no metal results reported.
- Lab 5
 - erratic results for ammonia, +100%, -70%
 - high results for F, 18%; and Ca, +12%
 - a rejectable result for DOC
 - no metal results reported.
- Lab 7
 - a high nitrate-nitrite result, +10%.

WQB average number of anomalies per sample is 1.5.

* Rejectable by Grubb's procedure for statistical calculation.

Appendix I

Definitions of Types of Metals Analysis

1. D/A - Direct Aspiration

Without sample pretreatment, samples are aspirated by Atomic Absorption Spectrophotometry (AAS) or Inductively Coupled (Argon) Plasma (ICAP or ICP). Standards should contain the acid equivalent of the sample.

2. S/E - Code for low level analysis.

Analysis is presently carried out by one of the following methods:

1. Solvent extraction sample concentration followed by AAS.
2. Digestion and concentration of aqueous phase followed by ICAP.
3. Digestion of aqueous phase followed by ICAP.
4. Graphite tube (flameless) AAS.

DATA SUMMARY

INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 1

STUDY NO. 116 DATE: 01/05/84
SOURCE OF SAMPLE SPIKED SAMPLE.

DATE DISTRIBUTED 10584

TRACE METALS	D/A.	LAB 1	LAB 2	LAB 3	LAB 4	LAB 5	LAB 7	MEAN	STDEV	RELAT SPIKE STDEV	BGD	%REC	ST BIAS
SAMPLE 1 = TRACE METALS 3% HNO ₃ D/A.													
13302	AL EXTRBL UF D/A MG/L *	N/A	.540	.540	N/A	N/A	N/A	.540	0.000	0.0			
1399A	AL ICP D/A	N/A	N/A	.5300	N/A	N/A	N/A	.5300	0.0000	0.0			
13999	AL MIXED METHODS MG/L AL *	N/A	.5400	.5400	N/A	N/A	N/A	.5400	0.0000	0.0			
23301	V EXTRBL UF D/A MG/L *	N/A	N/A	.560	N/A	N/A	N/A	.560	0.0000	0.0			
23998	V ICP D/A	N/A	N/A	.4900	N/A	N/A	N/A	.4900	0.0000	0.0			
23999	VANADIUM MIX MET MG/L V *	N/A	N/A	.5600	N/A	N/A	N/A	.5600	0.0000	0.0			
24302	CR EXTRBL UF D/A MG/L *	N/A	N/A	.070	N/A	N/A	N/A	.065	.007	10.9			
24998	CR ICP D/A	N/A	N/A	.0770	N/A	N/A	N/A	.0770	0.0000	0.0			
24999	CHROMIUM MIX MET MG/L CR *	N/A	N/A	.0700	N/A	N/A	N/A	.0650	.0071	10.9			
25304	MN EXTRBL UF D/A MG/L *	N/A	.050	.050	N/A	N/A	N/A	.050	0.000	0.0			
25998	MN ICP D/A	N/A	N/A	.0470	N/A	N/A	N/A	.0470	0.0000	0.0			
25999	MANGANESE MIX MT MG/L MN *	N/A	.0500	.0500	N/A	N/A	N/A	.0500	0.0000	0.0			
26304	FF EXTRBL UF D/A MG/L *	N/A	.250	.240	N/A	N/A	N/A	.245	.007	2.9			
26998	FF ICP D/A	N/A	N/A	.2700	N/A	N/A	N/A	.2700	0.0000	0.0			
26999	IFON MIXED METH MG/L FE *	N/A	.2500	.2400	N/A	N/A	N/A	.2450	.0071	2.9			
27301	CO EXTRBL UF D/A MG/L *	N/A	.240	.240	N/A	N/A	N/A	.240	0.000	0.0			
27998	CO ICP D/A	N/A	N/A	.2300	N/A	N/A	N/A	.2300	0.0000	0.0			
27999	COBALT MIX METH MG/L CO *	N/A	.2400	.2400	N/A	N/A	N/A	.2400	0.0000	0.0			
28301	NI EXTRBL UF D/A MG/L *	N/A	.2800	.3000	N/A	N/A	N/A	.2900	.0141	4.9			
28998	NI ICP D/A	N/A	N/A	.2700	N/A	N/A	N/A	.2700	0.0000	0.0			
28999	NICKEL MIX METH MG/L NI *	N/A	.2900	.3000	N/A	N/A	N/A	.2900	0.0000	0.0			
29306	CU EXTRBL UF D/A MG/L *	N/A	.030	.050	N/A	N/A	N/A	.040	.014	35.4			
29998	CU ICP D/A	N/A	N/A	.0410	N/A	N/A	N/A	.0410	0.0000	0.0			
29999	COPPER MIX METH MG/L CU *	N/A	.0300 low	.0500	N/A	N/A	N/A	.0400	.0141	35.4			
30304	ZN EXTRBL UF D/A MG/L *	N/A	.060	.080	N/A	N/A	N/A	.070	.014	20.2			
30998	ZN ICP D/A	N/A	N/A	.0550	N/A	N/A	N/A	.0550	0.0000	0.0			
30999	ZINC MIXED METH MG/L ZN *	N/A	.0600	.0600	N/A	N/A	N/A	.0700	.0141	20.2			
38301	SR EXTRBL UF D/A MG/L *	N/A	N/A	.180	N/A	N/A	N/A	.180	0.0000	0.0			
38998	SR ICP D/A	N/A	N/A	.1700	N/A	N/A	N/A	.1700	0.0000	0.0			
38999	STRONTIUM MIX MT MG/L SR *	N/A	N/A	.1800	N/A	N/A	N/A	.1800	0.0000	0.0			
42301	MO EXTRBL UF D/A MG/L *	N/A	N/A	1.020	N/A	N/A	N/A	1.020	0.0000	0.0			
42998	MO ICP D/A	N/A	N/A	.8900	N/A	N/A	N/A	.8900	0.0000	0.0			
42999	MOLYBDENUM MIX M MG/L MO *	N/A	N/A	1.0200	N/A	N/A	N/A	1.0200	0.0000	0.0			
48301	CD EXTRBL UF D/A MG/L *	N/A	.040	.060	N/A	N/A	N/A	.050	.014	28.3			
48998	CD ICP D/A	N/A	N/A	.0380	N/A	N/A	N/A	.0380	0.0000	0.0			
48999	CADMIUM MIXED MT MG/L CD *	N/A	.0400	.0600	N/A	N/A	N/A	.0500	.0141	28.3			
56301	BA EXTRBL UF D/A MG/L *	N/A	N/A	.480	N/A	N/A	N/A	.480	0.0000	0.0			
56998	BA ICP D/A	N/A	N/A	.4600	N/A	N/A	N/A	.4600	0.0000	0.0			
56999	BARIUM MIXED MET MG/L BA *	N/A	N/A	.480	N/A	N/A	N/A	.480	0.0000	0.0			
82301	PB EXTRBL UF D/A MG/L *	N/A	.300	.280	N/A	N/A	N/A	.290	.014	4.9			
82998	PB ICP D/A	N/A	N/A	.2800	N/A	N/A	N/A	.2800	0.0000	0.0			
82999	LEAD MIXED METH MG/L PB *	N/A	.3000	.2800	N/A	N/A	N/A	.2900	.0141	4.9			

Note: codes ending in 997 and 998 are temporary codes.

DATA SUMMARY

INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 2

STUDY NO. 116 DATE: 01/05/84
SOURCE OF SAMPLE SPIKED SAMPLE.

DATE DISTRIBUTED 10584

MAJOR IONS	4 C.	LAB 1	LAB 2	LAB 3	LAB 4	LAB 5	LAB 7	MEAN	STDEV	RELAT SPIKE STDEV	BGD	XREC	ST BIAS
SAMPLE 2 = MAJOR IONS - UNPRESERVED													
00110	IONIC BALNCE PCT	N/A	1.730	-.800	N/A	.960	N/A	.630	1.297	205.9			
00120	SUM OF CATIONS	MEQ/L	N/A	8.0271	N/A	8.2180	N/A	8.1226	.1350	1.7			
00125	SUM OF ANIONS	MEQ/L	N/A	8.1540	N/A	8.0620	N/A	8.1080	.0651	.8			
02011	COLOUR APPARENT	REL UNI	N/A	N/A	N/A	N/A	N/A	2.0	0.0	0.0			
02021	COLOUR TRUE	REL UNI	5.0L	N/A	N/A	5.0L	N/A	10.0	0.0	0.0			
02041	SPECIFIC COND 25	USIE/CM	N/A	N/A	10.0	N/A	N/A	10.0	0.0	0.0			
02073	TURBIDITY	JTU	880.0	895.6	888.0	883.0	918.0	892.9	15.2	1.7			
02190	COLOR MIX METHOD	REL UNI	N/A	N/A	N/A	N/A	N/A	.18	.10	54.7			
02290	SPECIFIC COND MM	U S/CM	880.0	895.6	888.0	883.0	918.0	892.9	15.2	1.7			
02390	TURBIDITY MIX MT	JTU/NTU	N/A	N/A	N/A	N/A	N/A	6.0	5.7	94.3			
05105	B DISVD COLRNTY	MG/L	.10	N/A	.20	.10	.20	.18	.10	54.7			
05190	BORON MIXED METH	MG/L	N/A	N/A	.170	N/A	N/A	.170	0.000	0.0			
06101	CARBON DIS ORG.	MG/L	N/A	N/A	.170	N/A	N/A	.170	0.000	0.0			
06104	DISS ORG CARBON	MG/L	N/A	N/A	N/A	N/A	N/A	0.000	0.000	0.0			
06107	DOC UV CO2 EVLN	MG/L	1.30	N/A	1.8	N/A	N/A	2.2	.6	25.7			
06151	DIC/COMBUST CO2	MG/L	N/A	N/A	N/A	N/A	N/A	1.30	0.000	0.0			
06153	DIC IP CO2 EVLN	MG/L	N/A	N/A	N/A	15.300	N/A	15.300	0.000	0.0			
06290	DOC MIXED METHOD	MG/L	N/A	N/A	36.0R	N/A	N/A	0.0	0.0	0.0			
06490	DIC MIXED METHOD	MG/L	1.30	2.60	1.20	1.30	1.90	1.90	.66	34.5			
07010	TOT KJEM NITROGE	MG/L	N/A	N/A	36.00R	15.30	N/A	15.30	0.000	0.0			
07050	TKN MIXED METHOD	MG/L	N/A	.153	N/A	N/A	N/A	.153	0.000	0.0			
07110	NO3+NO2 DIS AA2	MG/L	N/A	.153	N/A	N/A	N/A	.153	0.000	0.0			
07112	NITRATE UNFIL	MG/L	N/A	.580	N/A	.580	N/A	.583	.005	.8			
07190	NO3+NO2-N MIX MT	MG/L	N/A	.580	N/A	N/A	N/A	.620	.028	4.7			
07505	NH3-N TOT COLRTY	MG/L	.5800	.5800	.5800	.5800	.6200	.5896	.173	2.9			
07506	AMMONIA-N TOT IS	MG/L	N/A	.0070	N/A	N/A	N/A	.0070	0.0000	0.0			
07557	DIS AMH N/INDOPH	MG/L	N/A	N/A	N/A	N/A	N/A	0.000	0.0000	0.0			
07590	AMMONIA MIX METO	MG/L	N/A	N/A	.100L	N/A	N/A	0.000	0.0000	0.0			
07601	T NITROGEN UV/CY	MG/L	N/A	.0070	N/A	N/A	N/A	.0440	0.0000	0.0			
07651	TOT. N FIL UV/AA	MG/L	.6400	N/A	.1000L	.0440	N/A	.0255	J262	102.6			
07690	TOTAL N COMBINED	MG/L	N/A	N/A	N/A	N/A	N/A	.6400	0.0000	0.0			
09105	DIS FLUORIDE (UF)	MG/L	.6400	N/A	N/A	.6600	N/A	.6675	.0106	1.6			
09106	FLUOR FIL EL POT	MG/L	.070	N/A	N/A	.6750	N/A	.6575	.0247	3.8			
09190	F DISS MIX METHOD	MG/L	N/A	N/A	N/A	N/A	N/A	.070	0.000	0.0			
10101	TOT ALKLTY TITN	MG/L	N/A	N/A	N/A	.064	N/A	.064	0.000	0.0			
10106	TOT ALKLTY CO2	MG/L	62.90	N/A	65.00	.064	N/A	.067	.004	6.3			
10140	T ALKLTY MIX MET	MG/L	N/A	N/A	N/A	N/A	N/A	.067	0.000	0.0			
10301	PH	UNITS	62.90	54.90R	65.00	64.70	65.40	64.50	1.10	1.7			
10390	PH MIXED METHODS	UNITS	N/A	54.90R	65.00	64.70	65.40	64.50	1.10	1.7			
10603	T HONFSS TITN CC	MG/L	7.800	7.800	7.900	7.560	7.700	7.752	.129	1.7			
10690	T HARDNSS MIXMET	MG/L	7.800	7.800	7.900	7.560	7.700	7.752	.129	1.7			
			N/A	N/A	N/A	260.0	262.5	261.3	1.8	.7			
			N/A	N/A	N/A	260.0	262.5	261.3	1.8	.7			

DATA SUMMARY

INTER-REGIONAL QUALITY CONTROL PROGRAM

TABLE 2 (cont'd)

STUDY NO. 116 DATE: 01/05/84
SOURCE OF SAMPLE SPIKED SAMPLE.

DATE DISTRIBUTED 10584

MAJOR IONS	C.	LAB 1	LAB 2	LAB 3	LAB 4	LAB 5	LAB 7	MEAN	STDEV	RELAT SPIKE STDEV	BGD	%REC	ST BIAS
SAMPLE 2 = MAJOR IONS - UNPRESERVED													
11103	SODIUM FILTERED	MG/L	N/A	60.000	N/A	N/A	58.500	N/A	* 59.250	1.061			1.8
11105	SODIUM DIS AA/DA	MG/L	N/A	N/A	N/A	N/A	N/A	59.5000	* 59.5000	0.0000			0.0
11107	SODIUM UNFIL	MG/L	N/A	N/A	58.700	N/A	N/A	N/A	* 58.700	0.000			0.0
11190	NA MIXED METHODS	MG/L	N/A	60.000	58.700	N/A	58.500	59.500	* 59.175	.699			1.2
12101	MG DISVLD CALTO	MG/L	N/A	N/A	N/A	N/A	19.200	N/A	* 19.200	0.000			0.0
12102	MG FILTERED AA	MG/L	N/A	N/A	N/A	N/A	N/A	20.9000	* 20.9000	0.0000			0.0
12106	MG UNFIL	MG/L	N/A	N/A	N/A	N/A	N/A	N/A	* 19.900	0.000			0.0
12107	MG DISVLD AA AUT	MG/L	N/A	21.000	19.900	N/A	N/A	N/A	* 21.000	0.000			0.0
12190	MG MIXED METHODS	MG/L	MG*	21.0000	19.9000	N/A	19.2000	20.9000	* 20.2500	.8583			4.2
14102	SILICA-REAC SI02	MG/L	N/A	16.000	N/A	N/A	N/A	N/A	* 16.000	0.000			0.0
14105	SILICATE FIL	MG/L	N/A	N/A	N/A	N/A	14.200	N/A	* 14.200	0.000			0.0
14106	SILICATE UNFIL	MG/L	N/A	N/A	13.880	N/A	N/A	N/A	* 13.880	0.000			0.0
14190	SI02 REACT MIXMT	MG/L	N/A	16.0000	13.8800	N/A	14.2000	N/A	* 14.6933	1.1429			7.8
15406	P TOTAL ASCOR AC	MG/L	N/A	N/A	N/A	N/A	14.2000	N/A	* 0.0000	0.0000			0.0
15413	T P AA SNCL	MG/L	P	N/A	N/A	.0030L	N/A	N/A	* .0073	.0004			5.8
15490	TOTAL P MIX METH	MG/L	N/A	.0070	.0076	.0030L	N/A	N/A	* .0073	.0004			5.8
16304	SULPHATE DISS	MG/L	N/A	70.00	N/A	N/A	N/A	N/A	* 70.00	0.00			0.0
16306	SULPHATE FILT	MG/L	N/A	N/A	N/A	N/A	65.50	73.50	* 69.50	5.66			8.1
16307	SULPHATE UNFIL	MG/L	N/A	N/A	74.50	N/A	N/A	N/A	* 74.50	0.00			0.0
16309	SULPHATE DIS IC	MG/L	SO*	70.00	N/A	N/A	N/A	N/A	* 70.00	0.00			0.0
16390	SULPHATE SO4 MMT	MG/L	N/A	70.00	74.50	N/A	65.50	73.50	* 70.88	4.07			5.7
17203	DISS CHLORIDE UF	MG/L	N/A	N/A	N/A	N/A	N/A	190.50	* 190.50	0.00			0.0
17205	DISS CL/ELECTPOD	MG/L	N/A	200.00	N/A	N/A	N/A	N/A	* 200.00	0.00			0.0
17206	CHLORIDE FILT	MG/L	N/A	N/A	183.50	N/A	190.00	N/A	* 186.75	4.60			2.5
17290	CHLORIDE MIX MET	MG/L	N/A	200.00	183.50	N/A	190.00	190.50	* 191.00	6.79			3.6
19102	K DISSOLVED AAS	MG/L	K	N/A	N/A	N/A	N/A	17.400	* 17.400	0.000			0.0
19103	POTASSIUM FILT	MG/L	N/A	17.000	N/A	N/A	18.700	N/A	* 17.850	1.202			6.7
19107	POTASSIUM UNFIL	MG/L	N/A	N/A	18.300	N/A	N/A	N/A	* 18.300	0.000			0.0
19190	POTASSIUM MIX MT	MG/L	N/A	17.000	18.300	N/A	18.700	17.400	* 17.850	.785			4.4
20101	CALCIUM DIS TITA	MG/L	N/A	N/A	N/A	N/A	72.4000	N/A	* 72.4000	0.0000			0.0
20103	CA JISS AA MANUL	MG/L	N/A	N/A	N/A	N/A	N/A	68.60	* 68.60	0.00			0.0
20108	CALCIUM UNFIL	MG/L	N/A	N/A	67.500	N/A	N/A	N/A	* 67.500	0.000			0.0
20110	CA JISS AA AUTMD	MG/L	N/A	67.00	N/A	N/A	N/A	N/A	* 67.00	0.00			0.0
20190	CALCIUM MIX METH	MG/L	CA*	N/A	67.000	67.500	72.400	68.600	* 68.875	2.443			3.5

DATA SUMMARY

INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 3

STUDY NO. 117 DATE: 01/06/84
SOURCE OF SAMPLE SPEIKED SAMPLE.

DATE DISTRIBUTED 10584

TRACE METALS S/E.		LAH 1	LAB 2	LAB 3	LAB 4	LAB 5	LAB 7	MEAN	STDEV	RELAT STDEV	SPIKE	BGD	%REC	SI BIAS
SAMPLE 3 = TRACE METALS 0.2% MN03 S/E.														
13305	AL EXTRBL UF S/E MG/L AL*	N/A	.0830	.0830	N/A	N/A	N/A	.0830	0.0000	0.0				
13997	AL ICP ICP	N/A	N/A	.1100*	N/A	N/A	N/A	.1100	0.0000	0.0				
13998	AL ICP D/A	N/A	N/A	.1400*	N/A	N/A	N/A	.1400	0.0000	0.0				
13999	AL MIXED METHODS MG/L AL*	N/A	.0830	.0830	N/A	N/A	N/A	.0830	0.0000	0.0				
23301	V EXTRBL UF D/A MG/L	N/A	N/A	.090	N/A	N/A	N/A	.090	0.0000	0.0				
23997	V 10X ICP	N/A	N/A	.0400	N/A	N/A	N/A	.0400	0.0000	0.0				
23998	V ICP D/A	N/A	N/A	.0540	N/A	N/A	N/A	.0540	0.0000	0.0				
23999	VANADIUM MIX MET MG/L V*	N/A	N/A	.0900	N/A	N/A	N/A	.0900	0.0000	0.0				
24004	CR TTL GRA FRNCE MG/L	N/A	.0720	.0960	N/A	N/A	N/A	.0900	0.0000	0.0				
24302	CP EXTRBL UF D/A MG/L	N/A	N/A	N/A	N/A	N/A	N/A	.0720	0.0000	0.0				
24997	CR 10X ICP	N/A	N/A	.060	N/A	N/A	N/A	.060	0.0000	0.0				
24998	CR ICP D/A	N/A	N/A	.0610	N/A	N/A	N/A	.0610	0.0000	0.0				
24999	CHROMIUM MIX MET MG/L CR*	N/A	.0720	.0700	N/A	N/A	N/A	.0700	0.0000	0.0				
25304	MN EXTRBL UF D/A MG/L	N/A	.040	.0600	N/A	N/A	N/A	.0660	.0085	12.9				
25997	MN 10X ICP	N/A	N/A	.050	N/A	N/A	N/A	.045	.007	15.7				
25998	MN ICP D/A	N/A	N/A	.0470	N/A	N/A	N/A	.0470	0.0000	0.0				
25999	MANGANESE MIX MT MG/L MN*	N/A	N/A	.0520	N/A	N/A	N/A	.0520	0.0000	0.0				
26304	FE EXTRBL UF D/A MG/L	N/A	.0400	.0500	N/A	N/A	N/A	.0450	.0071	15.7				
26305	FE EXTRBL UF S/E MG/L	N/A	N/A	.040	N/A	N/A	N/A	.080	0.000	0.0				
26997	FE 10X ICP	N/A	N/A	.0930	N/A	N/A	N/A	.0930	0.0000	0.0				
26998	FE ICP D/A	N/A	N/A	.0850	N/A	N/A	N/A	.0850	0.0000	0.0				
26999	IRON MIXED METH MG/L FE*	N/A	.0800	.0830	N/A	N/A	N/A	.0830	0.0000	0.0				
27003	CO TTL GRA FRNCE MG/L	N/A	.0600	.0930	N/A	N/A	N/A	.0865	.0092	10.6				
27301	CO EXTRBL UF D/A MG/L	N/A	N/A	N/A	N/A	N/A	N/A	.0600	0.0000	0.0				
27997	CO 10X ICP	N/A	N/A	.070	N/A	N/A	N/A	.070	0.0000	0.0				
27998	CO ICP D/A	N/A	N/A	.0570	N/A	N/A	N/A	.0570	0.0000	0.0				
27999	COBALT MIX METH MG/L CO*	N/A	.0600	.0700	N/A	N/A	N/A	.0650	0.0000	0.0				
28007	NI TOT AAS FRNCE MG/L NI*	N/A	.0850	N/A	N/A	N/A	N/A	.0650	.0071	10.9				
28302	NI EXTRBL UF S/E MG/L	N/A	N/A	N/A	N/A	N/A	N/A	.0850	0.0000	0.0				
28997	NI 10X ICP	N/A	N/A	.0590	N/A	N/A	N/A	.0590	0.0000	0.0				
28998	NI ICP D/A	N/A	N/A	.0580	N/A	N/A	N/A	.0580	0.0000	0.0				
28999	NICKEL MIX METH MG/L NI*	N/A	N/A	.0630	N/A	N/A	N/A	.0630	0.0000	0.0				
29305	CU EXTRBL UF S/E MG/L	N/A	.0850	.0590	N/A	N/A	N/A	.0630	0.0000	0.0				
29306	CU EXTRBL UF D/A MG/L	N/A	N/A	.0450	N/A	N/A	N/A	.0720	.0184	25.5				
29997	CU 10X ICP	N/A	N/A	.050	N/A	N/A	N/A	.0450	0.0000	0.0				
29998	CU ICP D/A	N/A	N/A	.0500	N/A	N/A	N/A	.050	0.0000	0.0				
29999	COPPER MIX METH MG/L CU*	N/A	.0500	.0460	N/A	N/A	N/A	.0460	0.0000	0.0				
30304	ZN EXTRBL UF D/A MG/L	N/A	N/A	.0450	N/A	N/A	N/A	.0475	.0035	7.4				
30997	ZN 10X ICP	N/A	N/A	.050	N/A	N/A	N/A	.050	0.0000	0.0				
30998	ZN ICP D/A	N/A	N/A	.0470	N/A	N/A	N/A	.0470	0.0000	0.0				
30999	ZINC MIXED METH MG/L ZN*	N/A	N/A	.0500	N/A	N/A	N/A	.0500	0.0000	0.0				
33301	SR EXTRBL UF D/A MG/L	N/A	N/A	.0500	N/A	N/A	N/A	.0500	0.0000	0.0				
33997	SR 10X ICP	N/A	N/A	.180	N/A	N/A	N/A	.180	0.0000	0.0				
38998	SR ICP D/A	N/A	N/A	.1600	N/A	N/A	N/A	.1600	0.0000	0.0				
38999	STRONTIUM MIX MT MG/L SR*	N/A	N/A	.1700	N/A	N/A	N/A	.1700	0.0000	0.0				
42301	MO EXTRBL UF D/A MG/L	N/A	N/A	.1400	N/A	N/A	N/A	.1400	0.0000	0.0				
42997	MO 10X ICP	N/A	N/A	.100	N/A	N/A	N/A	.100	0.0000	0.0				
42998	MO ICP D/A	N/A	N/A	.0690	N/A	N/A	N/A	.100	0.0000	0.0				
42999	MOLYBDENUM MIX M MG/L MO*	N/A	N/A	.0880	N/A	N/A	N/A	.0690	0.0000	0.0				
48301	CD EXTRBL UF D/A MG/L	N/A	.050	.1000	N/A	N/A	N/A	.0880	0.0000	0.0				
48302	CD EXTRBL UF S/E MG/L	N/A	N/A	N/A	N/A	N/A	N/A	.1000	0.0000	0.0				
48997	CD 10X ICP	N/A	N/A	.0570	N/A	N/A	N/A	.0570	0.0000	0.0				
48998	CD ICP D/A	N/A	N/A	.0390*	N/A	N/A	N/A	.0390	0.0000	0.0				
48999	CADMIUM MIXED MT MG/L CD*	N/A	.0500	.0500	N/A	N/A	N/A	.0500	0.0000	0.0				
56301	BA EXTRBL UF D/A MG/L	N/A	.0500	.0570	N/A	N/A	N/A	.0500	0.0000	0.0				
56997	BA 10X ICP	N/A	N/A	.350L	N/A	N/A	N/A	.0535	.0049	9.3				
56998	BA ICP D/A	N/A	N/A	.0210	N/A	N/A	N/A	.0210	0.0000	0.0				
56999	BARIUM MIXED MET MG/L BA*	N/A	N/A	.0230	N/A	N/A	N/A	.0230	0.0000	0.0				
82301	PB EXTRBL UF D/A MG/L	N/A	N/A	.050L	N/A	N/A	N/A	.0500	0.0000	0.0				
82302	PB EXTRBL UF S/E MG/L	N/A	.070	N/A	N/A	N/A	N/A	.070	0.0000	0.0				
82997	PB 10X ICP	N/A	N/A	.0660	N/A	N/A	N/A	.0660	0.0000	0.0				
82998	PB ICP D/A	N/A	N/A	.0530	N/A	N/A	N/A	.0530	0.0000	0.0				
82999	LEAD MIXED METH MG/L PB*	N/A	.0700	.0660	N/A	N/A	N/A	.0660	0.0000	0.0				

DATA SUMMARY

INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 4

STUDY NO. 117
SOURCE OF SAMPLE DATED 31/06/84
SPIKED SAMPLE.

DATE DISTRIBUTED 10584

MAJOR IONS	4 C.	LAB 1	LAB 2	LAB 3	LAB 4	LAB 5	LAB 7	MEAN	STDEV	RELAT SPIKE STDEV	BGD	XREC	ST BIAS
SAMPLE 4 = MAJOR IONS - UNPRESERVED													
00110	IONIC BALNCE PCT	N/A	N/A	1.300	N/A	2.040	N/A						
00120	SUM OF CATIONS	MEQ/L	N/A	5.7396	N/A	6.0100	N/A	1.670	.523	31.3			
00125	SUM OF ANIONS	MEQ/L	N/A	5.5935	N/A	5.7700	N/A	5.8748	.1912	3.3			
02011	COLOUR APPARENT	REL UNI	N/A	5.0L	N/A	5.0L	N/A	5.6818	.1248	2.2			
02021	COLOR TRUE	REL UNI	N/A	N/A	N/A	5.0L	0.0	0.0	0.0	0.0			
02041	SPECIFIC COND 25	USIE/CM	N/A	N/A	5.0	N/A	N/A	5.0	0.0	0.0			
02073	TURBIDITY	JTU	N/A	595.0	609.6	619.0	591.0	612.5	605.4	11.9			
02190	COLOR MIX METHOD	REL UNT	N/A	.20	N/A	.35	.10	.19	.12	63.0			
02290	SPECIFIC COND MH	U S/CM	N/A	5.0L	N/A	6.0	5.0L	2.5	3.5	141.4			
02390	TURBIDITY MIX NT	JTU/NTU	N/A	595.0	609.6	619.0	591.0	612.5	605.4	11.9			
05105	D DISVD COLRHTY	MG/L	N/A	.20	N/A	.35	.10	.19	.12	63.0			
05190	BORON MIXED METH	MG/L	N/A	N/A	N/A	.200	N/A	.200	0.000	0.0			
06101	CARBON DIS ORG.	MG/L	N/A	N/A	N/A	.200	N/A	.200	0.000	0.0			
06104	DISS ORG CARBON	MG/L	N/A	N/A	N/A	N/A	.960R	0.000	0.000	0.0			
06107	DOC UV CO2 EVLN	MG/L	N/A	N/A	21.4	22.0	N/A	N/A	21.7	.4			
06151	DOC COMBUST CO2	MG/L	N/A	22.00	N/A	N/A	N/A	22.00	0.000	0.0			
06153	DOC IR CO2 EVLN	MG/L	N/A	N/A	N/A	N/A	N/A	15.000	0.000	0.0			
06290	DOC MIXED METHOD	MG/L	N/A	N/A	N/A	39.0R	N/A	0.0	0.0	0.0			
06490	DOC MIXED METHOD	MG/L	N/A	22.00	21.40	22.00	.96R	21.80	.35	1.6			
07010	TOT KJEM NITROGE	MG/L	N/A	N/A	N/A	39.00R	15.00	15.00	0.000	0.0			
07090	TKN MIXED METHOD	MG/L	N/A	N/A	.802	N/A	N/A	.802	0.000	0.0			
07110	NO3+NO2 DIS AA2	MG/L	N/A	N/A	N/A	N/A	N/A	.802	0.000	0.0			
07112	NITRATE UNFIL	MG/L	N/A	2.200	N/A	2.100	N/A	2.170	.081	3.8			
07190	NO3+NO2-N MIX NT	MG/L	N/A	N/A	2.020	2.040	N/A	2.113	.081	3.8			
07505	NH3-N TOT COLPTY	MG/L	N/A	2.2000	2.0200	2.1000	2.0400	2.320	.212	9.8			
07506	AMMONIA-N TOT IS	MG/L	N/A	N/A	.0260	N/A	N/A	2.1360	.1244	5.8			
07557	DIS AMM N/INDOPH	MG/L	N/A	N/A	N/A	1.00L	N/A	0.0000	0.0000	0.0			
07590	AMMONIA MIX METD	MG/L	N/A	N/A	N/A	N/A	N/A	0.000	0.000	0.0			
07601	T NITROGEN UV/CY	PG/L	N/A	N/A	.0260	1.000L	N/A	.0110	0.0000	0.0			
07651	TOT N FIL UV/AA	PG/L	N/A	2.6000	N/A	N/A	.0110	.0185	.0106	57.3			
07690	TOTAL N COMBINED	MG/L	N/A	N/A	N/A	1.000L	N/A	2.6000	0.0000	0.0			
09105	DIS FLUORIDE (UF)	MG/L	N/A	2.6000	N/A	2.2000	2.4700	2.3350	.1909	8.2			
09106	FLUOR FIL EL POT	MG/L	N/A	1.200	N/A	N/A	N/A	2.5350	.0919	3.6			
09190	F DISS MIX METHOD	MG/L	N/A	N/A	N/A	N/A	N/A	1.200	0.000	0.0			
10101	TOT ALKLTY TITA	MG/L	N/A	1.200	N/A	N/A	1.350	1.360	0.000	0.0			
10106	TOT ALKLTY CO2	MG/L	N/A	75.20	N/A	77.00	77.60	1.280	.113	8.8			
10190	T ALKLTY MIX MET	MG/L	N/A	N/A	75.10	N/A	77.60	76.90	1.03	1.3			
10301	PH	UNITS	N/A	75.20	75.10	77.00	N/A	75.10	0.00	0.0			
10390	PH MIXED METHODS	UNITS	N/A	7.700	7.820	7.800	7.610	7.800	1.14	1.5			
10603	T HDNESS TITN CC	MG/L	N/A	7.700	7.820	7.800	7.610	7.800	.089	1.2			
10690	T HARDNSS MIXMET	MG/L	N/A	N/A	N/A	N/A	198.0	201.5	.089	1.2			
			N/A	N/A	N/A	N/A	198.0	201.5	2.5	1.2			

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MEMORANDUM

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TO / A Distribution

FROM / DE H. Alkema
Quality Assurance & Methods Section
AMD/NWRI
Burlington

SUBJECT / OBJET Summary Report on IRQC Studies 118-119
Résumé final des études IRQC 118 et 119

I have enclosed the final report mentioned above.

Vous trouverez le résumé final des études IR susmentionnées.

Harry A.
H. Alkema

H. ALKEMA/IWD-NWRI/4645/jb

SECURITY - CLASSIFICATION - DE SÉCURITÉ
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DATE 7 November 1984

SUMMARY REPORT
IROC STUDIES 118 AND 119
FOR JULY AND AUGUST, 1984

**Major Ions, Nutrients, Physical Parameters
and Trace Metals in Spiked Water Samples**

by

H. Alkema

October 1984

Analytical Methods Division
National Water Research Institute
Canada Centre for Inland Waters
Burlington, Ontario

L7R 4A6

This report summarizes the WQB IRQC interlaboratory quality control studies IR 118 and 119, for the months of July and August, 1984. The studies dealt mainly with high levels for trace metals, and low levels for major ions, nutrients and physical parameters in spiked water samples.

Sample Particulars

Three samples were for trace metals and two were for the remaining parameters. The five samples contained the following parameters:

IRQC 118 - Sample 1 - 125 mL, D/A* of trace metals
(3% HNO₃).

Sample 2 - up to 1 L, major ions etc., stored
at 4°C.

IRQC 119 - Sample 3 - 1 L, S/E* of trace metals
(0.2% HNO₃).

Sample 4 - up to 1 L, major ions etc., stored
at 4°C.

Sample 5 - 125 mL, DA of trace metals (3% HNO₃)

Data Analysis

Routine analyses performed by each lab were reported on the report sheets submitted with the IRQC samples. All of the reported

* For definitions see Appendix I.

data, combined data and their resulting statistics are presented in Tables 1-5. This is the final summary report. Preliminary data summaries were sent to the reporting labs to provide immediate notification of anomalies. These summaries were sent on Sept. 11 and Oct. 2, 1984. The data was submitted on time. To rectify any errors in compilation of data summaries, the labs were given three weeks.

Data for each parameter were accumulated under a mixed method or combined method code ending in either 90 or 99. Under these codes, data for each parameter were combined for statistical comparison. Trace metal results were reported by only two WQB labs.

Performance Indicators

Deviant results are circled in the Tables 1-5, and a % deviation from the mean is noted in the comments. Flagged results, those with an R or L, are not used in the statistical calculations. Performance indicators were fully explained in the previous report dated August 7, 1984.

Comments on Lab Performance

High coefficients of variation (incomparability) were observed for high and low level ammonia analyses and for Mo by direct aspiration.

Individual lab deviations are listed below:

- Lab 2
 - a low Total N result, -20%
 - Total P was slightly high at the detection limit (D.L.).
- Lab 3
 - a low result for MO by DA, -60%; for Al by SE, -57%
 - a high result by DA for: Mn, +29%; Pb, +18%; Zn, +33%
 - a high result for Cu by DA, (R)*, +78%
 - a high result for DOC, +60%
 - a very high result for TKN at the detection limit (D.L.)
- Lab 4
 - a high result for Total P at the D.L.
 - a high detection limit (HDL) for NH₃
 - (no metal results were reported)
- Lab 5
 - two low results for DOC, one (R), one -38%
 - a low result for SO₄, (R), -20%
 - (no metal results were reported)
- Lab 7
 - a low turbidity result
 - (no metal results were reported).

WQB average number of anomalies per sample =4/5.

* Rejectable by Grubb's procedure for statistical calculation.

Appendix I

Definitions of Types of Metals Analysis

1. D/A - Direct Aspiration

Without sample pretreatment, samples are aspirated by Atomic Absorption Spectrophotometry (AAS) or Inductively Coupled (Argon) Plasma (ICAP or ICP). Standards should contain the acid equivalent of the sample.

2. S/E - Code for low level analysis.

Analysis is presently carried out by one of the following methods:

1. Solvent extraction sample concentration followed by AAS.
2. Digestion and concentration of aqueous phase followed by ICAP.
3. Digestion of aqueous phase followed by ICAP.
4. Graphite tube (flameless) AAS.

DATA SUMMARY

INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 1

STUDY NO. 118
SOURCE OF SAMPLE DATE: 01/07/84
SPIKED SAMPLE.

DATE DISTRIBUTED 30764

TRACE METALS D/A.		LAB 1	LAB 2	LAB 3	LAB 4	LAB 5	LAB 7	MEAN	STDEV	RELAT SPIKE STDEV	BGD	Z REC	ST BIAS
SAMPLE 1 = TRACE METALS 3% HNO3 D/A.													
13302	AL EXTRBL UF D/A	MG/L	2.450	2.400	N/A	N/A	N/A	2.625	.318	12.1			
13999	AL MIXED METHODS	MG/L AL*	2.4500	2.4000	N/A	N/A	N/A	2.6250	.3182	12.1			
23301	V EXTRBL UF D/A	MG/L	N/A	2.140	N/A	N/A	N/A	2.140	0.000	0.0			
23999	VANADIUM MIX MET	MG/L V*	N/A	2.1400	N/A	N/A	N/A	2.1400	0.0000	0.0			
24302	CR EXTRBL UF D/A	MG/L	N/A	.310	N/A	N/A	N/A	.310	0.000	0.0			
24999	CHROMIUM MIX MET	MG/L CR*	N/A	.3100	N/A	N/A	N/A	.3100	0.0000	0.0			
25304	MN EXTRBL UF D/A	MG/L	N/A	.260	N/A	N/A	N/A	.260	0.000	0.0			
25999	MANGANESE MIX MT	MG/L MN*	N/A	.2600	N/A	N/A	N/A	.2600	0.0000	0.0			
26304	FE EXTRBL UF D/A	MG/L	N/A	1.100	N/A	N/A	N/A	1.100	.007	2.7			
26999	IRON MIXED METH	MG/L FE*	N/A	1.1000	N/A	N/A	N/A	1.1000	.0071	2.7			
27301	CO EXTRBL UF D/A	MG/L	N/A	1.1500	N/A	N/A	N/A	1.125	.035	3.1			
27999	CORALT MIX METH	MG/L CO*	N/A	1.000	N/A	N/A	N/A	1.1250	.0354	3.1			
28301	NI EXTRBL UF D/A	MG/L	N/A	1.0000	N/A	N/A	N/A	1.000	0.000	0.0			
28999	NICKEL MIX METH	MG/L NI*	N/A	1.2000	N/A	N/A	N/A	1.0000	0.0000	0.0			
29306	CU EXTRBL UF D/A	MG/L	N/A	1.2000	N/A	N/A	N/A	1.2400	.0566	4.6			
29999	COPPER MIX METH	MG/L CU*	N/A	.310	N/A	N/A	N/A	1.2400	.0566	4.6			
30304	ZN EXTRBL UF D/A	MG/L	N/A	.3000	N/A	N/A	N/A	.305	.007	2.3			
30999	ZINC MIXED METH	MG/L ZN*	N/A	.320	N/A	N/A	N/A	.3050	.0071	2.3			
30301	SR EXTRBL UF D/A	MG/L	N/A	.3200	N/A	N/A	N/A	.320	0.000	0.0			
30999	STRONTIUM MIX MT	MG/L SR*	N/A	N/A	N/A	N/A	N/A	.3200	0.0000	0.0			
42301	MO EXTRBL UF D/A	MG/L	N/A	4.800	N/A	N/A	N/A	4.800	0.000	0.0			
42999	POLYBDENUM MIX M	MG/L MO*	N/A	4.800	N/A	N/A	N/A	4.800	0.000	0.0			
48301	CD EXTRBL UF D/A	MG/L	N/A	1.8000	N/A	N/A	N/A	1.800	0.000	0.0			
48999	CADMIUM MIXED MT	MG/L CD*	N/A	.250	N/A	N/A	N/A	1.8000	0.0000	0.0			
56301	BA EXTRBL UF D/A	MG/L	N/A	2.500	N/A	N/A	N/A	2.400	.014	5.9			
56999	BARIUM MIXED MET	MG/L BA*	N/A	2.800	N/A	N/A	N/A	2.400	.0141	5.9			
82301	PB EXTRBL UF D/A	MG/L	N/A	1.360	N/A	N/A	N/A	2.800	0.000	0.0			
82999	LEAD MIXED METH	MG/L PB*	N/A	1.3600	N/A	N/A	N/A	2.8000	0.0000	0.0			
				1.3400	N/A	N/A	N/A	1.350	.014	1.0			
					N/A	N/A	N/A	1.3500	.0141	1.0			

* Design Value ~ 4.5

DATA SUMMARY

INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 2

STUDY NO. 118 DATE: 01/07/84
 SOURCE OF SAMPLE SPIKED SAMPLE.

DATE DISTRIBUTED 30764

MAJOR IONS	C.	LAB 1	LAB 2	LAB 3	LAB 4	LAB 5	LAB 7	MEAN	STDEV	RELAT SPIKE	BGD	%REC	ST BIAS
SAMPLE 2 = MAJOR IONS - UNPRESERVED													
00110	IONIC BALNCE PCT	N/A	1.347	-3.450	N/A	.720	N/A						
00120	SUM OF CATIONS	MEQ/L	2.1779	2.2540	N/A	2.2620	N/A	-2.461	2.607	-565.6			
00125	SUM OF ANIONS	MEQ/L	2.2370	2.4150	N/A	2.2290	N/A	2.2310	.0469	2.1			
02011	COLOUR APPARENT	REL UNI*	5.0L	N/A	N/A	5.0L	N/A	2.2937	.1052	4.6			
02021	COLOR TRUE	REL UNI*	N/A	N/A	N/A	5.0L	N/A	0.0	0.0	0.0			
02041	SPECIFIC COND 25	USIE/CM*	229.0	N/A	N/A	5.0L	N/A	0.0	0.0	0.0			
02073	TURBIDITY	JTU	N/A	N/A	228.0	230.0	230.0	229.3	1.0	0.4			
02190	COLOR MIX METHOD	REL UNI*	5.0L	N/A	45	38	20	34	.13	37.6			
02290	SPECIFIC COND MM	U S/CM*	229.0	N/A	5.0L	5.0L	0.0	34	0.0	0.0			
02390	TURBIDITY MIX MT	JTU/NTU*	N/A	N/A	228.0	230.0	230.0	229.3	1.0	0.4			
05105	B DISVD COLRMTY	MG/L	N/A	N/A	45	38	20	34	.13	37.6			
05190	BORON MIXED METH	MG/L	N/A	N/A	.060	N/A	N/A	.360	0.000	0.0			
06101	CARBON DIS ORG.	MG/L	N/A	N/A	.060	N/A	N/A	.060	0.000	0.0			
06104	DISS ORG CARBON	MG/L	N/A	N/A	N/A	2.300	N/A	2.300	0.000	0.0			
06107	DOC UV CO2 EVLN	MG/L	3.5	3.3	3.5	N/A	N/A	3.4	.1	4.2			
06151	DIC/COMBUST CO2	MG/L	N/A	N/A	N/A	N/A	N/A	3.50	0.000	0.0			
06152	DIC IR DETCT CO2	MG/L	N/A	N/A	N/A	21.000	N/A	21.000	0.000	0.0			
06153	DIC TP CO2 EVLN	MG/L	N/A	20.4	N/A	N/A	N/A	20.4	0.0	0.0			
06290	DOC MIXED METHOD	MG/L	N/A	N/A	20.0	N/A	N/A	20.0	0.0	0.0			
06490	DIC MIXED METHOD	MG/L	3.50	3.30	3.50	2.318	N/A	20.0	0.0	0.0			
07010	TOT KJEH NITROGE	MG/L	N/A	20.40	20.00	21.00	N/A	20.47	.50	18.2			
07090	TKN MIXED METHOD	MG/L	N/A	1.1000	N/A	N/A	N/A	0.000	0.000	0.0			
07110	NO3+NO2 DIS AA2	MG/L	N/A	1.1000	N/A	N/A	N/A	0.000	0.000	0.0			
07112	NITRATE UNFIL	MG/L	.423	N/A	.430	N/A	N/A	.425	.005	1.2			
07190	NO3+NO2-N MIX MT	MG/L	N/A	.418	N/A	N/A	N/A	.425	.005	1.2			
07505	NH3-N TOT COLRKY	MG/L	.423	.418	.430	.425	.440	.429	.016	3.6			
07506	AMMONIA-N TOT IS	MG/L	N/A	1.2800	.4300	.4250	.4400	.4266	.0688	2.1			
07557	DIS AMM N/INOOPH	MG/L	N/A	N/A	N/A	N/A	N/A	1.2900	0.0000	0.0			
07590	AMMONIA MIX METD	MG/L	N/A	N/A	1.300	N/A	N/A	1.300	0.000	0.0			
07601	T NITROGEN UV/CY	MG/L	N/A	1.2800	1.3000	1.0100	N/A	1.0100	0.0000	0.0			
07651	TOT. N FIL UV/AA	MG/L	3.8000	1.2800	1.3000	1.0100	N/A	1.1967	.1620	13.5			
07690	TOTAL N COMBINED	MG/L	N/A	N/A	1.2000	N/A	N/A	3.8000	0.0000	0.0			
09105	DIS FLUORIDE (UF)	MG/L	3.8000	N/A	N/A	4.1300	N/A	2.6650	2.0718	77.7			
09106	FLUOR FIL EL POT	MG/L	.150	N/A	N/A	N/A	N/A	3.8000	0.0000	0.0			
09190	F DISS MIX METHOD	MG/L	N/A	N/A	N/A	N/A	N/A	.150	0.000	0.0			
10101	TOT ALKLYT TITN	MG/L	.153	N/A	N/A	.155	N/A	.155	0.000	0.0			
10106	TOT ALKLYT CO2	MG/L	80.90	N/A	82.00	84.20	79.60	.153	.004	2.3			
10190	T ALKLYT MIX MET	MG/L	N/A	90.20	N/A	N/A	N/A	81.43	2.14	2.6			
10301	PH	UNITS	80.09	90.20	82.00	84.20	79.50	90.20	0.00	0.0			
10390	PH MIXED METHODS	UNITS	8.290	N/A	8.040	7.941	7.900	83.18	4.34	5.2			
10603	T HARDNESS TITN CC	MG/L	8.200	N/A	8.040	7.941	7.900	8.030	.127	1.6			
10690	T HARDNESS MIXMET	MG/L	N/A	N/A	N/A	101.0	101.0	101.0	0.0	0.0			

DATA SUMMARY

INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 2 cont'd

STUDY NO. 118
SOURCE OF SAMPLE DATE: 01/07/84
SPIKED SAMPLE.

DATE DISTRIBUTED 30784

MAJOR IONS & C.	LAB 1	LAB 2	LAB 3	LAB 4	LAB 5	LAB 7	MEAN	STDEV	RELAT SPIKE STDEV	BGD	%REC	ST BIAS
SAMPLE 2 = MAJOR IONS - UNPRESERVED												
11103 SODIUM FILTERED MG/L *	N/A	3.800	N/A	N/A	4.200	N/A	4.000	.283	7.1			
11105 SODIUM DIS AA/DA MG/L *	N/A	N/A	N/A	N/A	N/A	N/A	3.800	0.000	0.0			
11107 SODIUM UNFIL MG/L *	N/A	N/A	N/A	N/A	N/A	N/A	4.180	0.000	0.0			
11190 NA MIXED METHODS MG/L *	N/A	3.400	4.180	N/A	4.200	3.800	3.995	.225	5.6			
12102 MG FILTERED AA MG/L *	N/A	N/A	N/A	N/A	N/A	7.700	7.700	0.000	0.0			
12106 MG UNFIL MG/L *	N/A	N/A	N/A	N/A	N/A	N/A	7.800	0.000	0.0			
12107 MG DISLVD AA AUT MG/L *	N/A	8.000	7.500	N/A	N/A	N/A	8.000	0.000	0.0			
12190 MG MIXED METHODS MG/L MG *	N/A	9.000	7.800	N/A	N/A	N/A	8.000	0.000	0.0			
14102 SILICA-REAC SID2 MG/L *	N/A	1.300	N/A	N/A	N/A	7.700	7.833	.1528	2.0			
14105 SILICATE FIL MG/L *	N/A	N/A	N/A	N/A	N/A	N/A	1.300	0.000	0.0			
14106 SILICATE UNFIL MG/L *	N/A	N/A	N/A	N/A	1.200	N/A	1.200	0.000	0.0			
14190 SI02 REACT MIXMT MG/L *	N/A	1.210	1.210	N/A	N/A	N/A	1.210	0.000	0.0			
15406 P TOTAL ASCOR AC MG/L *	N/A	1.300	1.210	N/A	1.200	N/A	1.2367	.0551	4.5			
15490 TOTAL P MIX METH MG/L *	N/A	N/A	N/A	.0170	N/A	.0010L	.0170	0.000	0.0			
16304 SULPHATE DISS MG/L *	N/A	N/A	N/A	.0170	N/A	.0010L	.0170	0.000	0.0			
16306 SULPHATE FILT MG/L *	N/A	13.70	N/A	N/A	N/A	N/A	19.70	0.000	0.0			
16307 SULPHATE UNFIL MG/L *	N/A	N/A	N/A	N/A	N/A	N/A	19.70	0.000	0.0			
16309 SULPHATE DIS IC MG/L SO *	N/A	N/A	18.80	N/A	N/A	N/A	19.70	0.000	0.0			
16390 SULPHATE SO4 MMT MG/L *	N/A	19.60	N/A	N/A	N/A	N/A	19.80	0.000	0.0			
17203 DISS CHLORIDE UF MG/L *	N/A	19.70	18.80	N/A	15.20R	N/A	19.70	0.000	0.0			
17205 DISS CL/ELECTPOD MG/L *	N/A	N/A	N/A	N/A	N/A	N/A	19.40	.52	2.7			
17206 CHLORIDE FILT MG/L *	N/A	6.70	N/A	N/A	N/A	N/A	6.60	0.000	0.0			
17208 CHLORIDE UNFIL MG/L *	N/A	N/A	N/A	N/A	N/A	N/A	6.70	0.000	0.0			
17290 CHLORIDE MIX MET MG/L *	N/A	N/A	6.80	N/A	N/A	N/A	6.80	0.000	0.0			
19102 K DISSOLVED AAS MG/L K *	N/A	6.70	6.80	N/A	N/A	N/A	6.80	0.000	0.0			
19103 POTASSIUM FILT MG/L *	N/A	N/A	N/A	N/A	N/A	N/A	6.73	.10	1.4			
19107 POTASSIUM UNFILT MG/L *	N/A	2.200	N/A	N/A	N/A	N/A	2.400	0.000	0.0			
19190 POTASSIUM MIX MT MG/L *	N/A	N/A	2.480	N/A	N/A	N/A	2.300	.141	6.1			
20101 CALCIUM DIS TITN MG/L *	N/A	2.200	2.400	N/A	N/A	N/A	2.400	0.000	0.0			
20103 CA DISS AA MANUL MG/L *	N/A	N/A	N/A	N/A	28.1000	2.400	2.370	.115	5.0			
20108 CALCIUM UNFILT MG/L *	N/A	N/A	N/A	N/A	N/A	N/A	28.1000	0.0000	0.0			
20110 CA DISS AA AUTMD MG/L *	N/A	N/A	27.400	N/A	N/A	26.30	26.30	0.000	0.0			
20190 CALCIUM MIX METH MG/L CA *	N/A	26.00	N/A	N/A	N/A	N/A	27.400	0.000	0.0			
		26.000	27.400	N/A	28.100	26.300	26.950	.975	3.6			

Design Value ~ 5pt

DATA SUMMARY

INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 3

STUDY NO. 119 DATE: 01/08/84
SOURCE OF SAMPLE SPIKED SAMPLE.

DATE DISTRIBUTED 30784

TRACE METALS S/E.	LAB 1	LAB 2	LAB 3	LAB 4	LAB 5	LAB 7	MEAN	STDEV	RELAT SPIKE STDEV	BGD	%REC	ST BIAS
SAMPLE 3 = TRACE METALS 0.2% HNO3 S/E OR D/A.												
13305 AL EXTRBL UF S/E MG/L AL*	N/A	.0730	.0350*	N/A	N/A	N/A	.0540	.0269	49.8			
13999 AL MIXED METHODS MG/L AL*	N/A	.0730	.0350*	N/A	N/A	N/A	.0540	.0269	49.8			
23302 V EXTRBL UF S/E MG/L V*	N/A	N/A	.0487	N/A	N/A	N/A	.0540	0.0000	0.0			
23999 VANADIUM MIX MET MG/L V*	N/A	N/A	.0487	N/A	N/A	N/A	.0487	0.0000	0.0			
24004 CR TOT AAS G. F. MG/L V*	N/A	N/A	.0500	N/A	N/A	N/A	.0500	0.0000	0.0			
24303 CR EXTRBL UF S/E MG/L V*	N/A	N/A	N/A	N/A	N/A	N/A	.0620	0.0000	0.0			
24999 CHROMIUM MIX MET MG/L CR*	N/A	.0500	.0620	N/A	N/A	N/A	.0620	0.0000	0.0			
25304 MN EXTRBL UF D/A MG/L CR*	N/A	.0500	.0620	N/A	N/A	N/A	.0560	0.0000	0.0			
25999 MANGANESE MIX MT MG/L MN*	N/A	.0500	.0500	N/A	N/A	N/A	.0500	0.0000	15.2			
26304 FE EXTRBL UF D/A MG/L	N/A	.0800	N/A	N/A	N/A	N/A	.0500	0.0000	0.0			
26305 FF EXTRBL UF S/E MG/L	N/A	N/A	N/A	N/A	N/A	N/A	.0800	0.0000	0.0			
26999 IRON MIXED METH MG/L FE*	N/A	N/A	.0770	N/A	N/A	N/A	.0770	0.0000	0.0			
27302 CO EXTRBL UF S/E MG/L	N/A	.0800	.0770	N/A	N/A	N/A	.0770	0.0000	0.0			
27999 COBALT MIX METH MG/L CO*	N/A	N/A	.0640	N/A	N/A	N/A	.0785	0.0021	2.7			
28007 NI TOT AAS G. F. MG/L	N/A	N/A	.0640	N/A	N/A	N/A	.0640	0.0000	0.0			
28302 NI EXTRBL UF S/E MG/L	N/A	.0700	N/A	N/A	N/A	N/A	.0640	0.0000	0.0			
28999 NICKEL MIX METH MG/L NI*	N/A	N/A	.0640	N/A	N/A	N/A	.0700	0.0000	0.0			
29305 CU EXTRBL UF S/E MG/L	N/A	.0700	.0640	N/A	N/A	N/A	.0640	0.0000	0.0			
29999 COPPER MIX METH MG/L CU*	N/A	.0400	.0510	N/A	N/A	N/A	.0670	0.0042	6.3			
30304 ZN EXTRBL UF D/A MG/L	N/A	.0400	.0510	N/A	N/A	N/A	.0455	0.0078	17.1			
30305 ZN EXTRBL UF S/E MG/L	N/A	.0500	N/A	N/A	N/A	N/A	.0455	0.0078	17.1			
30999 ZINC MIXED METH MG/L ZN*	N/A	N/A	.0510	N/A	N/A	N/A	.0510	0.0000	0.0			
38301 SR EXTRBL UF D/A MG/L	N/A	.0500	.0510	N/A	N/A	N/A	.0505	0.0007	1.4			
38999 STRONTIUM MIX MT MG/L SR*	N/A	N/A	.1600	N/A	N/A	N/A	.1600	0.0000	0.0			
48302 CD EXTRBL UF S/E MG/L	N/A	N/A	.1600	N/A	N/A	N/A	.1600	0.0000	0.0			
48999 CAONIUM MIXED MT MG/L CD*	N/A	.0500	.0510	N/A	N/A	N/A	.0505	0.0007	1.4			
56301 PA EXTRBL UF D/A MG/L	N/A	.0500	.0510	N/A	N/A	N/A	.0505	0.0007	1.4			
56999 BARIUM MIXED MET MG/L BA*	N/A	N/A	.100L	N/A	N/A	N/A	.0500	0.0000	0.0			
82302 PB EXTRBL UF S/E MG/L	N/A	N/A	.100L	N/A	N/A	N/A	.0600	0.0000	0.0			
82999 LEAD MIXED METH MG/L PB*	N/A	.0600	.0660	N/A	N/A	N/A	.0630	0.0042	6.7			

* Design Value ~ .08

DATA SUMMARY

INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 4

STUDY NO. 119
SOURCE OF SAMPLE

DATE: 01/08/84
SPIKED SAMPLE.

DATE DISTRIBUTED 30764

MAJOR IONS & C.	LAB 1	LAB 2	LAB 3	LAB 4	LAB 5	LAB 7	MEAN	STDEV	RELAT SPIKE STDEV	EGD	%REC	ST BIAS
SAMPLE 4 = MAJOR IONS - UNPRESERVED												
00110 IONIC BALNCE PCT	N/A	N/A	-2.600	N/A	3.710	N/A						
00120 SUM OF CATIONS MEQ/L	N/A	N/A	.9600	N/A	.9990	N/A	.455	4.603	1011.7			
00125 SUM OF ANIONS MEQ/L	N/A	N/A	1.0150	N/A	.8440	N/A	.9345	.0361	3.9			
02011 COLOUR APPARENT REL UNIT	N/A	5.0L	N/A	N/A	5.0	N/A	.9295	.1209	13.0			
02021 COLOR TRUE REL UNIT	N/A	N/A	N/A	N/A	5.0L	N/A	2.25	3.5	141.4			
02041 SPECIFIC COND 25 USIE/CM	N/A	94.0	N/A	N/A	92.5	N/A	0.0	0.0	0.0			
02073 TURBIDITY JTU	N/A	33	N/A	N/A	90.8	N/A	93.1	0.0	0.0			
02190 COLOR MIX METHOD REL UNIT	N/A	5.0L	N/A	N/A	5.31	N/A	2.25	.07	28.8			
02290 SPECIFIC COND MH U S/CM	N/A	94.0	N/A	N/A	92.5	N/A	2.5	3.5	141.4			
02390 TURBIDITY MIX MT JTU/NTU	N/A	.30	N/A	N/A	90.8	N/A	93.1	1.8	2.0			
05105 B DISV COLRMTY MG/L	N/A	N/A	N/A	N/A	.31	N/A	.25	.07	28.8			
05190 BORON MIXED METH MG/L	B	N/A	N/A	N/A	.040	N/A	.040	0.000	0.0			
06101 CARBON DIS ORG. MG/L	N/A	N/A	N/A	N/A	.040	N/A	.040	0.000	0.0			
06104 DISS ORG CARBON MG/L	N/A	N/A	N/A	N/A	.730	N/A	.790	0.000	0.0			
06107 DOC UV CO2 EVLN MG/L	C	N/A	2.1	N/A	1.0	N/A	1.6	.8	50.2			
06151 DIC/COMBUST CO2 MG/L	C	N/A	1.30	N/A	N/A	N/A	1.30	0.00	0.0			
06152 DIC IP DETCT CO2 MG/L	C	N/A	N/A	N/A	N/A	N/A	1.30	0.00	0.0			
06153 DIC IP CO2 EVLN MG/L	C	N/A	N/A	N/A	9.5	N/A	9.900	0.000	0.0			
06290 DOC MIXED METHOD MG/L	C	N/A	N/A	N/A	N/A	N/A	9.95	0.0	0.0			
06490 DIC MIXED METHOD MG/L	C	N/A	1.30	N/A	8.8	N/A	8.8	0.0	0.0			
07010 TOT KJFH NITROGE MG/L	N	N/A	2.11	N/A	1.00	N/A	1.30	.57	44.3			
07090 TKN MIXED METHOD MG/L	N	N/A	9.50	N/A	8.80	N/A	9.40	.56	5.9			
07110 NO3+NO2 DIS AA2 MG/L	N	N/A	1.100G	N/A	N/A	N/A	0.000	0.000	0.0			
07112 NITRATE UNFIL MG/L	N	N/A	.280	N/A	.310	N/A	.294	.015	5.1			
07190 NO3+NO2-N MIX MT MG/L	N	N/A	.294	N/A	.294	N/A	.297	.064	1.4			
07505 NH3-N TOT COLRTY MG/L	N	N/A	.2800	N/A	.3100	N/A	.2956	.3109	3.7			
07506 AMMONIA-N TOT IS MG/L	N	N/A	.0050L	N/A	N/A	N/A	.2956	.3109	3.7			
07557 DIS AMM N/INDOPH MG/L	N	N/A	N/A	N/A	1.00L	N/A	0.0000	0.0000	0.0			
07590 AMMONIA MIX ME TO MG/L	N	N/A	N/A	N/A	N/A	N/A	0.0000	0.0000	0.0			
07601 T NITROGEN UV/CY MG/L	N	N/A	.3950L	N/A	.1000L	N/A	.0020L	0.0000	0.0			
07651 TOT. N FIL UV/AA MG/L	N	N/A	.3000	N/A	N/A	N/A	.0020L	0.0000	0.0			
07690 TOTAL N COMBINED MG/L	N	N/A	N/A	N/A	.3400	N/A	.3000	0.0000	0.0			
09106 FLUOR FIL EL POT MG/L	N	N/A	.3000	N/A	N/A	N/A	.3400	0.0000	0.0			
09190 F DISS MIX METHOD MG/L	N	N/A	N/A	N/A	N/A	N/A	.3200	.0283	8.8			
10191 TOT ALKLTY TITN MG/L	N	N/A	N/A	N/A	N/A	N/A	0.0000	0.0000	0.0			
10106 TOT ALKLTY CO2 MG/L	N	N/A	N/A	N/A	.050L	N/A	0.0000	0.0000	0.0			
10190 T ALKLTY MIX MET MG/L	N	N/A	N/A	N/A	N/A	N/A	0.0000	0.0000	0.0			
10391 PH UNITS	N	N/A	40.00	N/A	40.00	N/A	39.00	39.08	1.42			
10390 PH MIXED METHODS UNITS	N	N/A	45.10	N/A	N/A	N/A	45.10	0.00	0.0			
10603 T HDNSS TITN CC MG/L	N	N/A	7.800	N/A	7.720	N/A	7.400	2.96	7.4			
10690 T HARDNSS MIXMET MG/L	N	N/A	7.800	N/A	7.720	N/A	7.633	.173	2.3			
	N	N/A	N/A	N/A	7.720	N/A	7.400	.173	2.3			
	N	N/A	N/A	N/A	42.4	N/A	43.9	2.1	4.7			
	N	N/A	N/A	N/A	42.4	N/A	43.4	2.1	4.7			

* Design Value \approx 0

DATA SUMMARY

INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 4 cont'd

STUDY NO. 119
SOURCE OF SAMPLE

DATE: 01/04/84
SPIKED SAMPLE.

DATE DISTRIBUTED 30764

MAJOR IONS & C.	LAB 1	LAB 2	LAB 3	LAB 4	LAB 5	LAB 7	MEAN	STDEV	RELAT SPIKE STDEV	BGD	%REC	ST BIAS
SAMPLE 4 = MAJOR IONS - UNPRESERVED												
11103 SODIUM FILTERED MG/L *	N/A	1.100	N/A	N/A	1.200	N/A	1.150	.071	6.1			
11105 SODIUM DIS AA/DA MG/L *	N/A	N/A	N/A	N/A	N/A	N/A	.9000	0.0000	0.0			
11107 SODIUM UNFIL MG/L *	N/A	N/A	N/A	N/A	N/A	N/A	1.280	0.000	0.0			
11190 NA MIXED METHODS MG/L *	N/A	N/A	1.280	N/A	N/A	N/A	1.200	.900	14.7			
12101 MG DISVLD CALTD MG/L *	N/A	1.100	1.280	N/A	2.710	N/A	2.710	0.000	0.0			
12102 MG FILTERED AA MG/L *	N/A	N/A	N/A	N/A	N/A	N/A	2.7000	0.0000	0.0			
12106 MG UNFIL MG/L *	N/A	N/A	N/A	N/A	N/A	N/A	2.700	0.000	0.0			
12107 MG DISVLD AA AUT MG/L *	N/A	N/A	2.700	N/A	N/A	N/A	2.7000	0.0000	0.0			
12190 MG MIXED METHODS MG/L *	MG	3.000	N/A	N/A	N/A	N/A	2.700	0.000	0.0			
14102 SILICA-REAC SI02 MG/L *	N/A	3.0000	2.7000	N/A	2.7100	2.7000	2.7000	0.0000	0.0			
14105 SILICATE FIL MG/L *	N/A	2.600	N/A	N/A	N/A	N/A	2.7775	.1484	5.3			
14106 SILICATE UNFIL MG/L *	N/A	N/A	N/A	N/A	N/A	N/A	2.600	0.000	0.0			
14190 SI02 REACT MIXMT MG/L *	N/A	N/A	2.280	N/A	2.400	N/A	2.400	0.000	0.0			
15406 P TOTAL ASCOR AC MG/L *	N/A	2.6000	2.2800	N/A	2.4000	N/A	2.280	0.000	0.0			
15413 T P AA SNCL MG/L *	P	N/A	N/A	N/A	0.020L	N/A	2.4267	.1617	6.7			
15490 TOTAL P MIX METH MG/L *	P	.0010L	N/A	N/A	N/A	.0070	0.0070	0.0000	0.0			
16304 SULPHATE DISS MG/L *	N/A	.0010L	N/A	N/A	N/A	N/A	0.0000	0.0000	0.0			
16306 SULPHATE FILT MG/L *	N/A	3.20	N/A	N/A	N/A	.0070	0.0070	0.0000	0.0			
16307 SULPHATE UNFIL MG/L *	N/A	N/A	N/A	N/A	N/A	N/A	3.20	0.000	0.0			
16309 SULPHATE DIS IC MG/L *	SO	N/A	3.10	N/A	2.40	3.00	2.70	.42	15.7			
16390 SULPHATE SO4 MHY MG/L *	SO	2.90	N/A	N/A	N/A	N/A	3.10	0.00	0.0			
17203 DISS CHLORIDE UF MG/L *	N/A	3.10	3.10	N/A	N/A	N/A	2.90	0.00	0.0			
17205 DISS CL/ELECTROD MG/L *	N/A	N/A	N/A	N/A	N/A	N/A	2.90	.34	11.6			
17206 CHLORIDE FILT MG/L *	N/A	1.30	N/A	N/A	N/A	2.10R	0.00	0.00	0.0			
17208 CHLORIDE UNFIL MG/L *	N/A	N/A	N/A	N/A	N/A	N/A	1.30	0.00	0.0			
17290 CHLORIDE MIX MET MG/L *	N/A	N/A	1.00	N/A	N/A	N/A	1.20	0.00	0.0			
19102 K DISSOLVED AAS MG/L *	K	1.30	1.00	N/A	N/A	N/A	1.00	0.00	0.0			
19103 POTASSIUM FILT MG/L *	K	N/A	N/A	N/A	N/A	2.10R	1.17	.15	13.1			
19107 POTASSIUM UNFILT MG/L *	N/A	.400	N/A	N/A	N/A	.500	.500	0.000	0.0			
19190 POTASSIUM MIX MT MG/L *	N/A	N/A	.510	N/A	N/A	N/A	.400	0.000	0.0			
20101 CALCIUM DIS TITA MG/L *	N/A	.400	.510	N/A	N/A	N/A	.510	0.000	0.0			
20103 CA DISS AA MANUL MG/L *	N/A	N/A	N/A	N/A	N/A	N/A	.400	.061	13.4			
20108 CALCIUM UNFILT MG/L *	N/A	N/A	N/A	N/A	12.5000	N/A	N/A	0.0000	0.0			
20110 CA DISS AA AUTMD MG/L *	N/A	N/A	13.400	N/A	N/A	13.20	13.20	0.000	0.0			
20190 CALCIUM MIX METH MG/L *	CA	13.20	13.400	N/A	N/A	N/A	13.400	0.000	0.0			
		13.200	13.400	N/A	12.500	13.200	13.075	.395	3.0			

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