NWRI CONTRIBUTION NO. 90-110

Annual Report for the Interlab Federal-Provincial Quality Assurance Pgm, Studies FP33-44, (September 1988 to August 1989) for Inorganic Constituents in Surface Waters

H. Alkema

Management Perspective FP33 - FP44

Under terms of the Federal-Provincial Agreements on Water Quality, a quality assurance program was initiated to assess comparability of surface water analysis data generated by the Provincial and Federal laboratories.

Within the framework of the NWRI Quality Assurance Project, six bimonthly quality assurance studies were distributed between September 1988 and August 1989. These studies dealt with the analysis of trace metals, major ions, nutrients and physical parameters in a variety of typical sample types.

In this annual report, data for thirteen laboratories (for the above mentioned period) are presented and evaluated for some 40 parameters involving some 200 analytical procedures.

Generally, analyses were performed well, nevertheless, a number of key analyses were identified to be out of control and promptly brought to the attention of the laboratory managers. This prompt feedback helped laboratory managers to improve the quality of their data, and to alert them to re-evaluate their internal quality control. However, two laboratories had an excessive number of flagged results and generally failed to make improvements in their weak areas.

Dr. J. Lawrence
Director
Research & Applications Branch

PERSPECTIVE DE GESTION FP33 - FP44

Aux termes de l'Accord Canada-Provincial sur la qualité des eaux, on a mis sur pied un programme d'assurance de la qualité pour évaluer la comparabilité des résultats d'analyse des eaux de surface émenant des laboratoires provincials par rapport à ceux des laboratoires du gouvernement fédéral.

Suivant les réglementations de projet de l'assurance de qualité de l'INRE, six études d'assurance de la qualité ont été menées entre Septembre 1988 et Août 1989 (soit une tous les deux mois). Ces études ont été porté sur l'analyse des composés métalliques à l'état de trace, des principaux ions, des substances nutratives et des paramètres physiques à partir d'un éventail d'échantillons typiques.

Dans le rapport annuel, on présente et on évalue les données que nous ont fournies de quinzaine laboratoires (pour la période précitée) ayant eu à déterminer 40 paramètres en faisant appel à deux centaines environs de méthodes analytiques différentes.

Règle générale, les laboratoires ont éffectué de bonnes analyses. Cependant, on a constaté que les résultats de certaines analyses clés s'écartaient trop des marges d'erreur permises. Les directeurs de laboratoires visés en ont été informés ce qui leur a permis de se rendre compte qu'ils doivent réevaluer les méthodes de contrôle interne de la qualité et produire des données plus exactes. Aussi, deux laboratoires ont un nombre excessif de résultats erronés (indiqés *) et n'ont jamais montrés d'amélioration de leurs points faibles.

Dr. J. Lawrence
Directeur
Direction de la Recherche et des Applications

ABSTRACT

This annual compiled report of fourteen quality assurance (QA) studies evaluates the chemical analysis of surface waters for laboratories under the Canada - Provincial Agreement on Water Quality. This report, which covers the period of September 1988 to August 1989 (QA Studies FP33 - FP44), describes the following aspects of the quality control report: study design, treatment of data, performance indicators, and comments on individual laboratory performance.

A single bimonthly study consisted of four standard reference samples of known concentrations. Half of these samples were for trace metal analysis at two levels. For the other half of the samples, the laboratories reported on 25 major ion, nutrients and physical parameters. Altogether, about 200 analysis methodologies and individual results were tabulated in the data summary. Since other laboratories from other programs analyzed the same samples, all results were tabulated so that statistical analyses could be more accurately made.

Each bimonthly report, in conclusion, summarizes laboratory performance. Good performance (and comparability) is indicated by the lack of flagged results. More than several flagged results indicates poorer performance. Results are flagged by two criteria: those that differ by more than 10% from a reference value, and those that are statistical outliers according to the Grubbs' outlier test.

Generally, analyses were performed well, nevertheless, a number of key analyses were identified to be out of control and promptly brought to the attention of the laboratory managers. Two laboratories in this QA program had an excessive number of flagged results and have generally failed to make improvements.

RESUME

Ce rapport annuel regroupant douze études sur le contrôle de la qualité (CQ) présente une évaluation de l'analyse chimique des eaux de surface pour les laboratoires aux termes de l'Accord Canada-Provincial sur la qualité des eaux. Dans ce rapport couvrant la période de Septembre 1988 à Août 1989 (études CQ FP33 à FP44), on décrit les aspects suivant du contrôle se la qualité: conception des études, traitment des données, indicateurs d'exactitude et commentaires sur la performance individuelle des laboratoires.

Une étude bimestrielle individuelle a porté sur quatre échantillons de référence de valeurs connues. On utilise la moitié de ces échantillons pour analyser la teneur en métaux à l'état de trace à deux niveaux. Les laboratoires utilisent l'autre moitié des échantillons pour faire rapport sur 25 principaux ions, des substances nutratives et des paramètres physiques à partir d'un éventail d'échantillons typiques. Environs 200 méthodologies d'analyse et résultats individuelles sont ensuite rassemblés dans un résumé des données. Puisque les autres laboratoires des programmes de contrôle de la qualité analysent les mêmes échantillons, on peut, grâce aux résultats présentés, faire les analyses statistiques plus précises possibles.

A la conclusion de chaque rapport bimestriel, on trouve un résumé de la performance des laboratoires. L'absence de résultats indiqués indique une bonne performance (et la comparabilité des données). S'il y a plusieurs résultats indiqués, c'est que la performance a été plus faibles. On indique aux résultats en fonction de deux critères: s'ils divergent de plus de test de 10% ou le deviation standard et, selon de Grubbs, ils sont des valeurs statistiques rejetées.

En général, les résultats des analyses ont été satisfaisant; on a constaté que les résultats de certaines analyses clés s'écartaient trop des marges d'erreur permises. Les directeurs de laboratoires visés en ont été informés ce qui leur a permis de se rendre compte qu'ils doivent réevaluer les méthodes de contrôle interne de la qualité et produire des données plus exactes. Cependent, deux laboratoires ont un nombre excessif de résultats erronés (indiqués *) et n'ont jamais montrés d'amélioration de leurs points faibles.

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H. Alkema
Section de l'Assurance-Qualité
Institut National de Recherche sur les Eaux
Burlington, Ontario.

SUBJECT
OBJET

Programme d'Assurance-Qualité Fédéral-Provincial (PAQFP)
Résumé final de l'études FP 33-34
Federal-Provicial Quality Assurance Program
Final Report: FPQC Studies 33-34

Vous trouverez en annexe le résumé final de l'étude F/P susmentionées.

Si vous avez de commentaire sur ce résumé, ou des corrections valides à notre base de données, veuillez me les transmettre.

I have enclosed the final report for the above mentioned studies.

If you have any comments on this report, or any legitimate corrections to the data base, please do not hesitate to communicate them.

Harry A.

H. Alkema

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RESEARCH & APPLICATIONS BRANCH

FINAL REPORT

REPORT NO. RAB 89-03 (Eng)

FEDERAL PROVINCIAL QUALITY ASSURANCE PROGRAM

STUDIES 33 AND 34

for September and October 1988

TRACE METALS, MAJOR IONS, NUTRIENTS AND PHYSICAL PARAMETERS IN SURFACE WATERS

by

H. Alkema

Quality Assurance Section
National Water Research Institute
Burlington, Ontario

February 1989

(Ce rapport est aussi disponible en francais)

Introduction

As part of an on-going study, the Quality Assurance Section, NWRI in Burlington, Ontario, has been sending reference water samples bi-monthly to chemical laboratories participating in the FP program. This report summarizes the most recent FP interlaboratory quality assurance studies: FP 33 and 34, for the months September and October, 1988. These two studies dealt with trace metals, major ions, nutrients and physical parameters. The levels were high for metals, and low for major ions.

Study Design

Four water samples were submitted to each laboratory for chemical analyses. Two samples were submitted for trace metals analysis, while the remaining two were submitted for major ions, nutrients and some physical measurements. The following is a breakdown of the four samples:

FP 33 - Sample 1 - 125 ml, DA* for trace metals (3% HNO_3)
Sample 2 - up to 1L, major ions etc., stored at 4^oC

FP 34 - Sample 3 - 1L, SE* for trace metals (0.2% HNO_3)
Sample 4 - up to 1L, major ions, etc., stored at 4^oC

* for definitions see Appendix 1

Treatment of Data

Each laboratory was asked to perform only those analyses which were routine to their particular laboratory, using the general methodology guidelines listed above. Results for these analyses were recorded on report sheets provided with the QA samples. Upon receipt of the Standard Reporting Sheets, the results were tabulated for each parameter, first for each method reported, and then for all methods combined. These data, and the resulting statistics are presented in the Data Summary. (attached)

Preliminary data summaries (RAB # 88-14), including problematic results, were sent November 2 or 10, and January 26. Each laboratory was given three weeks to notify us of any errors in data transcription, compilation, or flags.

Performance Indicators

In the Federal Provincial QA program, two types of reference samples are used for the accuracy assessment. Reference waters (RMs) and certified reference waters (CRMs) have Design Values for the stable parameters. Also, regional samples are used occassionally as reference samples. The means for the regional samples, and the Design Values (together called the comparator) are used to test each reported result for accuracy.

Percentage deviations from the comparator are used as an indicator for the laboratory head to determine the extent of the discrepencies between the laboratory result and comparator as it applies to his procedures. However, please keep in mind that at low levels, high % deviations are often seen, and may be misleading if interpreted too strictly.

A result which deviates more than the greater of 10% or 1 standard deviation from the comparator is marked with an asterik in the data table and its value tabulated in the flags table (Table 1). Results reported with an "L" (less than) or flagged with an "R" (rejectable) are not used in the statistical calculations. Performance indicators are fully explained in Appendix II.

Comments on Laboratory Performance

Results accompanied with a 'less than' are difficult to appraise. If a design value or mean is significantly lower than the detection limit given by a particular laboratory, then that detection limit is too high. Such a result is assigned an 'HDL' and is tabulated for each laboratory in Table 1.

If, on the other hand, the detection limit reported is far lower than the mean or design value, then the use of 'less than' is clearly inadequate and the result is flagged low. The magnitude of the deviation from the mean in such a case is taken from the detection limit given.

Attached are two tables listing flagged data by laboratory (Table 1), and listing parameters for which there was a high standard deviation (Table 2). The latter (formerly called a high coefficient of variation) was generated with a new set of criteria to provide a more accurate and more consistent description of difficult to analyse parameters or levels. Your comments will be appreciated.

Provincial laboratories average number of deviations per sample was 1.8.
Federal laboratories average number of deviations per sample was 1.9.

APPENDIX I

Definitions of Types of Metals Analysis

1. DA - Direct Aspiration

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

2. SE - Code for low level analysis

Analysis is 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 and ICAP analysis.
4. Graphite tube (flameless) AAS.

APPENDIX II

Performance Indicators

1. Circled Results

Results are circled in the data tables when a minor deviation from the comparator has ocurred. (The comparator is the design value of the reference sample, or the mean in the case of a biologically active sample.) Circled results are in general greater than or less than 10% from the comparator. At very low levels of analytes or with parameters that are difficult to analyse, a greater deviation than 10% is allowed. Under these conditions, a result is circled when it is outside one standard deviation of the comparator. These circled results, though acceptable values, are a warning to laboratory managers that the parameter analysis should be investigated.

2. Rejectable Results

Each laboratory result is statistically tested to see if it is outlying. Outlying results were caused by non random causes such as a faulty calibration or a transcription error. These outlying results, calculated by the Grubbs' procedure,* and indicated in the data tables with an 'R', are noncomparable with the other data for the parameter.

3. A High Co-efficient of Variation (HCV)

Occasionally data for a parameter yields a very high relative standard deviation (RSD). When this HCV is not due to outlying values, it indicates a high variability within the data set. The data in this set is then noncomparable. In such a case, the RSD for the parameter is circled in the data tables and the parameter's noncomparability is noted in the comments.

4. High Detection Limits (HDL)

Each laboratory determines its own detection limits according to its own requirements. When major differences of detection limits occur, the result is flagged with 'HDL' in the data tables. An HDL indicates that low level analysis may not be comparable with the analyses of other laboratories.

* reference : Frank E. Grubbs, Technometrics, 1969, p. 1.

TABLE 1: FED-PROV LABORATORIES FLAGGED DATA - STUDIES FP 33-34

LAB 2	FLAGS :	SILICA	47%		NITRATE	-77%	L	SILICA	56%
	HDL :	T N DIS							
LAB 3	FLAGS :	NONE							
LAB 4	FLAGS :	NITRATE	-11%						
LAB 5	FLAGS :	D O C	124%	R	D I C	20%		D I C	35%
		T N DIS	-13%						
LAB 7	FLAGS :	COLOUR	158%		TOT P	145%			
LAB 9	FLAGS :	MOLYBNUM	11%		PTASSIUM	16%			
LAB 10	FLAGS :	CHROMIUM	15%		ALUMINUM	20%		VANADIUM	14%
		COBALT	-20%		NICKEL	-39%	R	MOLYBNUM	17%
	HDL :	AMMONIA			TOT P			AMMONIA	
		TOT P							
LAB 11	FLAGS :	NITRATE	-15%		SODIUM	-22%		IRON	-79% R
		ZINC	-26%						
LAB 12	FLAGS :	SODIUM	17%						
	HDL :	D O C							
LAB 13	FLAGS :	CHROMIUM	18%		ZINC	16%	R	CONDUCT	38% R
		NITRATE	-12%		ALKLINTY	17%		HARDNESS	13%
		MGNESIUM	16%		SULFATE	44%	R	CALCIUM	17%
		ALKLINTY	19%	R	SODIUM	13%		SULFATE	25% R
	HDL :	AMMONIA			AMMONIA				
LAB 14	FLAGS :	COPPER	25%		LEAD	-91%	R	FLUORIDE	100%
		SODIUM	28%		ALUMINUM	-36%		IRON	-44%
		COPPER	15%		ZINC	-32%		LEAD	-35%
		HARDNESS	-11%		CALCIUM	-13%			
LAB 15	FLAGS :	BARIUM	-17%	R	AMMONIA	112%	R	ALKLINTY	17%
		SILICA	-59%		TOT P	175%		CHLORIDE	-61% L
		CALCIUM	16%		ALUMINUM	-78%	R	MANGNESE	-18%
		IRON	-33%		COBALT	-12%		COPPER	17%
		STRNTIUM	16%		MOLYBNUM	67%	R	LEAD	-98% L
		TURBIDTY	1390%	R	D I C	-23%		NITRATE	69%
		AMMONIA	196%	R	SILICA	-59%		SULFATE	-12%
		PTASSIUM	-14%						
	HDL :	D O C			D O C				
LAB 16	FLAGS :	ALUMINUM	-25%	R	MGNESIUM	-15%		SULFATE	-39% L
		ALUMINUM	84%	R	VANADIUM	38%	R	CHROMIUM	30%
		MANGNESE	45%	R	IRON	44%		COPPER	34% R
		ZINC	38%		STRNTIUM	12%		CADMIUM	-19%
		BARIUM	50%		LEAD	54%	R	SODIUM	-13%
		MGNESIUM	-15%		SULFATE	-29%		CALCIUM	-12%
	HDL :	TKN			AMMONIA			FLUORIDE	
		TOT P			SULFATE			CHLORIDE	
		TKN			NITRATE			AMMONIA	
		FLUORIDE			TOT P				

NOTE: A VERY HIGH FREQUENCY OF FLAGGED RESULTS (OR A HIGH %) IS INDICATIVE OF POOR PERFORMANCE. ON THE OTHER HAND, LABS WITH FEW IF ANY FLAGS ARE JUDGED TO HAVE VERY GOOD PERFORMANCE.

ALSO, AN "R" FLAG INDICATES A NON COMPARABLE RESULT, THAT IS, ONE PRODUCED WITH NON RANDOM FACTORS. AN "L" FLAG INDICATES A 'LESS THAN' RESULT LOWER THAN THE COMPARATOR.

TABLE 2: HIGH STANDARD DEVIATION

PARAMETER		LEVEL
BORON	AT	.032 PPM
D O C	AT	1.248 PPM
SILICA	AT	2.378 PPM
IRON	AT	.048 PPM
BORON	AT	.013 PPM
D O C	AT	.425 PPM
SILICA	AT	1.350 PPM

DATA SUMMARY

FEDERAL-PROVINCIAL & PRAIRIE PROVINCES QUALITY ASSURANCE PROGRAMS

STUDY NO. PP 73 FP 33 DATE: 01/09/88 DUE DATE: 31/10/88 PAGE 1

SAMPLE 1 SPIKED SAMPLE. TRACE METALS D/A. (IN 0.2% HNO3)

LAB	13009 AL TOT 5X ICP	13111 AL DIS ICP DA	13302 AL EXT AAS DA	13311 AL EXT ICP DA	13321 AL EXT ICP DA	13322 AL EXT DCP DA	13999 ALUMINUM COMMON	23009 V TOT 5X ICP	23011 V TOT 5X ICP	23012 V TOT 5X DCP	23111 V DIS ICP DA	23311 V EXT ICP DA	23321 V EXT ICP DA
1	-	-	-	-	-	-	-	3.718	-	-	-	-	-
2	-	-	4.0	-	-	-	4.0	-	-	-	-	-	-
3	-	-	3.89	-	4.10	-	3.89	-	-	-	-	-	3.95
6	4.4	-	-	-	-	-	4.4	-	4.3	-	-	-	-
8	-	-	3.9	-	-	-	3.9	-	-	-	-	-	-
9	-	4.3	-	-	-	-	4.3	-	-	-	3.9	-	-
10	-	4.01	-	-	-	-	4.01	-	-	-	3.73	-	-
15	-	-	-	4.09	-	-	4.09	-	-	-	-	3.77	-
16	-	-	-	-	-	3.02 R	3.02 R	-	-	3.65	-	-	-
MEAN	4.4000	4.1550	3.9300	4.0900	4.1000	-	4.0843	3.7180	4.3000	3.6500	3.8150	3.7700	3.9500
STD DEV	-	.2051	.0608	-	-	-	.1960	-	-	-	.1202	-	-
REL STD	-	4.9	1.5	-	-	-	4.8	-	-	-	3.2	-	-
DES VAL	-	-	-	-	-	-	4.000	-	-	-	-	-	-

LAB	23999 VANADIUM COMMON	24009 CR TOT 5X ICP	24011 CR TOT 5X ICP	24012 CR TOT 5X DCP	24111 CR DIS ICP DA	24302 CR EXT AAS DA	24311 CR EXT ICP DA	24321 CR EXT ICP DA	24999 CHROMIUM COMMON	25003 MN TOT 5X ICP	25011 MN TOT 5X ICP	25012 MN TOT 5X DCP	25104 MN DIS AAS DA
1	3.718	0.398	-	-	-	-	-	-	0.398	0.493	-	-	-
3	3.95	-	-	-	-	-	-	0.411	0.411	-	-	-	-
6	4.3 *	-	0.40 R	-	-	-	-	-	0.40 R	-	0.53	-	-
8	-	-	-	-	-	0.44	-	-	0.44	-	-	-	-
9	3.9	-	-	-	0.39	-	-	-	0.39	-	-	-	-
10	3.73	-	-	-	0.460	-	-	-	0.460*	-	-	-	-
11	-	-	-	-	-	0.36	-	-	0.36	-	-	-	-
13	-	-	-	-	-	-	0.47	-	0.47 *	-	-	-	-
14	-	-	-	-	-	-	-	-	-	-	-	-	0.515
15	3.77	-	-	-	-	-	0.404	-	0.404	-	-	-	-
16	3.65	-	-	0.389	-	-	-	-	0.389	-	-	0.506	-
MEAN	3.8597	.3980	-	.3890	.4250	.4000	.4370	.4110	.4136	.4930	.5300	.5060	.5150
STD DEV	.2208	-	-	-	.0495	.0566	.0467	-	.0361	-	-	-	-
REL STD	5.7	-	-	-	11.6	14.1	10.7	-	8.7	-	-	-	-
DES VAL	3.820	-	-	-	-	-	-	-	.400	-	-	-	-

LAB	25111 MN DIS ICP DA	25304 MN EXT AAS DA	25311 MN EXT ICP DA	25321 MN EXT ICP DA	25999 MANGNESE COMMON	26009 FE TOT 5X ICP	26011 FE TOT 5X ICP	26012 FE TOT 5X DCP	26104 FE DIS AAS DA	26111 FE DIS ICP DA	26304 FE EXT AAS DA	26311 FE EXT ICP DA	26321 FE EXT ICP DA
1	-	-	-	-	0.493	1.89	-	-	-	-	-	-	-
2	-	0.48	-	-	0.48	-	-	-	-	-	1.8	-	-
3	-	0.496	-	0.502	0.496	-	-	-	-	-	1.94	-	2.02
6	-	-	-	-	0.53	-	2.1	-	-	-	-	-	-
8	-	-	0.48	-	0.48	-	-	-	-	-	-	1.98	-
9	0.48	-	-	-	0.48	-	-	-	-	1.9	-	-	-
10	0.479	-	-	-	0.479	-	-	-	-	1.86	-	-	-
11	-	-	-	-	-	-	-	-	-	-	1.85	-	-
13	-	-	0.47	-	0.47	-	-	-	-	-	-	2.12	-
14	-	-	-	-	0.515	-	-	-	1.88	-	-	-	-
15	-	-	0.523	-	0.523	-	-	-	-	-	-	2.01	-
16	-	-	-	-	0.506	-	-	1.88	-	-	-	-	-
MEAN	.4795	.4880	.4910	.5020	.4956	1.8900	2.1000	1.8800	1.8800	1.8800	1.8633	2.0367	2.0200
STD DEV	.0007	.0113	.0282	-	.0202	-	-	-	-	.0283	.0709	.0737	-
REL STD	.1	2.3	5.7	-	4.1	-	-	-	-	1.5	3.8	3.6	-
DES VAL	-	-	-	-	.491	-	-	-	-	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. PP 73 - FP 33 SAMPLE 1

LAB	26999 IRON COMMON	27009 CO TOT 5X ICP	27011 CO TOT 5X ICP	27012 CO TOT 5X DCP	27111 CO DIS ICP DA	27301 CO EXT AAS DA	27311 CO EXT ICP DA	27321 CO EXT ICP DA	27999 COBALT COMMON	28009 NI TOT 5X ICP	28011 NI TOT 5X ICP	28012 NI TOT 5X DCP	28111 NI DIS ICP DA
1	1.89	1.141	-	-	-	-	-	-	1.141	1.842	-	-	-
2	1.8	-	-	-	-	-	-	-	-	-	-	-	-
3	1.94	-	-	-	-	-	-	1.15	1.15	-	-	-	-
6	2.1	-	1.1	-	-	-	-	-	1.1	-	2.1	-	-
8	1.98	-	-	-	-	1.16	-	-	1.16	-	-	-	-
9	1.9	-	-	-	1.12	-	-	-	1.12	-	-	-	1.85
10	1.86	-	-	-	1.165	-	-	-	1.165	-	-	-	1.86
11	1.85	-	-	-	-	1.2	-	-	1.2	-	-	-	-
13	2.12	-	-	-	-	-	-	-	-	-	-	-	-
14	1.88	-	-	-	-	-	-	-	-	-	-	-	-
15	2.01	-	-	-	-	-	1.06	-	1.06	-	-	-	-
16	1.88	-	-	1.09	-	-	-	-	1.09	-	-	1.84	-
MEAN	1.9342	1.1410	1.1000	1.0900	1.1425	1.1800	1.0600	1.1500	1.1318	1.8420	2.1000	1.8400	1.8550
STD DEV	.0998	-	-	-	.0318	.0283	-	-	.0433	-	-	-	.0071
REL STD	5.2	-	-	-	2.8	2.4	-	-	3.8	-	-	-	.4
DES VAL	1.962	-	-	-	-	-	-	-	1.155	-	-	-	-

LAB	28301 NI EXT AAS DA	28311 NI EXT ICP DA	28321 NI EXT ICP DA	28999 NICKEL COMMON	29009 CU TOT 5X ICP	29011 CU TOT 5X ICP	29012 CU TOT 5X DCP	29106 CU DIS AAS DA	29111 CU DIS ICP DA	29306 CU EXT AAS DA	29311 CU EXT ICP DA	29321 CU EXT ICP DA	29999 COPPER COMMON
1	-	-	-	1.842	0.485	-	-	-	-	-	-	-	0.485
2	-	-	-	-	-	-	-	-	-	0.51	-	-	0.51
3	-	-	1.94	1.94	-	-	-	-	-	-	-	0.509	0.509
6	-	-	-	2.1 *	-	0.52	-	-	-	-	-	-	0.52
8	-	1.97	-	1.97	-	-	-	-	-	-	0.46	-	0.46
9	-	-	-	1.85	-	-	-	-	0.50	-	-	-	0.50
10	-	-	-	1.86	-	-	-	-	0.491	-	-	-	0.491
11	1.86	-	-	1.86	-	-	-	-	-	0.51	-	-	0.51
13	-	2.04	-	2.04	-	-	-	-	-	-	0.54	-	0.54
14	-	-	-	-	-	-	-	0.631	-	-	-	-	0.631*
15	-	1.77	-	1.77	-	-	-	-	-	-	0.52	-	0.52
16	-	-	-	1.84	-	-	0.481	-	-	-	-	-	0.481
MEAN	1.8600	1.9267	1.9400	1.9072	.4850	.5200	.4810	.6310	.4955	.5100	.5067	.5090	.5131
STD DEV	-	.1401	-	.1028	-	-	-	-	.0064	.0000	.0416	-	.0427
REL STD	-	7.3	-	5.4	-	-	-	-	1.3	-1.0	8.2	-	8.3
DES VAL	-	-	-	1.890	-	-	-	-	-	-	-	-	.505

LAB	30009 ZN TOT 5X ICP	30011 ZN TOT 5X ICP	30012 ZN TOT 5X DCP	30104 ZN DIS AAS DA	30111 ZN DIS ICP DA	30304 ZN EXT AAS DA	30311 ZN EXT ICP DA	30321 ZN EXT ICP DA	30999 ZINC COMMON	38011 SR TOT ICP DA	38012 SR TOT DCP DA	38111 SR DIS ICP DA	38301 SR EXT AAS DA
1	0.511	-	-	-	-	-	-	-	0.511	-	-	-	-
2	-	-	-	-	-	0.49	-	-	0.49	-	-	-	-
3	-	-	-	-	-	-	-	0.520	0.520	-	-	-	-
6	-	0.5	-	-	-	-	-	-	0.5	0.31 R	-	-	-
8	-	-	-	-	-	-	0.48	-	0.48	-	-	-	-
9	-	-	-	-	0.50	-	-	-	0.50	-	-	0.88	-
10	-	-	-	-	0.506	-	-	-	0.506	-	-	-	0.83
11	-	-	-	-	-	0.50	-	-	0.50	-	-	-	-
13	-	-	-	-	-	-	0.59 R	-	0.59 R	-	-	-	-
14	-	-	-	0.523	-	-	-	-	0.523	-	-	-	-
15	-	-	-	-	-	-	0.51	-	0.51	-	-	-	-
16	-	-	0.496	-	-	-	-	-	0.496	-	0.944	-	-
MEAN	.5110	.5000	.4960	.5230	.5030	.4950	.4950	.5200	.5033	-	.9440	.8800	.8300
STD DEV	-	-	-	-	.0042	.0071	.0212	-	.0126	-	-	-	-
REL STD	-	-	-	-	.8	1.4	4.3	-	2.5	-	-	-	-
DES VAL	-	-	-	-	-	-	-	-	.509	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. PP 73 FP 33 SAMPLE 1

LAB	38311 SR EXT ICP DA	38321 SR EXT ICP DA	38999 STRNTIUM COMMON	42009 MO TOT 5X ICP	42011 MO TOT 5X ICP	42012 MO TOT 5X DCP	42111 MO DIS ICP DA	42121 MO EXT ICP DA	42311 MO EXT ICP DA	42999 MOLYBNUM COMMON	48009 CD TOT 5X ICP	48011 CD TOT 5X ICP	48012 CD TOT 5X DCP
1	-	-	-	3.816	-	-	-	-	-	3.816	0.48	-	-
3	-	0.910	0.910	-	-	-	-	3.97	-	3.97	-	-	-
6	-	-	0.31 R	-	4.1	-	-	-	-	4.1	-	0.54	-
9	-	-	0.88	-	-	-	3.7	-	-	3.7	-	-	-
10	-	-	0.83	-	-	-	3.99	-	-	3.99	-	-	-
15	0.879	-	0.879	-	-	-	-	-	3.92	3.92	-	-	-
16	-	-	0.944	-	-	3.85	-	-	-	3.85	-	-	0.483
MEAN	.8790	.9100	.8886	3.8160	4.1000	3.8500	3.8450	3.9700	3.9200	3.9066	.4800	.5400	.4830
STD DEV	-	-	.0422	-	-	-	.2051	-	-	.1308	-	-	-
REL STD	-	-	4.8	-	-	-	5.3	-	-	3.3	-	-	-
DES VAL	-	-	.860	-	-	-	-	-	-	3.820	-	-	-

LAB	48111 CD DIS ICP DA	48301 CD EXT AAS DA	48311 CD EXT ICP DA	48321 CD EXT ICP DA	48999 CADMIUM COMMON	56009 BA TOT 5X ICP	56011 BA TOT 5X ICP	56012 BA TOT 5X DCP	56111 BA DIS ICP DA	56301 BA EXT AAS DA	56311 BA EXT ICP DA	56321 BA EXT ICP DA	56999 BARIUM COMMON
1	-	-	-	-	0.48	3.838	-	-	-	-	-	-	3.838
2	-	0.49	-	-	0.49	-	-	-	-	-	-	-	-
3	-	-	-	0.489	0.489	-	-	-	-	3.87	-	3.94	3.87
6	-	-	-	-	0.54 *	-	4.1	-	-	-	-	-	4.1
8	-	0.49	-	-	0.49	-	-	-	-	-	-	-	-
9	0.51	-	-	-	0.51	-	-	-	3.9	-	-	-	3.9
10	0.460	-	-	-	0.460	-	-	-	3.78	-	-	-	3.78
11	-	0.49	-	-	0.49	-	-	-	-	-	-	-	-
13	-	-	0.51	-	0.51	-	-	-	-	-	-	-	-
15	-	-	0.474	-	0.474	-	-	-	-	-	3.35 R	-	3.35 R
16	-	-	-	-	0.483	-	-	3.82	-	-	-	-	3.82
MEAN	.4850	.4900	.4920	.4890	.4924	3.8380	4.1000	3.8200	3.8400	3.8700	-	3.9400	3.8847
STD DEV	.0354	.0000	.0255	-	.0213	-	-	-	.0849	-	-	-	.1133
REL STD	7.3	-1.0	5.2	-	4.3	-	-	-	2.2	-	-	-	2.9
DES VAL	-	-	-	-	.486	-	-	-	-	-	-	-	4.050

LAB	82011 PB TOT 5X ICP	82012 PB TOT 5X DCP	82101 PB DIS AAS DA	82111 PB DIS ICP DA	82301 PB EXT AAS DA	82311 PB EXT ICP DA	82321 PB EXT ICP DA	82999 LEAD COMMON
2	-	-	-	-	1.9	-	-	1.9
3	-	-	-	-	-	-	2.04	2.04
6	2.0	-	-	-	-	-	-	2.0
8	-	-	-	-	-	1.86	-	1.86
9	-	-	-	2.08	-	-	-	2.08
10	-	-	-	2.18	-	-	-	2.18
11	-	-	-	-	1.98	-	-	1.98
13	-	-	-	-	-	2.16	-	2.16
14	-	-	0.180R	-	-	-	-	0.180R
15	-	-	-	-	-	2.12	-	2.12
16	-	1.97	-	-	-	-	-	1.97
MEAN	2.0000	1.9700	-	2.1300	1.9400	2.0467	2.0400	2.0290
STD DEV	-	-	-	.0707	.0566	.1629	-	.1069
REL STD	-	-	-	3.3	2.9	8.0	-	5.3
DES VAL	-	-	-	-	-	-	-	2.040

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. PP 73 FP 33 SAMPLE 2

LAB	00110 IONIC BALANC %	00120 SUM OF CATIONS	00125 SUM OF ANIONS	02011 COLOUR APPARE	02021 COLOUR VIS COM	02023 COLOUR SPECT	02024 COL TRU SPECT	02040 COLOUR COMMON	02041 CONDUCT SPEC 25	02060 CONDUCT COMMON	02073 TURB HACH	02074 TURB NPLMTRI	02077 TURB HACH FZ
1	5.22	0.878	0.975	-	-	-	6.4	6.4	94.9	94.9	0.14	-	-
2	0.03	0.923	0.929	5. L	-	-	-	5. L	94.	94.	0.2	-	-
3	-1.69	0.943	0.976	5. L	-	-	-	5. L	95.4	95.4	0.13	-	-
4	-	-	-	-	5. L	-	-	5. L	94.6	94.6	-	-	-
5	1.33	0.957	0.932	5.	-	-	-	5.	93.	93.	0.2	-	-
6	9.8	1.06	0.87	-	-	-	-	-	107. R	107. R	-	0.17	-
7	-1.2	0.93	0.95	10.	-	-	-	10. *	97.9	97.9	0.35	-	-
8	5.72	0.96	0.86	5. L	-	-	-	5. L	97.7	97.7	-	0.12	-
9	0.51	0.99	0.98	-	-	-	-	-	100.	100.	-	-	-
10	-0.21	0.945	0.949	-	-	3.	-	3.	92.	92.	-	0.2	-
11	-	-	-	5.	-	-	-	5.	91.	91.	-	-	0.2
12	-	-	-	-	-	-	-	-	101.	101.	0.1	-	-
13	-	-	-	-	-	-	-	-	130. R	130. R	-	-	-
14	-	-	-	-	-	-	-	-	93.8	93.8	0.3	-	-
15	-	-	-	-	-	-	-	-	93.	93.	-	0.1	-
16	-	-	-	-	-	-	-	-	99.	99.	0.1	-	-
MEAN	2.1680	.9540	.9357	6.6667	-	3.0000	6.4000	5.8800	95.5214	95.5214	.1900	.1475	.2000
STD DEV	3.8742	.0501	.0442	2.8868	-	-	-	2.6023	3.0967	3.0967	.0927	.0457	-
REL STD	178.7	5.3	4.7	43.3	-	-	-	44.3	3.2	3.2	48.8	31.0	-
DES VAL	-	-	-	-	-	-	-	3.872	-	94.195	-	-	-

LAB	02081 TURB RATIO	02090 TURBIDTY COMMON	05100 BORON ?	05105 BORON AA CARM	05106 BORON F AZOMETH	05107 BORON ICP DA	05111 BORON F ICP DA	05190 BORON COMMON	06009 TOC CO2 IR	06051 TIC COMB IR	06101 DOC IR /DIF	06104 DOC UV CO2 IR	06107 DOC UV CO2 PHE
1	-	0.14	0.006	-	-	-	-	0.006	-	-	-	-	1.04
2	-	0.2	-	-	-	-	-	-	-	-	-	-	1.4
3	-	0.13	-	-	-	-	-	-	-	-	-	1.3	-
4	0.26	0.26	-	0.054	-	-	-	0.054	-	-	-	1.64	-
5	-	0.2	-	-	-	-	-	-	-	-	2.8 R	-	-
6	-	0.17	-	-	-	-	-	-	-	-	-	1.0	-
7	-	0.35	-	-	-	-	-	-	-	-	-	-	-
8	-	0.12	-	-	0.05 L	-	-	0.05 L	-	-	-	-	-
10	-	0.2	-	-	-	-	0.01 L	0.01 L	-	-	-	-	-
11	-	0.2	-	-	-	-	-	-	-	-	-	-	-
12	-	0.1	-	-	-	-	-	-	-	-	1.0	-	-
14	-	0.3	-	-	-	-	-	-	-	-	-	-	-
15	-	0.1	-	-	-	0.01 L	-	0.01 L	1. L	9.	-	-	-
16	-	0.1	0.050L	-	-	-	-	0.050L	-	-	-	-	-
MEAN	.2600	.1836	.0060	.0540	-	-	-	.0300	-	9.0000	1.0000	1.3133	1.2200
STD DEV	-	.0775	-	-	-	-	-	.0339	-	-	-	.3202	.2546
REL STD	-	42.2	-	-	-	-	-	113.1	-	-	-	24.4	20.9
DES VAL	-	.185	-	-	-	-	-	.032	-	-	-	-	-

LAB	06109 DOC UV CO2 OH	06112 DOC PER IR	06150 D O C COMMON	06151 DIC IR COMBUST	06152 DIC UV CO2 IR	06154 DIC AA CO2 PHE	06159 DIC AA CO2 OH	06180 DIC CALC'D	06490 D I C COMMON	07000	07010 TKN AA SAL	07015 TKN DIG BERTHEL	07016 TKN BLK AMM-SAL
1	-	-	1.04	-	-	9.22	-	-	9.22	-	-	-	-
2	-	-	1.4	-	-	-	-	-	-	-	-	-	-
3	-	-	1.3	-	-	-	-	-	-	-	0.058	-	-
4	-	-	1.64	-	10.5	-	-	-	10.5	-	-	-	-
5	-	-	2.8 R	11.9	-	-	-	-	11.9 *	-	-	-	-
6	-	-	1.0	-	-	-	-	-	-	-	-	-	0.4
8	-	-	-	-	-	-	-	-	-	-	-	0.20 L	-
10	1.0	-	1.0	-	-	-	10.4	-	10.4	-	-	-	-
12	-	-	1.0	10.8	-	-	-	-	10.8	-	-	-	-
15	-	-	1. L	-	-	-	-	-	9.	0.08	-	-	-
16	-	1.6	1.6	-	-	-	-	9.9	9.9	-	-	-	-
MEAN	1.0000	1.6000	1.2475	11.3500	10.5000	9.2200	10.4000	9.9000	10.2457	.0800	.0580	-	.4000
STD DEV	-	-	.2755	.7778	-	-	-	-	.9879	-	-	-	-
REL STD	-	-	22.1	6.9	-	-	-	-	9.6	-	-	-	-
DES VAL	-	-	1.280	-	-	-	-	-	9.917	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. PP 73 FP 33 SAMPLE 2

LAB	07018 TKN BLK INDOPHE	07021 TKN BLK DIG BER	07023 TKN DIG INDO	07090 TKN COMMON	07109 NO3+NO2 AA HYD	07110 NO3+NO2 AA2 CD	07111 NO3+NO2 DIS SPEC	07112 NO3+NO2 UF AA CD	07121 NO3+NO2 AA AZ	07390 NITRATE COMMON	07500	07505 NH3 TOT AA BERT	07540 NH3 TOT AA SAL
1	-	0.08	-	0.08	-	-	0.29	-	-	0.29	-	-	-
2	-	-	-	-	-	0.30	-	-	-	0.30	-	-	-
3	-	-	-	0.058	-	-	-	.291	-	.291	-	0.005L	-
4	-	-	-	-	-	0.252	-	-	-	0.252*	-	-	0.005L
5	-	-	-	-	-	0.265	-	-	-	0.265	-	-	-
6	-	-	-	0.4 *	0.29	-	-	-	-	0.29	-	-	-
7	-	-	-	-	-	-	-	0.26	-	0.26	-	-	-
8	-	-	-	0.20 L	-	0.31	-	-	-	0.31	-	-	-
9	-	-	-	-	0.31	-	-	-	-	0.31	-	-	-
10	-	-	-	-	0.300	-	-	-	-	0.300	-	-	-
11	-	-	-	-	-	0.24	-	-	-	0.24 *	-	-	0.007L
12	0.09	-	-	0.09	-	0.29	-	-	-	0.29	-	-	-
13	-	-	-	-	-	0.25	-	-	-	0.25 *	-	-	0.1 L
14	-	-	-	-	-	-	0.30	-	-	0.30	0.005	-	-
15	-	-	-	0.08	-	0.303	-	-	-	0.303	-	-	-
16	-	-	0.2 L	0.2 L	-	-	-	-	0.28	0.28	-	-	-
MEAN	.0900	.0800	-	.1416	.3000	.2763	.2950	.2755	.2800	.2832	.0050	-	-
STD DEV	-	-	-	.1449	.0100	.0276	.0071	.0219	-	.0227	-	-	-
REL STD	-	-	-	102.3	3.3	10.0	2.4	8.0	-	8.0	-	-	-
DES VAL	-	-	-	.075	-	-	-	-	-	.301	-	-	-

LAB	07555 NH3 DIS AA PHEN	07557 NH3 DIS AA INDO	07562 NH3 DIS AA EDTA	07563 NH3 DIS AA INDO	07565	07590 AMMONIA COMMON	07600 T N PER AUTO	07601 T N UV AA SUL	07602 T N CALC'D	07605 T N UV HY SUL	07651 T N DIS UV AA	07655 T N DIS UV EDTA	07690 TOT N COMMON
1	-	-	0.001	-	-	0.001	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	0.29	-	-	-	-	-
3	-	-	-	-	-	0.005L	-	0.329	-	-	-	-	-
4	-	-	-	-	-	0.005L	-	-	-	-	0.331	-	-
5	-	0.002L	-	-	-	0.002L	-	-	-	-	-	0.320	-
6	-	0.01 R	-	-	-	0.01 R	-	-	-	-	-	-	-
8	0.004	-	-	-	-	0.004	-	-	-	-	-	-	-
10	0.010L	-	-	-	-	0.010L	-	-	-	0.32	-	-	-
11	-	-	-	-	-	0.007L	-	-	-	-	-	-	-
12	-	-	-	0.005L	-	0.005L	-	-	0.38	-	-	-	0.38
13	-	-	-	-	-	0.1 L	-	-	-	-	-	-	-
14	-	-	-	-	-	0.005	-	-	-	-	-	-	-
15	0.007R	-	-	-	-	0.007R	0.38	-	-	-	-	-	0.38
16	-	-	-	-	0.1 L	0.1 L	-	-	-	-	-	-	-
MEAN	.0040	-	.0010	-	-	.0033	.3800	.3095	.3800	.3200	.3310	.3200	.3800
STD DEV	-	-	-	-	-	.0021	-	.0276	-	-	-	-	.0000
REL STD	-	-	-	-	-	62.4	-	8.9	-	-	-	-	-1.0
DES VAL	-	-	-	-	-	.003	-	-	-	-	-	-	.367

LAB	07790 T N DIS COMMON	09100	09103 F DIS COL SP	09105 F DIS SP EL	09106 F DIS EL POT	09107 F DIS AUT POT	09108 F DIS SP EL	09115 F DIS AA ALIZ	09116 F DIS IC	09190 FLUORIDE COMMON	10101 ALKLNTY TITR'N	10108 ALKLNTY POT TIT	10109 ALKLNTY POT TIT
1	-	-	-	-	-	0.05	-	-	-	0.05	43.	-	-
2	0.29	-	-	-	0.05 L	-	-	-	-	0.05 L	39.8	-	-
3	0.329	-	-	-	-	-	0.03	-	-	0.03	-	-	-
4	0.331	-	-	-	-	-	-	-	-	-	-	-	-
5	0.320	-	-	-	0.05 L	-	-	-	-	0.05 L	40.9	-	-
6	-	-	0.1 L	-	-	-	-	-	-	0.1 L	-	-	44.
7	-	-	-	-	-	-	-	-	-	-	41.3	-	-
8	-	-	-	0.05 L	-	-	-	-	-	0.05 L	-	-	40.0
9	-	-	-	-	-	-	-	-	-	-	-	43.	-
10	0.32	-	-	-	-	-	-	0.04	-	0.04	-	-	-
11	-	-	-	0.05 L	-	-	-	-	-	0.05 L	41.	-	-
12	-	-	-	0.10 L	-	-	-	-	-	0.10 L	40.3	-	-
13	-	-	-	-	-	-	-	-	-	-	48.	-	-
14	-	0.1	-	-	-	-	-	-	-	0.1 *	42.3	-	-
15	-	-	-	0.07	-	-	-	-	-	0.07	48.	-	-
16	-	-	-	-	-	-	-	-	1.0 L	1.0 L	40.7	-	-
MEAN	.3180	.1000	-	.0700	-	.0500	.0300	.0400	-	.0580	42.5300	43.0000	42.0000
STD DEV	.0164	-	-	-	-	-	-	-	-	.0277	3.0258	-	2.8284
REL STD	5.2	-	-	-	-	-	-	-	-	47.8	7.1	-	6.7
DES VAL	.331	-	-	-	-	-	-	-	-	.050	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. PP 73 . FP 33 SAMPLE 2

LAB	10111 ALKLNTY TIT PRO	10112 ALKLNTY TIT CON	10190 ALKLINTY COMMON	10301 PH	10390 PH COMMON	10602 HARDNSS CALC'D	10603 HARDNSS TITR'N	10606 HARDNSS CALC'D	10645 HARDNSS ?	10690 HARDNESS COMMON	11001 NA TOT AAS	11005 NA TOT ICP	11007 NA DIS DCP
1	-	-	43.	7.2	7.2	41.	-	-	-	41.	-	-	-
2	-	-	39.8	7.3	7.3	42.8	-	-	-	42.8	-	-	-
3	40.3	-	40.3	7.90	7.90	-	-	43.8	-	43.8	-	-	-
4	-	-	-	7.93	7.93	-	-	-	-	-	-	-	-
5	-	-	40.9	7.80	7.80	-	-	-	-	-	-	-	-
6	-	-	44.	7.0	7.0	-	48.	-	-	48.	-	-	-
7	-	-	41.3	8.0	8.0	-	45.4	-	-	45.4	-	-	-
8	-	-	40.0	7.85	7.85	44.8	-	-	-	44.8	-	-	-
9	-	-	43.	7.65	7.65	-	-	-	46.	46.	-	1.3	-
10	-	41.	41.	7.66	7.66	-	-	-	-	-	-	1.18	-
11	-	-	41.	7.6	7.6	43.	-	-	-	43.	-	-	-
12	-	-	40.3	7.9	7.9	-	-	-	-	-	-	-	-
13	-	-	48. *	7.3	7.3	50.4	-	-	-	50.4 *	-	-	-
14	-	-	42.3	7.62	7.62	40.4	-	-	-	40.4	1.64	-	-
15	-	-	48. *	7.7	7.7	48.7	-	-	-	48.7	-	-	-
16	-	-	40.7	7.48	7.48	41.5	-	-	-	41.5	-	-	1.18
MEAN	40.3000	41.0000	42.2400	7.6181	7.6181	44.0750	46.7000	43.8000	46.0000	44.6500	1.6400	1.2400	1.1800
STD DEV	-	-	2.6354	.2918	.2918	3.6702	1.8385	-	-	3.1805	-	.0849	-
REL STD	-	-	6.2	3.8	3.8	8.3	3.9	-	-	7.1	-	6.8	-
DES VAL	-	-	41.188	-	7.666	-	-	-	-	44.697	-	-	-

LAB	11102 NA F AAS	11103 NA DIS FL PH	11105 NA DIS AAS DA	11107 NA UF FL PH	11111 NA DIS ICP	11311 NA EXT ICP	11990 SODIUM COMMON	12005 MG TOT ICP	12012 MG TOT DCP	12101 MG DIS CALC'D	12102 MG DIS AAS DA	12106 MG UF AAS DA	12107 MG DIS AAS AUT
1	-	1.	-	-	-	-	1. *	-	-	-	-	-	-
2	-	1.3	-	-	-	-	1.3	-	-	-	-	-	2.7
3	-	-	-	1.26	-	-	1.26	-	-	-	-	2.7	-
5	-	1.3	-	-	-	-	1.3	-	-	-	2.72	-	-
6	2. R	-	-	-	-	-	2. R	-	-	3.4	-	-	-
7	-	-	1.15	-	-	-	1.15	-	-	-	2.74	-	-
8	-	-	-	-	-	1.27	1.27	-	-	-	-	-	-
9	-	-	-	-	-	-	1.3	3.0	-	-	-	-	-
10	-	-	-	-	-	-	1.18	2.76	-	-	-	-	-
11	1.0	-	-	-	-	-	1.0 *	-	-	-	2.9	-	-
12	-	1.5	-	-	-	-	1.5 *	-	-	-	-	-	-
13	-	-	-	-	1.38	-	1.38	-	-	-	-	-	-
14	-	-	-	-	-	-	1.64 *	-	-	-	2.70	-	-
15	-	-	-	-	1.4	-	1.4	-	-	-	-	-	-
16	-	-	-	-	-	-	1.18	-	2.34	-	-	-	-
MEAN	1.0000	1.2750	1.1500	1.2600	1.3900	1.2700	1.2757	2.8800	2.3400	3.4000	2.7650	2.7000	2.7000
STD DEV	-	.2062	-	-	.0141	-	.1749	.1697	-	-	.0915	-	-
REL STD	-	16.2	-	-	1.0	-	13.7	5.9	-	-	3.3	-	-
DES VAL	-	-	-	-	-	-	1.278	-	-	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. PP 73 FP 33 SAMPLE 2

LAB	12111 MG DIS ICP	12303 MG UF AAS AUT	12311 MG EXT ICP	12990 MGNESIUM COMMON	14102 SILICA ANSA AA	14105 SILICA MOLY AA	14106 SILICA MOLY	14107 SILICA MOLY AA	14111 SILICA ICP DA	14112 SILICA DCP DA	14190 SILICA COMMON	15313 T P ACL AA SNCL	15315 T P AA SNCL
1	-	2.1	-	2.1 *	-	-	-	2.4	-	-	2.4	-	-
2	-	-	-	2.7	3.5	-	-	-	-	-	3.5 *	-	-
3	-	-	-	2.7	-	-	2.40	-	-	-	2.40	-	-
5	-	-	-	2.72	-	2.4	-	-	-	-	2.4	-	-
6	-	-	-	3.4 *	-	-	-	-	-	-	-	-	-
7	-	-	-	2.74	-	-	-	-	-	-	-	-	-
8	-	-	3.00	3.00	-	-	-	-	-	-	-	-	-
9	-	-	-	3.0	-	-	-	-	2.5	-	2.5	-	-
10	-	-	-	2.76	-	2.2	-	-	-	-	2.2	-	-
11	-	-	-	2.9	-	-	-	-	-	-	-	0.005L	-
12	-	-	-	-	-	2.5	-	-	-	-	2.5	-	-
13	3.20	-	-	3.20 *	-	-	-	-	-	-	-	-	-
14	-	-	-	2.70	-	-	-	-	-	-	-	-	-
15	2.8	-	-	2.8	-	-	-	-	0.98	-	0.98 *	-	-
16	-	-	-	2.34 *	-	-	-	-	-	2.44	2.44	-	0.2 L
MEAN	3.0000	2.1000	3.0000	2.7900	3.5000	2.3667	2.4000	2.4000	1.7400	2.4400	2.3689	-	-
STD DEV	.2828	-	-	.3225	-	.1528	-	-	1.0748	-	.6402	-	-
REL STD	9.4	-	-	11.6	-	6.5	-	-	61.8	-	27.0	-	-
DES VAL	-	-	-	2.754	-	-	-	-	-	-	2.378	-	-

LAB	15400	15401 T P UV AA ASC	15406 T P UF AA ASC	15409 T P BLK AA ASC	15413 T P ACL AA SNCL	15421 T P BLK DIG ASC	15490 TOT P COMMON	16304 SO4 DIS AUTO BA	16306 SO4 DIS AA MTB	16307 SO4 UF AA MTB	16309 SO4 DIS I C	16310 SO4 DIS AA CALM	16311 SO4 DIS IC
1	-	-	-	-	-	0.001	0.001	-	3.	-	-	-	-
2	-	-	-	-	0.001L	-	0.001L	3.4	-	-	3.1	-	-
3	-	-	-	-	0.003	-	0.003	-	-	3.1	-	-	-
4	-	-	0.004	-	-	-	0.004	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	3.1	-	-	-	-
6	-	-	-	0.02 R	-	-	0.02 R	10. L	-	-	-	-	-
7	-	-	0.010	-	-	-	0.010	-	3.3	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	3.2	-	-
10	-	0.010L	-	-	-	-	0.010L	-	-	-	-	3.5	-
11	-	-	-	-	-	-	0.005L	-	3.4	-	-	-	-
12	-	-	0.003	-	-	-	0.003	-	3.3	-	-	-	-
13	-	-	0.001	-	-	-	0.001	-	4.71 R	-	-	-	-
14	-	-	-	-	-	-	-	-	-	-	3.07	-	-
15	0.014	-	-	-	-	-	0.014*	-	3.	-	-	-	-
16	-	-	-	-	-	-	0.2 L	-	-	-	-	-	2. L
MEAN	.0140	-	.0045	-	.0030	.0010	.0051	3.4000	3.1833	3.1000	3.1233	3.5000	-
STD DEV	-	-	.0039	-	-	-	.0049	-	.1722	-	.0681	-	-
REL STD	-	-	86.1	-	-	-	96.2	-	5.4	-	2.2	-	-
DES VAL	-	-	-	-	-	-	.004	-	-	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. PP 73 . FP 33 SAMPLE 2

LAB	16990 SULFATE COMMON	17203 CL DIS AA FE	17204 CL DIS AG TIT	17206 CL DIS AA HG	17208 CL DIS AA HG	17209 CL DIS I C	17210 CL DIS TIT CON	17211 CL DIS IC	17990 CHLORIDE COMMON	19001 K TOT AAS	19005 K TOT ICP	19008 K TOT DCP	19102 K DIS AAS
1	3.	1.	-	-	-	-	-	-	1. *	-	-	-	-
2	3.1	-	-	-	-	1.2	-	-	1.2	-	-	-	-
3	3.1	-	-	-	1.2	-	-	-	1.2	-	-	-	-
5	3.1	-	-	1.1	-	-	-	-	1.1	-	-	-	-
6	10. L	-	2. L	-	-	-	-	-	2. L	-	-	-	0.6
7	3.3	1.3	-	-	-	-	-	-	1.3	-	-	-	0.50
8	-	-	-	1.30	-	-	-	-	1.30	-	-	-	-
9	3.2	-	-	-	-	1.3	-	-	1.3	-	0.5	-	-
10	3.5	-	-	-	-	-	1.2	-	1.2	-	0.49	-	-
11	3.4	-	-	-	-	-	-	-	-	-	-	-	-
12	3.3	-	-	1.3	-	-	-	-	1.3	-	-	-	-
13	4.71 R	-	-	1.3	-	-	-	-	1.3	-	-	-	-
14	3.07	-	-	-	-	1.34	-	-	1.34	0.48	-	-	-
15	3.	-	-	0.5 L	-	-	-	-	0.5 *	-	-	-	-
16	2. *	-	-	-	-	-	-	2. L	2. L	-	-	0.485	-
MEAN	3.1882	1.1500	-	1.2500	1.2000	1.2800	1.2000	-	1.2309	.4800	.4950	.4850	.5500
STD DEV	.1659	.2121	-	.1000	-	.0721	-	-	.1044	-	.0071	-	.0707
REL STD	5.2	18.4	-	8.0	-	5.6	-	-	8.5	-	1.4	-	12.9
DES VAL	3.273	-	-	-	-	-	-	-	1.267	-	-	-	-

LAB	19103 K DIS FLM PH	19105 K DIS AAS DA	19106 K DIS AAS LI	19107 K DIS FLM PH	19111 K DIS ICP	19301 K EXT HNO3 AA	19990 PTASSIUM COMMON	20005 CA TOT ICP	20007 CA TOT DCP	20050 CA DIS AAS NO	20100 CA DIS CALC'D	20103 CA DIS AAS	20108 CA DIS AAS UF
1	0.5	-	-	-	-	-	0.5	-	-	-	-	-	-
2	0.43	-	-	-	-	-	0.43	-	-	-	-	-	-
3	-	-	-	0.48	-	-	0.48	-	-	-	-	-	13.1
5	0.5	-	-	-	-	-	0.5	-	-	-	-	13.3	-
6	-	-	-	-	-	-	0.6 *	-	-	-	13.6	-	-
7	-	-	-	-	-	-	0.50	-	-	-	-	12.8	-
8	-	-	-	-	-	0.47	0.47	-	-	-	-	-	-
9	-	-	-	-	-	-	0.5	13.5	-	-	-	-	-
10	-	-	-	-	-	-	0.49	13.11	-	-	-	-	-
11	-	-	0.5	-	-	-	0.5	-	-	-	-	12.	-
12	0.4	-	-	-	-	-	0.4	-	-	-	-	-	-
13	-	-	-	-	0.43	-	0.43	-	-	-	-	-	-
14	-	-	-	-	-	-	0.48	-	-	11.7	-	-	-
15	-	0.43	-	-	-	-	0.43	-	-	-	-	-	-
16	-	-	-	-	-	-	0.485	-	12.1	-	-	-	-
MEAN	.4575	.4300	.5000	.4800	.4300	.4700	.4797	13.3050	12.1000	11.7000	13.6000	12.7000	13.1000
STD DEV	.0506	-	-	-	-	-	.0467	.2758	-	-	-	.6557	-
REL STD	11.1	-	-	-	-	-	9.7	2.1	-	-	-	5.2	-
DES VAL	-	-	-	-	-	-	.484	-	-	-	-	-	-

LAB	20110 CA DIS AAS AUT	20111 CA DIS ICP	20311 CA EXT ICP	20990 CALCIUM COMMON
1	13.	-	-	13.
2	12.7	-	-	12.7
3	-	-	-	13.1
5	-	-	-	13.3
6	-	-	-	13.6
7	-	-	-	12.8
8	-	-	13.0	13.0
9	-	-	-	13.5
10	-	-	-	13.11
11	-	-	-	12.
13	-	14.9	-	14.9 *
14	-	-	-	11.7
15	-	14.7	-	14.7 *
16	-	-	-	12.1
MEAN	12.8500	14.8000	13.0000	13.1079
STD DEV	.2121	.1414	-	.9068
REL STD	1.7	1.0	-	6.9
DES VAL	-	-	-	12.690

DATA SUMMARY

FEDERAL-PROVINCIAL & PRAIRIE PROVINCES QUALITY ASSURANCE PROGRAMS

STUDY NO. PP 74 FP 34 DATE: 01/10/88 DUE DATE: 31/10/88

SAMPLE 3 SPIKED SAMPLE. TRACE METALS S/E. (IN 0.2% HNO3)

LAB	13009 AL TOT 5X ICP	13105 AL DIS AAS GF	13111 AL DIS ICP DA	13302 AL EXT AAS DA	13305 AL EXT AAS SE	13311 AL EXT ICP DA	13322 AL EXT DCP DA	13999 ALUMINUM COMMON	23002 V TOT AAS SE	23009 V TOT 5X ICP	23011 V TOT 5X ICP	23012 V TOT 5X DCP	23111 V DIS ICP DA
1	-	-	-	-	-	-	-	-	-	0.021	-	-	-
2	-	-	-	-	0.048	-	-	0.048	-	-	-	-	-
3	0.059	-	-	-	0.049	-	-	0.049	0.019	0.020	-	-	-
6	0.054	-	-	-	-	-	-	0.054	-	-	0.02	-	-
8	-	-	-	0.2 L	-	-	-	0.2 L	-	-	-	-	-
9	-	-	0.05	-	-	-	-	0.05	-	-	-	-	0.022
10	-	-	0.06	-	-	-	-	0.06 *	-	-	-	-	0.024
14	-	0.032	-	-	-	-	-	0.032*	-	-	-	-	-
15	-	-	-	-	-	0.011R	-	0.011R	-	-	-	-	-
16	-	-	-	-	-	-	0.092R	0.092R	-	-	-	0.029R	-
MEAN	.0565	.0320	.0550	-	.0485	-	-	.0488	.0190	.0205	.0200	-	.0230
STD DEV	.0035	-	.0071	-	.0007	-	-	.0093	-	.0007	-	-	.0014
REL STD	6.3	-	12.9	-	1.5	-	-	19.1	-	3.4	-	-	6.1
DES VAL	-	-	-	-	-	-	-	.050	-	-	-	-	-

LAB	23311 V EXT ICP DA	23999 VANADIUM COMMON	24003 CR TOT AAS SE	24004 CR TOT AAS GF	24009 CR TOT 5X ICP	24011 CR TOT 5X ICP	24012 CR TOT 5X DCP	24111 CR DIS ICP DA	24303 CR EXT AAS SE	24311 CR EXT ICP DA	24999 CHROMIUM COMMON	25003 MN TOT 5X ICP	25004 MN TOT AAS DA
1	-	0.021	-	-	0.026	-	-	-	-	-	0.026	0.021	-
3	-	0.019	0.028	-	0.026	-	-	-	-	-	0.028	-	0.019
6	-	0.02	-	-	-	0.020	-	-	-	-	0.020*	-	-
8	-	-	-	0.030	-	-	-	-	-	-	0.030	-	-
9	-	0.022	-	0.026	-	-	-	-	-	-	0.026	-	-
10	-	0.024*	-	-	-	-	-	0.027	-	-	0.027	-	-
11	-	-	-	-	-	-	-	-	0.025	-	0.025	-	-
14	-	0.022	-	-	-	-	-	-	-	-	-	-	-
15	0.020	0.020	-	-	-	-	-	-	-	0.031	0.031	-	-
16	-	0.029R	-	-	-	-	0.035	-	-	-	0.035*	-	-
MEAN	.0200	.0211	.0280	.0280	.0260	.0200	.0350	.0270	.0250	.0310	.0276	.0210	.0190
STD DEV	-	.0017	-	.0028	.0000	-	-	-	-	-	.0042	-	-
REL STD	-	7.9	-	10.1	-1.0	-	-	-	-	-	15.3	-	-
DES VAL	-	.021	-	-	-	-	-	-	-	-	.027	-	-

LAB	25010 MN TOT 5X ICP	25011 MN TOT 5X ICP	25012 MN TOT 5X DCP	25107 MN DIS AAS GF	25111 MN DIS ICP DA	25304 MN EXT AAS DA	25311 MN EXT ICP DA	25999 MANGNESE COMMON	26005 FE TOT AAS SE	26009 FE TOT 5X ICP	26011 FE TOT 5X ICP	26012 FE TOT 5X DCP	26107 FE DIS AAS GF
1	-	-	-	-	-	-	-	0.021	-	0.047	-	-	-
2	-	-	-	-	-	0.02	-	0.02	-	-	-	-	-
3	0.022	-	-	-	-	-	-	0.019	0.049	0.053	-	-	-
6	-	0.021	-	-	-	-	-	0.021	-	-	0.057	-	-
8	-	-	-	-	-	-	0.02	0.02	-	-	-	-	-
9	-	-	-	-	0.022	-	-	0.022	-	-	-	-	-
10	-	-	-	-	0.019	-	-	0.019	-	-	-	-	-
14	-	-	-	0.021	-	-	-	0.021	-	-	-	-	0.027
15	-	-	-	-	-	-	0.018	0.018*	-	-	-	-	-
16	-	-	0.032R	-	-	-	-	0.032R	-	-	-	0.069	-
MEAN	.0220	.0210	-	.0210	.0205	.0200	.0190	.0201	.0490	.0500	.0570	.0690	.0270
STD DEV	-	-	-	-	.0021	-	.0014	.0013	-	.0042	-	-	-
REL STD	-	-	-	-	10.3	-	7.4	6.3	-	8.5	-	-	-
DES VAL	-	-	-	-	-	-	-	.022	-	-	-	-	-

LAB	26111 FE DIS ICP DA	26305 FE EXT AAS SE	26311 FE EXT ICP DA	26999 IRON COMMON	27002 CO TOT AAS SE	27003 CO TOT AAS GF	27009 CO TOT 5X ICP	27011 CO TOT 5X ICP	27012 CO TOT 5X DCP	27111 CO DIS ICP DA	27311 CO EXT ICP DA	27999 COBALT COMMON	28002 NI TOT AAS SE
1	-	-	-	0.047	-	-	0.024	-	-	-	-	0.024	-
2	-	0.048	-	0.048	-	-	-	-	-	-	-	-	-
3	-	-	-	0.049	0.027	-	0.024	-	-	-	-	0.027	0.026
6	-	-	-	0.057	-	-	-	0.020	-	-	-	0.020*	-
8	-	-	0.06	0.06	-	0.026	-	-	-	-	-	0.026	-
9	0.05	-	-	0.05	-	-	-	-	-	0.025	-	0.025	-
10	0.039	-	-	0.039	-	-	-	-	-	0.020	-	0.020*	-
11	-	0.010R	-	0.010R	-	-	-	-	-	-	-	-	-
14	-	-	-	0.027*	-	-	-	-	-	-	-	-	-
15	-	-	0.032	0.032*	-	-	-	-	-	-	0.022	0.022*	-
16	-	-	-	0.069*	-	-	-	-	0.027	-	-	0.027	-
MEAN	.0445	.0480	.0460	.0478	.0270	.0260	.0240	.0200	.0270	.0225	.0220	.0239	.0260
STD DEV	.0078	-	.0198	.0127	-	-	.0000	-	-	.0035	-	.0029	-
REL STD	17.5	-	43.0	26.6	-	-	-1.0	-	-	15.7	-	12.1	-
DES VAL	-	-	-	.048	-	-	-	-	-	-	-	.025	-

LAB	28009 NI TOT 5X ICP	28011 NI TOT 5X ICP	28012 NI TOT 5X DCP	28111 NI DIS ICP DA	28302 NI EXT AAS SE	28309 NI EXT AAS GF	28311 NI EXT ICP DA	28999 NICKEL COMMON	29005 CU TOT AAS SE	29009 CU TOT 5X ICP	29011 CU TOT 5X ICP	29012 CU TOT 5X DCP	29107 CU DIS AAS GF
1	0.026	-	-	-	-	-	-	0.026	-	0.053	-	-	-
3	0.027	-	-	-	-	-	-	0.026	0.048	0.049	-	-	-
6	-	0.022	-	-	-	-	-	0.022*	-	-	0.051	-	-
8	-	-	-	-	-	0.026	-	0.026	-	-	-	-	-
9	-	-	-	0.025	-	-	-	0.025	-	-	-	-	-
10	-	-	-	0.017R	-	-	-	0.017R	-	-	-	-	-
11	-	-	-	-	0.026	-	-	0.026	-	-	-	-	-
14	-	-	-	-	-	-	-	-	-	-	-	-	0.061
15	-	-	-	-	-	-	0.03	0.03	-	-	-	-	-
16	-	-	0.028	-	-	-	-	0.028	-	-	-	0.071R	-
MEAN	.0265	.0220	.0280	.0250	.0260	.0260	.0300	.0261	.0480	.0510	.0510	-	.0610
STD DEV	.0007	-	-	-	-	-	-	.0023	-	.0028	-	-	-
REL STD	2.7	-	-	-	-	-	-	8.8	-	5.5	-	-	-
DES VAL	-	-	-	-	-	-	-	.028	-	-	-	-	-

LAB	29111 CU DIS ICP DA	29305 CU EXT AAS SE	29308 CU EXT AAS GF	29311 CU EXT ICP DA	29999 COPPER COMMON	30004	30009 ZN TOT 5X ICP	30011 ZN TOT 5X ICP	30012 ZN TOT 5X DCP	30107 ZN DIS AAS GF	30111 ZN DIS ICP DA	30304 ZN EXT AAS DA	30305 ZN EXT AAS SE
1	-	-	-	-	0.053	-	0.032	-	-	-	-	-	-
2	-	0.052	-	-	0.052	-	-	-	-	-	-	0.037	-
3	-	-	-	-	0.048	0.033	0.074	-	-	-	-	-	-
6	-	-	-	-	0.051	-	-	0.034	-	-	-	-	-
8	-	-	-	0.06	0.06	-	-	-	-	-	-	-	-
9	0.055	-	-	-	0.055	-	-	-	-	-	0.034	-	-
10	0.056	-	-	-	0.056	-	-	-	-	-	0.034	-	-
11	-	0.050	-	-	0.050	-	-	-	-	-	-	-	0.025
14	-	-	-	-	0.061*	-	-	-	-	0.023	-	-	-
15	-	-	0.062	-	0.062*	-	-	-	-	-	-	-	-
16	-	-	-	-	0.071R	-	-	-	0.047	-	-	-	-
MEAN	.0555	.0510	.0620	.0600	.0548	.0330	.0530	.0340	.0470	.0230	.0340	.0370	.0250
STD DEV	.0007	.0014	-	-	.0049	-	.0297	-	-	-	.0000	-	-
REL STD	1.3	2.8	-	-	8.9	-	56.0	-	-	-	-1.0	-	-
DES VAL	-	-	-	-	.053	-	-	-	-	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. PP 74 - FP 34 SAMPLE 3

LAB	30311 ZN EXT ICP DA	30999 ZINC COMMON	38009 SR TOT ICP DA	38011 SR TOT ICP DA	38012 SR TOT DCP DA	38111 SR DIS ICP DA	38301 SR EXT AAS DA	38311 SR EXT ICP DA	38999 STRNTIUM COMMON	42009 MO TOT 5X ICP	42011 MO TOT 5X ICP	42012 MO TOT 5X DCP	42111 MO DIS ICP DA
1	-	0.032	-	-	-	-	-	-	-	0.017	-	-	-
2	-	0.037	-	-	-	-	-	-	-	-	-	-	-
3	-	0.033	0.178	-	-	-	-	-	0.178	0.018	-	-	-
6	-	0.034	-	0.06 R	-	-	-	-	0.06 R	-	0.02	-	-
8	0.04	0.04	-	-	-	-	-	-	-	-	-	-	-
9	-	0.034	-	-	-	0.18	-	-	0.18	-	-	-	0.02
10	-	0.034	-	-	-	-	0.17	-	0.17	-	-	-	0.021
11	-	0.025*	-	-	-	-	-	-	-	-	-	-	-
14	-	0.023*	-	-	-	-	-	-	-	-	-	-	-
15	0.032	0.032	-	-	-	-	-	0.200	0.200*	-	-	-	-
16	-	0.047*	-	-	0.192	-	-	-	0.192*	-	-	0.018	-
MEAN	.0360	.0337	.1780	-	.1920	.1800	.1700	.2000	.1840	.0175	.0200	.0180	.0205
STD DEV	.0057	.0065	-	-	-	-	-	-	.0119	.0007	-	-	.0007
REL STD	15.7	19.3	-	-	-	-	-	-	6.5	4.0	-	-	3.4
DES VAL	-	.034	-	-	-	-	-	-	.172	-	-	-	-

LAB	42311 MO EXT ICP DA	42999 MOLYBNUM COMMON	48002 CD TOT AAS SE	48004	48009 CD TOT 5X ICP	48011 CD TOT 5X ICP	48012 CD TOT 5X DCP	48111 CD DIS ICP DA	48302 CD EXT AAS SE	48309 CD EXT AAS GF	48999 CADMIUM COMMON	56009 BA TOT 5X ICP	56011 BA TOT 5X ICP
1	-	0.017	-	-	0.021	-	-	-	-	-	0.021	0.023	-
2	-	-	-	-	-	-	-	-	0.021	-	0.021	-	-
3	-	0.018	0.020	-	0.020	-	-	-	-	-	0.020	0.023	-
6	-	0.02 *	-	-	-	0.021	-	-	-	-	0.021	-	0.022
8	-	-	-	-	-	-	-	-	-	0.022	0.022	-	-
9	-	0.02 *	-	0.022	-	-	-	-	-	-	0.022	-	-
10	-	0.021*	-	-	-	-	-	0.019	-	-	0.019	-	-
11	-	-	-	-	-	-	-	-	0.020	-	0.020	-	-
15	0.03 R	0.03 R	-	-	-	-	-	-	-	0.023	0.023	-	-
16	-	0.018	-	-	-	-	0.017	-	-	-	0.017*	-	-
MEAN	-	.0190	.0200	.0220	.0205	.0210	.0170	.0190	.0205	.0225	.0206	.0230	.0220
STD DEV	-	.0015	-	-	.0007	-	-	-	.0007	.0007	.0017	.0000	-
REL STD	-	8.2	-	-	3.4	-	-	-	3.4	3.1	8.3	-1.0	-
DES VAL	-	.018	-	-	-	-	-	-	-	-	.021	-	-

LAB	56012 BA TOT 5X DCP	56111 BA DIS ICP DA	56311 BA EXT ICP DA	56999 BARIUM COMMON	82002 PB TOT AAS SE	82004 PB TOT AAS GF	82009 PB TOT 5X ICP	82011 PB TOT 5X ICP	82012 PB TOT 5X DCP	82104 PB DIS AAS GF	82302 PB EXT AAS SE	82309 PB EXT AAS GF	82999 LEAD COMMON
1	-	-	-	0.023	-	-	-	-	-	-	0.028	-	0.028
2	-	-	-	-	-	-	-	-	-	-	0.026	-	0.026
3	-	-	-	0.023	0.026	-	0.026	-	-	-	-	-	0.026
6	-	-	-	0.022	-	-	-	0.021	-	-	-	-	0.021*
8	-	-	-	-	-	-	-	-	-	-	-	0.029	0.029
9	-	0.025	-	0.025	-	0.026	-	-	-	-	-	-	0.026
10	-	0.02	-	0.02	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	0.025	-	0.025
14	-	-	-	-	-	-	-	-	-	0.017	-	-	0.017*
15	-	-	0.027	0.027	-	-	-	-	-	-	-	.0005L	.0005*
16	0.033	-	-	0.033*	-	-	-	-	0.040R	-	-	-	0.040R
MEAN	.0330	.0225	.0270	.0247	.0260	.0260	.0260	.0210	-	.0170	.0263	.0290	.0248
STD DEV	-	.0035	-	.0043	-	-	-	-	-	-	.0015	-	.0039
REL STD	-	15.7	-	17.3	-	-	-	-	-	-	5.8	-	15.8
DES VAL	-	-	-	.022	-	-	-	-	-	-	-	-	.026

LAB	00110 IONIC BALANC %	00120 SUM OF CATIONS	00125 SUM OF ANIONS	02011 COLOUR APPARE	02021 COLOUR VIS COM	02023 COLOUR SPECT	02024 COL TRU SPECT	02040 COLOUR COMMON	02041 CONDUCT SPEC 25	02060 CONDUCT COMMON	02073 TURB HACH	02074 TURB NPLMTRI	02077 TURB HACH FZ
1	0.30	1.500	1.491	-	-	-	2.1	2.1	177.	177.	0.1	-	-
2	1.35	1.511	1.471	5. L	-	-	-	5. L	172.	172.	0.2	-	-
3	1.30	1.534	1.575	5. L	-	-	-	5. L	174.	174.	0.08	-	-
4	-	-	-	-	5. L	-	-	5. L	174.	174.	-	-	-
5	0.26	1.53	1.52	5.	-	-	-	5.	166.	166.	0.2	-	-
6	4.1	1.65	1.52	-	-	-	-	-	166.	166.	-	0.11	-
7	0.7	1.48	1.46	3.	-	-	-	3.	180.	180.	0.13	-	-
8	14.52	1.59	1.19	5. L	-	-	-	5. L	176.	176.	-	0.06	-
9	2.8	1.65	1.56	-	-	-	-	-	180.	180.	-	-	-
10	1.17	1.513	1.478	-	-	1. L	-	1. L	168.	168.	-	0.1	-
11	-	-	-	-	-	-	-	-	169.	169.	-	-	0.1
12	-	-	-	-	-	-	-	-	180.	180.	0.1	-	-
13	-	-	-	-	-	-	-	-	190.	190.	-	-	-
14	-	-	-	-	-	-	-	-	170.5	170.5	0.1	-	-
15	-	-	-	-	-	-	-	-	160.	160.	-	1.8 R	-
16	-	-	-	-	-	-	-	-	178.	178.	0.1	-	-
MEAN	2.9444	1.5509	1.4739	4.0000	-	-	2.1000	3.3667	173.7813	173.7813	.1263	.0900	.1000
STD DEV	4.5136	.0638	.1135	1.4142	-	-	-	1.4844	7.2732	7.2732	.0475	.0265	-
REL STD	153.3	4.1	7.7	35.4	-	-	-	44.1	4.2	4.2	37.6	29.4	-
DES VAL	-	-	-	-	-	-	-	4.667	-	171.314	-	-	-

LAB	02081 TURB RATIO	02090 TURBIDTY COMMON	05100 BORON ?	05105 BORON AA CARM	05106 BORON F AZOMETH	05107 BORON ICP DA	05111 BORON F ICP DA	05190 BORON COMMON	06009 TOC CO2 IR	06051 TIC COMB IR	06101 DOC IR /DIF	06104 DOC UV CO2 IR	06107 DOC UV CO2 PHE
1	-	0.1	0.005	-	-	-	-	0.005	-	-	-	-	0.2
2	-	0.2	-	-	-	-	-	-	-	-	-	-	0.7
3	-	0.08	-	-	-	-	-	-	-	-	-	0.7	-
4	0.19	0.19	-	0.022	-	-	-	0.022	-	-	-	0.448	-
5	-	0.2	-	-	-	-	-	-	-	-	-	-	-
6	-	0.11	-	-	-	-	-	-	-	-	-	0.3	-
7	-	0.13	-	-	-	-	-	-	-	-	-	-	-
8	-	0.06	-	-	0.05 L	-	-	0.05 L	-	-	-	-	-
10	-	0.1	-	-	-	-	0.01 L	0.01 L	-	-	-	-	-
11	-	0.1	-	-	-	-	-	-	-	-	-	-	-
12	-	0.1	-	-	-	-	-	-	-	-	1.0 L	-	-
14	-	0.1	-	-	-	-	-	-	-	-	-	-	-
15	-	1.8 R	-	-	-	0.01 L	-	0.01 L	1. L	4.	-	-	-
16	-	0.1	0.050L	-	-	-	-	0.050L	-	-	-	-	-
MEAN	.1900	.1208	.0050	.0220	-	-	-	.0135	-	4.0000	-	.4827	.4500
STD DEV	-	.0461	-	-	-	-	-	.0120	-	-	-	.2022	.3536
REL STD	-	38.2	-	-	-	-	-	89.0	-	-	-	41.9	78.6
DES VAL	-	.163	-	-	-	-	-	.013	-	-	-	-	-

LAB	06109 DOC UV CO2 OH	06112 DOC PER IR	06150 D O C COMMON	06151 DIC IR COMBUST	06152 DIC UV CO2 IR	06154 DIC AA CO2 PHE	06159 DIC AA CO2 OH	06180 DIC CALC'D	06490 D I C COMMON	07000	07010 TKN AA SAL	07015 TKN DIG BERTHEL	07016 TKN BLK AMM-SAL
1	-	-	0.2	-	-	4.06	-	-	4.06 *	-	-	-	-
2	-	-	0.7	-	-	-	-	-	-	-	-	-	-
3	-	-	0.7	-	4.5	-	-	-	4.5	-	0.051	-	-
4	-	-	0.448	-	5.70	-	-	-	5.70	-	-	-	-
5	-	-	-	7.0	-	-	-	-	7.0 *	-	-	-	-
6	-	-	0.3	-	-	-	-	-	-	-	-	-	0.2
8	-	-	-	-	-	-	-	-	-	-	-	0.20 L	-
10	0.2	-	0.2	-	-	-	5.8	-	5.8	-	-	-	-
12	-	-	1.0 L	5.9	-	-	-	-	5.9	-	-	-	-
15	-	-	1. L	-	-	-	-	-	4. *	0.01	-	-	-
16	-	0.43	0.43	-	-	-	-	5.1	5.1	-	-	-	-
MEAN	.2000	.4300	.4254	6.4500	5.1000	4.0600	5.8000	5.1000	5.2575	.0100	.0510	-	.2000
STD DEV	-	-	.2116	.7778	.8485	-	-	-	1.0388	-	-	-	-
REL STD	-	-	49.7	12.1	16.6	-	-	-	19.8	-	-	-	-
DES VAL	-	-	.773	-	-	-	-	-	5.204	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. PP 74 . FP 34 SAMPLE 4

LAB	07018 TKN BLK INDOPHE	07021 TKN BLK DIG BER	07023 TKN DIG INDO	07090 TKN COMMON	07109 NO3+NO2 AA HYD	07110 NO3+NO2 AA2 CD	07111 NO3+NO2 DIS SPEC	07112 NO3+NO2 UF AA CD	07121 NO3+NO2 AA AZ	07390 NITRATE COMMON	07500	07505 NH3 TOT AA BERT	07540 NH3 TOT AA SAL
1	-	0.06	-	0.06	-	-	0.02	-	-	0.02 *	-	-	-
2	-	-	-	-	-	0.01 L	-	-	-	0.01 *	-	-	-
3	-	-	-	0.051	-	-	-	0.041	-	0.041	-	0.005L	-
4	-	-	-	-	-	0.042	-	-	-	0.042	-	-	0.005L
5	-	-	-	-	-	0.040	-	-	-	0.040	-	-	-
6	-	-	-	0.2 *	0.07	-	-	-	-	0.07 *	-	-	-
7	-	-	-	-	-	-	-	0.04	-	0.04	-	-	-
8	-	-	-	0.20 L	-	0.04	-	-	-	0.04	-	-	-
9	-	-	-	-	0.05	-	-	-	-	0.05	-	-	-
10	-	-	-	-	0.030	-	-	-	-	0.030	-	-	-
11	-	-	-	-	-	0.03	-	-	-	0.03	-	-	0.007L
12	0.03	-	-	0.03	-	0.05	-	-	-	0.05	-	-	-
13	-	-	-	-	-	0.04	-	-	-	0.04	-	-	0.1 L
14	-	-	-	-	-	-	0.04	-	-	0.04	0.004	-	-
15	-	-	-	0.01	-	0.073	-	-	-	0.073*	-	-	-
16	-	-	0.2 L	0.2 L	-	-	-	-	0.1 L	0.1 L	-	-	-
MEAN	.0300	.0600	-	.0702	.0500	.0450	.0300	.0405	-	.0433	.0040	-	-
STD DEV	-	-	-	.0751	.0200	.0137	.0141	.0007	-	.0143	-	-	-
REL STD	-	-	-	107.0	40.0	30.3	47.1	1.7	-	32.9	-	-	-
DES VAL	-	-	-	.069	-	-	-	-	-	.044	-	-	-

LAB	07555 NH3 DIS AA PHEN	07557 NH3 DIS AA INDO	07562 NH3 DIS AA EDTA	07563 NH3 DIS AA INDO	07565	07590 AMMONIA COMMON	07600 T N PER AUTO	07601 T N UV AA SUL	07602 T N CALC'D	07605 T N UV HY SUL	07651 T N DIS UV AA	07655 T N DIS UV EDTA	07690 TOT N COMMON
1	-	-	0.001	-	-	0.001	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	0.1 L	-	-	-	-	-
3	-	-	-	-	-	0.005L	-	-	-	-	-	-	-
4	-	-	-	-	-	0.005L	-	-	-	-	0.065	-	-
5	-	0.002L	-	-	-	0.002L	-	-	-	-	-	0.055	-
6	-	0.01 R	-	-	-	0.01 R	-	-	-	-	-	-	-
8	0.003	-	-	-	-	0.003	-	-	-	-	-	-	-
10	0.010L	-	-	-	-	0.010L	-	-	-	0.07	-	-	-
11	-	-	-	-	-	0.007L	-	-	-	-	-	-	-
12	-	-	-	0.005L	-	0.005L	-	-	0.08	-	-	-	0.08
13	-	-	-	-	-	0.1 L	-	-	-	-	-	-	-
14	-	-	-	-	-	0.004	-	-	-	-	-	-	-
15	0.008R	-	-	-	-	0.008R	0.08	-	-	-	-	-	0.08
16	-	-	-	-	0.1 L	0.1 L	-	-	-	-	-	-	-
MEAN	.0030	-	.0010	-	-	.0027	.0800	-	.0800	.0700	.0650	.0550	.0800
STD DEV	-	-	-	-	-	.0015	-	-	-	-	-	-	.0000
REL STD	-	-	-	-	-	57.3	-	-	-	-	-	-	-1.0
DES VAL	-	-	-	-	-	.008	-	-	-	-	-	-	.113

LAB	07790 T N DIS COMMON	09100	09101	09103 F DIS COL SP	09105 F DIS SP EL	09106 F DIS EL POT	09107 F DIS AUT POT	09108 F DIS SP EL	09115 F DIS AA ALIZ	09116 F DIS IC	09190 FLUORIDE COMMON	10101 ALKLNTY TITR'N	10108 ALKLNTY POT TIT
1	-	-	-	-	-	-	0.03	-	-	-	0.03	24.9	-
2	0.1 L	-	-	-	-	0.05 L	-	-	-	-	0.05 L	20.8	-
3	-	-	-	-	-	-	-	0.02	-	-	0.02	-	-
4	0.065	-	-	-	-	-	-	-	-	-	-	-	-
5	0.055*	-	1.4	-	-	0.05 L	-	-	-	-	0.05 L	22.3	-
6	-	-	-	0.1 L	-	-	-	-	-	-	0.1 L	-	-
7	-	-	-	-	-	-	-	-	-	-	-	21.8	-
8	-	-	-	-	0.05 L	-	-	-	-	-	0.05 L	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	24.
10	0.07	-	-	-	-	-	-	-	0.04	-	0.04	-	-
11	-	-	-	-	0.05 L	-	-	-	-	-	0.05 L	22.	-
12	-	-	-	-	0.10 L	-	-	-	-	-	0.10 L	21.9	-
13	-	-	-	-	-	-	-	-	-	-	-	27. R	-
14	-	0.1 L	-	-	-	-	-	-	-	-	0.1 L	23.5	-
15	-	-	-	-	0.06	-	-	-	-	-	0.06	22.	-
16	-	-	-	-	-	-	-	-	-	1.0 L	1.0 L	22.3	-
MEAN	.0633	-	1.4000	-	.0600	-	.0300	.0200	.0400	-	.0375	22.3889	24.0000
STD DEV	.0076	-	-	-	-	-	-	-	-	-	.0171	1.1709	-
REL STD	12.1	-	-	-	-	-	-	-	-	-	45.5	5.2	-
DES VAL	.070	-	-	-	-	-	-	-	-	-	.045	-	-

LAB	10109 ALKLNTY POT TIT	10111 ALKLNTY TIT PRO	10112 ALKLNTY TIT CON	10190 ALKLINTY COMMON	10301 PH	10390 PH COMMON	10602 HARDNSS CALC'D	10603 HARDNSS TITR'N	10606 HARDNSS CALC'D	10645 HARDNSS ?	10690 HARDNESS COMMON	11001 NA TOT AAS	11005 NA TOT ICP
1	-	-	-	24.9	6.8	6.8	43.2	-	-	-	43.2	-	-
2	-	-	-	20.8	7.3	7.3	44.7	-	-	-	44.7	-	-
3	-	22.1	-	22.1	7.63	7.63	-	-	46.4	-	46.4	-	-
4	-	-	-	-	7.73	7.73	-	-	-	-	-	-	-
5	-	-	-	22.3	7.55	7.55	-	-	-	-	-	-	-
6	24.	-	-	24.	6.6	6.6 *	-	48.	-	-	48.	-	-
7	-	-	-	21.8	7.7	7.7	-	45.7	-	-	45.7	-	-
8	21.0	-	-	21.0	7.55	7.55	47.6	-	-	-	47.6	-	-
9	-	-	-	24.	7.41	7.41	-	-	-	49.	49.	-	14.5
10	-	-	22.	22.	7.43	7.43	-	-	-	-	-	-	12.71
11	-	-	-	22.	7.8	7.8	45.	-	-	-	45.	-	-
12	-	-	-	21.9	7.6	7.6	-	-	-	-	-	-	-
13	-	-	-	27. R	6.9	6.9	50.4	-	-	-	50.4	-	-
14	-	-	-	23.5	7.42	7.42	42.3	-	-	-	42.3 *	13.9	-
15	-	-	-	22.	7.4	7.4	51.0	-	-	-	51.0	-	-
16	-	-	-	22.3	7.46	7.46	44.5	-	-	-	44.5	-	-
MEAN	22.5000	22.1000	22.0000	22.4714	7.3925	7.3925	46.0875	46.8500	46.4000	49.0000	46.4833	13.9000	13.6050
STD DEV	2.1213	-	-	1.1841	.3426	.3426	3.2366	1.6263	-	-	2.7607	-	1.2657
REL STD	9.4	-	-	5.3	4.6	4.6	7.0	3.5	-	-	5.9	-	9.3
DES VAL	-	-	-	22.761	-	7.420	-	-	-	-	47.731	-	-

LAB	11007 NA DIS DCP	11102 NA F AAS	11103 NA DIS FL PH	11105 NA DIS AAS DA	11107 NA UF FL PH	11111 NA DIS ICP	11311 NA EXT ICP	11990 SODIUM COMMON	12005 MG TOT ICP	12012 MG TOT DCP	12101 MG DIS CALC'D	12102 MG DIS AAS DA	12106 MG UF AAS DA
1	-	-	14.	-	-	-	-	14.	-	-	-	-	-
2	-	-	13.5	-	-	-	-	13.5	-	-	-	-	-
3	-	-	-	-	13.2	-	-	13.2	-	-	-	-	2.8
5	-	-	13.1	-	-	-	-	13.1	-	-	-	2.82	-
6	-	15.	-	-	-	-	-	15. *	-	-	2.9	-	-
7	-	-	-	12.8	-	-	-	12.8	-	-	-	2.84	-
8	-	-	-	-	-	-	14.0	14.0	-	-	-	-	-
9	-	-	-	-	-	-	-	14.5	3.1	-	-	-	-
10	-	-	-	-	-	-	-	12.71	2.89	-	-	-	-
11	-	13.	-	-	-	-	-	13.	-	-	-	2.9	-
12	-	-	13.1	-	-	-	-	13.1	-	-	-	-	-
13	-	-	-	-	-	15.1	-	15.1 *	-	-	-	-	-
14	-	-	-	-	-	-	-	13.9	-	-	-	2.80	-
15	-	-	-	-	-	14.6	-	14.6	-	-	-	-	-
16	11.6	-	-	-	-	-	-	11.6 *	-	2.49	-	-	-
MEAN	11.6000	14.0000	13.4250	12.8000	13.2000	14.8500	14.0000	13.6073	2.9950	2.4900	2.9000	2.8400	2.8000
STD DEV	-	1.4142	.4272	-	-	.3536	-	.9596	.1485	-	-	.0432	-
REL STD	-	10.1	3.2	-	-	2.4	-	7.1	5.0	-	-	1.5	-
DES VAL	-	-	-	-	-	-	-	13.369	-	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. PP 74 - FP 34 SAMPLE 4

LAB	12107 MG DIS AAS AUT	12111 MG DIS ICP	12303 MG UF AAS AUT	12311 MG EXT ICP	12990 MGNESIUM COMMON	14102 SILICA ANSA AA	14105 SILICA MOLY AA	14106 SILICA MOLY	14107 SILICA MOLY AA	14111 SILICA ICP DA	14112 SILICA DCP DA	14190 SILICA COMMON	15313 T P ACL AA SNCL
1	-	-	2.3	-	2.3 *	-	-	-	1.4	-	-	1.4	-
2	2.8	-	-	-	2.8	2.1	-	-	-	-	-	2.1 *	-
3	-	-	-	-	2.8	-	-	1.37	-	-	-	1.37	-
5	-	-	-	-	2.82	-	1.3	-	-	-	-	1.3	-
6	-	-	-	-	2.9	-	-	-	-	-	-	-	-
7	-	-	-	-	2.84	-	-	-	-	-	-	-	-
8	-	-	-	3.07	3.07	-	1.2	-	-	-	-	1.2	-
9	-	-	-	-	3.1	-	-	-	-	1.4	-	1.4	-
10	-	-	-	-	2.89	-	1.27	-	-	-	-	1.27	-
11	-	-	-	-	2.9	-	-	-	-	-	-	-	0.005L
12	-	-	-	-	-	-	1.4	-	-	-	-	1.4	-
13	-	3.2	-	-	3.2	-	-	-	-	-	-	-	-
14	-	-	-	-	2.80	-	-	-	-	-	-	-	-
15	-	3.0	-	-	3.0	-	-	-	-	0.56	-	0.56 *	-
16	-	-	-	-	2.49 *	-	-	-	-	-	1.31	1.31	-
MEAN	2.8000	3.1000	2.3000	3.0700	2.8507	2.1000	1.2925	1.3700	1.4000	.9800	1.3100	1.3310	-
STD DEV	-	.1414	-	-	.2326	-	.0830	-	-	.5940	-	.3688	-
REL STD	-	4.6	-	-	8.2	-	6.4	-	-	60.6	-	27.7	-
DES VAL	-	-	-	-	2.915	-	-	-	-	-	-	1.350	-

LAB	15315 T P AA SNCL	15401 T P UV AA ASC	15406 T P UF AA ASC	15409 T P BLK AA ASC	15413 T P ACL AA SNCL	15421 T P BLK DIG ASC	15490 TOT P COMMON	16304 SO4 DIS AUTO BA	16306 SO4 DIS AA MTB	16307 SO4 UF AA MTB	16309 SO4 DIS I C	16310 SO4 DIS AA CALM	16311 SO4 DIS IC
1	-	-	-	-	-	0.001L	0.001L	-	26.	-	-	-	-
2	-	-	-	-	0.001L	-	0.001L	29.1	-	-	29.5	-	-
3	-	-	-	-	0.002	-	0.002	-	-	29.7	-	-	-
4	-	-	0.003L	-	-	-	0.003L	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	29.3	-	-	-	-
6	-	-	-	0.02 R	-	-	0.02 R	31.	-	-	-	-	-
7	-	-	0.013	-	-	-	0.013*	-	28.4	-	-	-	-
8	-	-	-	-	-	-	-	-	29.0	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	30.	-	-
10	-	0.010L	-	-	-	-	0.010L	-	-	-	-	28.	-
11	-	-	-	-	-	-	0.005L	-	29.	-	-	-	-
12	-	-	0.003L	-	-	-	0.003L	-	29.5	-	-	-	-
13	-	-	0.001	-	-	-	0.001	-	37. R	-	-	-	-
14	-	-	-	-	-	-	-	-	-	-	28.7	-	-
15	-	-	-	-	-	-	-	-	26.	-	-	-	-
16	0.2 L	-	-	-	-	-	0.2 L	-	-	-	-	-	21.
MEAN	-	-	.0070	-	.0020	-	.0053	30.0500	28.1714	29.7000	29.4000	28.0000	21.0000
STD DEV	-	-	.0085	-	-	-	.0067	1.3435	1.5217	-	.6557	-	-
REL STD	-	-	121.2	-	-	-	124.8	4.5	5.4	-	2.2	-	-
DES VAL	-	-	-	-	-	-	.003	-	-	-	-	-	-

LAB	16990 SULFATE COMMON	17203 CL DIS AA FE	17204 CL DIS AG TIT	17206 CL DIS AA HG	17208 CL DIS AA HG	17209 CL DIS I C	17210 CL DIS TIT CON	17211 CL DIS IC	17990 CHLORIDE COMMON	19001 K TOT AAS	19005 K TOT ICP	19008 K TOT DCP	19102 K DIS AAS
1	26. *	16.	-	-	-	-	-	-	16.	-	-	-	-
2	29.1	-	-	-	-	16.5	-	-	16.5	-	-	-	-
3	29.7	-	-	-	17.1	-	-	-	17.1	-	-	-	-
5	29.3	-	-	16.3	-	-	-	-	16.3	-	-	-	-
6	31.	-	14.	-	-	-	-	-	14. *	-	-	-	1.4
7	28.4	15.3	-	-	-	-	-	-	15.3	-	-	-	1.24
8	29.0	-	-	16.8	-	-	-	-	16.8	-	-	-	-
9	30.	-	-	-	-	16.	-	-	16.	-	1.4	-	-
10	28.	-	-	-	-	-	16.	-	16.	-	1.22	-	-
11	29.	-	-	-	-	-	-	-	-	-	-	-	-
12	29.5	-	-	16.4	-	-	-	-	16.4	-	-	-	-
13	37. R	-	-	18.	-	-	-	-	18.	-	-	-	-
14	28.7	-	-	-	-	17.4	-	-	17.4	1.18	-	-	-
15	26. *	-	-	15.7	-	-	-	-	15.7	-	-	-	-
16	21. *	-	-	-	-	-	-	16.	16.	-	-	1.18	-
MEAN	28.1929	15.6500	14.0000	16.6400	17.1000	16.6333	16.0000	16.0000	16.2500	1.1800	1.3100	1.1800	1.3200
STD DEV	2.4833	.4950	-	.8562	-	.7095	-	-	.9614	-	.1273	-	.1131
REL STD	8.8	3.2	-	5.1	-	4.3	-	-	5.9	-	9.7	-	8.6
DES VAL	29.705	-	-	-	-	-	-	-	16.832	-	-	-	-

LAB	19103 K DIS FLM PH	19105 K DIS AAS DA	19106 K DIS AAS LI	19107 K DIS FLM PH	19111 K DIS ICP	19301 K EXT HNO3 AA	19990 PTASSIUM COMMON	20005 CA TOT ICP	20007 CA TOT DCP	20050 CA DIS AAS NO	20100 CA DIS CALC'D	20103 CA DIS AAS	20108 CA DIS AAS UF
1	1.1	-	-	-	-	-	1.1	-	-	-	-	-	-
2	1.15	-	-	-	-	-	1.15	-	-	-	-	-	-
3	-	-	-	1.20	-	-	1.20	-	-	-	-	-	14.0
5	1.2	-	-	-	-	-	1.2	-	-	-	-	13.9	-
6	-	-	-	-	-	-	1.4 *	-	-	-	14.4	-	-
7	-	-	-	-	-	-	1.24	-	-	-	-	13.2	-
8	-	-	-	-	-	1.2	1.2	-	-	-	-	-	-
9	-	-	-	-	-	-	1.4 *	14.5	-	-	-	-	-
10	-	-	-	-	-	-	1.22	13.85	-	-	-	-	-
11	-	-	1.2	-	-	-	1.2	-	-	-	-	13.	-
12	1.1	-	-	-	-	-	1.1	-	-	-	-	-	-
13	-	-	-	-	1.22	-	1.22	-	-	-	-	-	-
14	-	-	-	-	-	-	1.18	-	-	12.3	-	-	-
15	-	1.03	-	-	-	-	1.03 *	-	-	-	-	-	-
16	-	-	-	-	-	-	1.18	-	12.5	-	-	-	-
MEAN	1.1375	1.0300	1.2000	1.2000	1.2200	1.2000	1.2013	14.1750	12.5000	12.3000	14.4000	13.3667	14.0000
STD DEV	.0479	-	-	-	-	-	.0980	.4596	-	-	-	.4726	-
REL STD	4.2	-	-	-	-	-	8.2	3.2	-	-	-	3.5	-
DES VAL	-	-	-	-	-	-	1.204	-	-	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. PP 74 FP 34 SAMPLE 4

LAB	20110 CA DIS AAS AUT	20111 CA DIS ICP	20311 CA EXT ICP	20990 CALCIUM COMMON
1	13.5	-	-	13.5
2	13.3	-	-	13.3
3	-	-	-	14.0
5	-	-	-	13.9
6	-	-	-	14.4
7	-	-	-	13.2
8	-	-	14.0	14.0
9	-	-	-	14.5
10	-	-	-	13.85
11	-	-	-	13.
13	-	14.9	-	14.9
14	-	-	-	12.3 *
15	-	15.5	-	15.5
16	-	-	-	12.5 *
MEAN	13.4000	15.2000	14.0000	13.7750
STD DEV	.1414	.4243	-	.8907
REL STD	1.1	2.8	-	6.5
DES VAL	-	-	-	14.131

DATES RECEIVED

1 88/10/11	2 88/11/01	3 88/10/24	3 88/11/24	4 88/11/01
5 89/01/24	6 88/09/27	6 89/01/18	7 89/01/17	8 88/11/04
9 88/11/07	10 88/10/28	11 88/10/25	12 88/12/30	13 88/11/04
14 89/01/23	15 88/11/03	16 88/10/06		

NOTE: ALL CONCENTRATION UNITS ARE EXPRESSED IN MG/L OF EACH ELEMENT, THE EXCEPTIONS BEING: COLOUR IN RELATIVE UNITS, CONDUCTIVITY IN USIE/CM, TURBIDITY IN JTU OR NTU, NITROGEN ANALYSES IN "N", ALKALINITY & HARDNESS IN CACO3, SILICA IN SIO2, AND SULFATE IN SO4.

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MEMORANDUM **NOTE DE SERVICE**

H.Alkema/NWRI/336-4929/ha

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H. Alkema
Section de l'Assurance-Qualité
Institut National de Recherche sur les Eaux
Burlington, Ontario.

SUBJECT/OBJET: **Programme d'Assurance-Qualité Fédéral-Provincial (PAQFP)**
Résumé final de l'études FP 35-36
Federal-Provicial Quality Assurance Program
Final Report: FPQC Studies 35-36

Vous trouverez en annexe le résumé final de l'étude F/P susmentionées.

Si vous avez de commentaire sur ce résumé, ou des corrections valides à notre base de données, veuillez me les transmettre.

I have enclosed the final report for the above mentioned studies.

If you have any comments on this report, or any legitimate corrections to the data base, please do not hesitate to communicate them.

Harry A.

H. Alkema

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RESEARCH & APPLICATIONS BRANCH

FINAL REPORT

REPORT NO. RAB 89-07 (Eng)

FEDERAL PROVINCIAL QUALITY ASSURANCE PROGRAM

STUDIES 35 AND 36

for November and December 1988

TRACE METALS, MAJOR IONS, NUTRIENTS AND PHYSICAL PARAMETERS IN SURFACE WATERS

by

H. Alkema

Quality Assurance Section
National Water Research Institute
Burlington, Ontario

March 1989

(Ce rapport est aussi disponible en francais)

Introduction

As part of an on-going study, the Quality Assurance Section, NWRI in Burlington, Ontario, has been sending reference water samples bi-monthly to chemical laboratories participating in the FP program. This report summarizes the most recent FP interlaboratory quality assurance studies: FP 35 and 36, for the months November and December, 1988. These two studies dealt with trace metals, major ions, nutrients and physical parameters. The levels were from medium to high.

Study Design

Four water samples were submitted to each laboratory for chemical analyses. Two samples were submitted for trace metals analysis, while the remaining two were submitted for major ions, nutrients and some physical measurements. The following is a breakdown of the four samples:

FP 35 - Sample 1 - 125 ml, high level* for trace metals (3% HNO_3)
Sample 2 - up to 1L, major ions etc., stored at 4^oC

FP 36 - Sample 3 - 1L, low level* for trace metals (0.2% HNO_3)
Sample 4 - up to 1L, major ions, etc., stored at 4^oC

* for definitions see Appendix 1

Treatment of Data

Each laboratory was asked to perform only those analyses which were routine to their particular laboratory, using the general methodology guidelines listed above. Results for these analyses were reported as required by the standard report sheets provided with the QA samples. Submitted results were tabulated for each parameter, first for each method reported, and then for all methods combined. These data, and the resulting statistics are presented in the Data Summary. (attached)

Preliminary data summaries (RAB # 89-01), including problematic results, were sent January 4, and February 2. Each laboratory was given three weeks to notify us of any errors in data transcription, compilation, or flags.

Performance Indicators

In the Federal Provincial QA program, two types of reference samples are used for the accuracy assessment. These are Reference Waters (RMs) and Certified Reference waters (CRMs) which have Design Values for the stable parameters. Also, regional samples are used occassionally as natural representative samples. The means for these regional samples, and the Design Values for the reference waters are used to test each reported result for accuracy.

Percentage deviations from the reference values are used as an indication by the laboratory head to determine the extent of the discrepencies between the laboratory result and the reference value. However, please keep in mind that at low levels, high % deviations are often seen, and may be misleading if interpreted too strictly.

A result which deviates more than the greater of 10% or 1 standard deviation from the reference value is marked with an asterisk in the data table and its value tabulated in the flagged data table (Table 1). Results reported with an "L" (less than) or flagged with an "R" (rejectable) are not used in the statistical calculations. Performance indicators are fully explained in Appendix II.

Comments on Laboratory Performance

Results accompanied with a 'less than' are difficult to appraise. If a design value or mean is significantly lower than the detection limit given by a particular laboratory, then that detection limit is too high. Such a result is assigned an 'HDL' and is tabulated for each laboratory in Table 1.

If, on the other hand, the detection limit reported is far lower than the mean or design value, then the use of 'less than' is clearly inadequate and the result is flagged low. The magnitude of the deviation from the mean in such a case is taken from the detection limit given.

Attached are two tables listing flagged data by laboratory (Table 1), and listing parameters for which there was a high standard deviation (Table 2). Formerly called a high coefficient of variation, the standard deviation is generated with standardized criteria that are included with the automated flagging routine. These automated criteria have been in use since March 1988 (Study FP 27), and should provide a more accurate and consistent listing of the difficult to analyse parameters or levels. A listing of the criteria used to indicate high deviation of analysis is available on request. Your comments would be appreciated.

A Unique Problem with Chloride

In Study 36, sample 4, a high standard deviation ocurred for chloride and two different means could be observed. One laboratory reported that a high level of bromide would interfere with colorimetric methods. It is assumed in this report that the Ion Chromatography (IC) results are correct, and for this reason the laboratories with colorimetric methodologies reporting high values (310 ppm versus 125) are flagged high. Since the above mentioned sample is a natural prairie water from the Qu'Appel River, those laboratories analysing this type of water need alternate in-house QC methodologies to check for this contingency. The ion balance check fails in this case.

Provincial laboratories average number of deviations per sample was 1.3.
Federal laboratories average number of deviations per sample was 2.0.

TABLE 1: FED-PROV LABORATORIES FLAGGED DATA - STUDIES FP 35-36

LAB 2	FLAGS :	T N DIS	-11%		T N DIS	-35%		ALKLINTY	17%
LAB 3	FLAGS :	BARIUM	14%		D O C	36%		D I C	-21%
		CHLORIDE	117%						
LAB 4	FLAGS :	BORON	228%		TOT P	-73%	L	BORON	29%
LAB 5	FLAGS :	D O C	93%	R	D I C	22%		NITRATE	19%
		CHLORIDE	133%						
LAB 7	FLAGS :	COLOUR	136%	R	NITRATE	-25%		CHLORIDE	157%
LAB 9	FLAGS :	NITRATE	-11%						
LAB 10	FLAGS :	CADMIUM	-12%		FLUORIDE	-40%		VANADIUM	30%
		IRON	-34%		COBALT	27%		CADMIUM	-27%
		AMMONIA	-47%		ALKLINTY	32%	R	CHLORIDE	107%
	HDL :	AMMONIA			TOT P			TOT P	
LAB 11	FLAGS :	IRON	16%		NICKEL	12%		COPPER	19%
		TURBIDTY	138%		AMMONIA	266%		CHROMIUM	38%
		IRON	34%		COPPER	23%		AMMONIA	94% R
		FLUORIDE	-11%		ALKLINTY	-13%		CHLORIDE	205%
		PTASSIUM	19%	R					
LAB 13	FLAGS :	CHLORIDE	241%						
	HDL :	AMMONIA			AMMONIA				
LAB 14	FLAGS :	MANGNESE	40%	R	IRON	12%		COPPER	131% R
		LEAD	-21%	R	HARDNESS	-12%		CALCIUM	-13%
		ALUMINUM	-48%		IRON	-45%		COPPER	23%
		FLUORIDE	-11%						
LAB 15	FLAGS :	D O C	-29%		D I C	22%		NITRATE	31% R
		SILICA	-54%	R	SULFATE	-20%	R	PTASSIUM	-15%
		ALUMINUM	82%		CHROMIUM	23%		CADMIUM	-36%
		LEAD	-60%		D I C	18%		NITRATE	23%
		AMMONIA	38%		FLUORIDE	86%	R	SILICA	-50% R
	HDL :	NICKEL							
LAB 16	FLAGS :	VANADIUM	-12%		CHROMIUM	15%		MANGNESE	19%
		IRON	-19%		COPPER	14%		CONDUCT	18% R
		SODIUM	-29%	R	MGNESIUM	-23%	R	SILICA	-28% R
		PTASSIUM	-22%		CALCIUM	-20%	R	COPPER	31%
		STRNTIUM	20%		MOLYBNUM	64%	R	LEAD	70%
		CONDUCT	16%	R	BORON	-26%		SODIUM	-14% R
		SILICA	-66%	R					

NOTE: A VERY HIGH FREQUENCY OF FLAGGED RESULTS (OR A HIGH %) IS INDICATIVE OF POOR PERFORMANCE. ON THE OTHER HAND, LABS WITH FEW IF ANY FLAGS ARE JUDGED TO HAVE VERY GOOD PERFORMANCE.

ALSO, AN "R" FLAG INDICATES A NON COMPARABLE RESULT, THAT IS, ONE PRODUCED WITH NON RANDOM FACTORS. AN "L" FLAG INDICATES A 'LESS THAN' RESULT LOWER THAN THE COMPARATOR.

TABLE 2: HIGH STANDARD DEVIATION

PARAMETER		LEVEL
BORON	AT	.053 PPM
D O C	AT	1.401 PPM
TOT P	AT	.011 PPM
ALUMINUM	AT	.061 PPM
IRON	AT	.029 PPM
LEAD	AT	.010 PPM
T N DIS	AT	1.841 PPM
CHLORIDE	AT	124.500 PPM

APPENDIX I

Definitions of Types of Metals Analysis

1. HIGH LEVEL ANALYSIS

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

2. LOW LEVEL ANALYSIS

Analysis is 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, or DCP.
3. Digestion of aqueous phase and ICAP or DCP analysis.
4. Graphite tube (flameless) AAS.

Updated March 1989.

APPENDIX II

Performance Indicators

1. Flagged Results

As a first indication that analysis results are appreciably deviant from the expected value, each submitted result is tested with the 10% or 1 Standard Deviation Rule. When a result is found to deviate more than 10%, or more than 1 standard deviation when this is greater than 10%, the result is flagged with an asterisk in the data summary and tabled for that laboratory in the Flagged Data Table. Typically at low levels the 10% criteria is too small and the 1 standard deviation criteria effectively indicates deviant analytical results. As performance indicator, the flagged results indicate to laboratory heads that in-house QC procedures and the methodology concerned need to be ivestigated. Results may still be comparable.

2. Grubbs' Rejectable Results

For every parameter, each laboratory result is statistically tested to see if it is outlying. Outlying results are caused by non random causes such as a faulty calibration or incorrect transcription. These outlying results, calculated by the Grubbs' procedure,* and indicated in the data tables with an 'R', are noncomparable with the other data for that parameter.

3. A High Standard Deviation for a Parameter

Occasionally data for a difficult to analyse parameter yields a very high relative standard deviation (RSD). When a high RSD is not due to outlying results, there are noncomparable results within the data set. In such a case, the RSD for that parameter is indicated in Table 2, entitiled: High Standard Deviations.

4. High Detection Limits (HDL's)

Each laboratory determines its own detection limits according to its own requirements. When major differences in detection limits occur, an HDL is indicated for the particular laboratory in the Flagged Data Table. An HDL indicates that low level analysis may not be comparable with the analyses of other laboratories.

* reference : Frank E. Grubbs, Technometrics, 1969, p. 1.

DATA SUMMARY

FEDERAL-PROVINCIAL & PRAIRIE PROVINCES QUALITY ASSURANCE PROGRAMS

STUDY NO. FP 35 PP 75 DATE: 01/11/88 DUE DATE: 31/12/88

SAMPLE 1 SPIKED SAMPLE. TRACE METALS D/A. (IN 3.0% HNO3)

LAB	13009 AL TOT 5X ICP	13111 AL DIS ICP DA	13302 AL EXT AAS DA	13306 AL UF AAS OX	13311 AL EXT ICP DA	13321 AL EXT ICP DA	13322 AL EXT DCP DA	13999 ALUMINUM COMMON	23011 V TOT 5X ICP	23012 V TOT 5X DCP	23111 V DIS ICP DA	23311 V EXT ICP DA	23321 V EXT ICP DA
1	-	-	-	1.014	-	-	-	1.014	-	-	0.949	-	-
2	-	-	1.1	-	-	-	-	1.1	-	-	-	-	-
3	-	-	0.980	-	-	1.11	-	0.980	-	-	-	-	0.985
6	1.0	-	-	-	-	-	-	1.0	1.0	-	-	-	-
8	-	-	1.2	-	-	-	-	1.2 *	-	-	-	-	-
9	-	1.05	-	-	-	-	-	1.05	-	-	0.98	-	-
10	-	0.97	-	-	-	-	-	0.97	-	-	0.924	-	-
15	-	-	-	-	1.02	-	-	1.02	-	-	-	1.01	-
16	-	-	-	-	-	-	1.03	1.03	-	0.845	-	-	-
MEAN	1.0000	1.0100	1.0933	1.0140	1.0200	1.1100	1.0300	1.0404	1.0000	.8450	.9510	1.0100	.9850
STD DEV	-	.0566	.1102	-	-	-	-	.0712	-	-	.0281	-	-
REL STD	-	5.6	10.1	-	-	-	-	6.8	-	-	2.9	-	-
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

LAB	23999 VANADIUM COMMON	24004 CR TOT AAS GF	24011 CR TOT 5X ICP	24012 CR TOT 5X DCP	24111 CR DIS ICP DA	24302 CR EXT AAS DA	24311 CR EXT ICP DA	24321 CR EXT ICP DA	24999 CHROMIUM COMMON	25004 MN TOT AAS DA	25011 MN TOT 5X ICP	25012 MN TOT 5X DCP	25104 MN DIS AAS DA
1	0.949	-	-	-	0.101	-	-	-	0.101	-	-	-	-
3	0.985	-	-	-	-	-	-	0.099	0.099	-	-	-	-
6	1.0	-	0.095	-	-	-	-	-	0.095	-	0.098	-	-
8	-	0.097	-	-	-	-	-	-	0.097	-	-	-	-
9	0.98	-	-	-	0.099	-	-	-	0.099	-	-	-	-
10	0.924	-	-	-	0.094	-	-	-	0.094	-	-	-	-
11	-	-	-	-	-	0.093	-	-	0.093	0.110	-	-	-
13	-	-	-	-	-	-	0.09	-	0.09	-	-	-	-
14	-	-	-	-	-	-	-	-	-	-	-	-	0.144R
15	1.01	-	-	-	-	-	0.098	-	0.098	-	-	-	-
16	0.845*	-	-	0.112	-	-	-	-	0.112*	-	-	0.122	-
MEAN	.9561	.0970	.0950	.1120	.0980	.0930	.0940	.0990	.0978	.1100	.0980	.1220	-
STD DEV	.0572	-	-	-	.0036	-	.0057	-	.0060	-	-	-	-
REL STD	6.0	-	-	-	3.7	-	6.0	-	6.1	-	-	-	-
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

LAB	25111 MN DIS ICP DA	25304 MN EXT AAS DA	25311 MN EXT ICP DA	25321 MN EXT ICP DA	25999 MANGNESE COMMON	26011 FE TOT 5X ICP	26012 FE TOT 5X DCP	26104 FE DIS AAS DA	26111 FE DIS ICP DA	26304 FE EXT AAS DA	26311 FE EXT ICP DA	26321 FE EXT ICP DA	26999 IRON COMMON
1	0.099	-	-	-	0.099	-	-	-	0.491	-	-	-	0.491
2	-	0.11	-	-	0.11	-	-	-	-	0.5	-	-	0.5
3	-	0.106	-	0.101	0.106	-	-	-	-	0.474	-	0.506	0.474
6	-	-	-	-	0.098	0.50	-	-	-	-	-	-	0.50
8	-	-	0.09	-	0.09 *	-	-	-	-	-	0.45	-	0.45
9	0.100	-	-	-	0.100	-	-	-	0.50	-	-	-	0.50
10	0.094	-	-	-	0.094	-	-	-	0.47	-	-	-	0.47
11	-	-	-	-	0.110	-	-	-	-	0.562	-	-	0.562*
13	-	-	0.10	-	0.10	-	-	-	-	-	0.45	-	0.45
14	-	-	-	-	0.144R	-	-	0.542	-	-	-	-	0.542*
15	-	-	0.101	-	0.101	-	-	-	-	-	0.497	-	0.497
16	-	-	-	-	0.122*	-	0.396	-	-	-	-	-	0.396*
MEAN	.0977	.1080	.0970	.1010	.1027	.5000	.3960	.5420	.4870	.5120	.4657	.5060	.4860
STD DEV	.0032	.0028	.0061	-	.0088	-	-	-	.0154	.0452	.0271	-	.0434
REL STD	3.3	2.6	6.3	-	8.6	-	-	-	3.2	8.8	5.8	-	8.9
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 35 PP 75 SAMPLE 1

LAB	27011 CO TOT 5X ICP	27012 CO TOT 5X DCP	27111 CO DIS ICP DA	27301 CO EXT AAS DA	27311 CO EXT ICP DA	27321 CO EXT ICP DA	27999 COBALT COMMON	28011 NI TOT 5X ICP	28012 NI TOT 5X DCP	28111 NI DIS ICP DA	28301 NI EXT AAS DA	28311 NI EXT ICP DA	28321 NI EXT ICP DA
1	-	-	0.291	-	-	-	0.291	-	-	0.484	-	-	-
3	-	-	-	-	-	0.286	0.286	-	-	-	-	-	0.487
6	0.29	-	-	-	-	-	0.29	0.48	-	-	-	-	-
8	-	-	-	0.28	-	-	0.28	-	-	-	-	0.45	-
9	-	-	0.28	-	-	-	0.28	-	-	0.47	-	-	-
10	-	-	0.269	-	-	-	0.269	-	-	0.465	-	-	-
11	-	-	-	0.298	-	-	0.298	-	-	-	0.530	-	-
13	-	-	-	-	-	-	-	-	-	-	-	0.45	-
15	-	-	-	-	0.288	-	0.288	-	-	-	-	0.46	-
16	-	0.263	-	-	-	-	0.263	-	0.453	-	-	-	-
MEAN	.2900	.2630	.2800	.2890	.2880	.2860	.2828	.4800	.4530	.4730	.5300	.4533	.4870
STD DEV	-	-	.0110	.0127	-	-	.0111	-	-	.0098	-	.0058	-
REL STD	-	-	3.9	4.4	-	-	3.9	-	-	2.1	-	1.3	-
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

LAB	28999 NICKEL COMMON	29011 CU TOT 5X ICP	29012 CU TOT 5X DCP	29106 CU DIS AAS DA	29111 CU DIS ICP DA	29306 CU EXT AAS DA	29311 CU EXT ICP DA	29321 CU EXT ICP DA	29999 COPPER COMMON	30011 ZN TOT 5X ICP	30012 ZN TOT 5X DCP	30104 ZN DIS AAS DA	30111 ZN DIS ICP DA
1	0.484	-	-	-	0.100	-	-	-	0.100	-	-	-	0.109
2	-	-	-	-	-	0.11	-	-	0.11	-	-	-	-
3	0.487	-	-	-	-	-	-	0.099	0.099	-	-	-	-
6	0.48	0.097	-	-	-	-	-	-	0.097	0.099	-	-	-
8	0.45	-	-	-	-	-	0.09	-	0.09 *	-	-	-	-
9	0.47	-	-	-	0.100	-	-	-	0.100	-	-	-	0.105
10	0.465	-	-	-	0.096	-	-	-	0.096	-	-	-	0.101
11	0.530*	-	-	-	-	0.123	-	-	0.123*	-	-	-	-
13	0.45	-	-	-	-	-	0.10	-	0.10	-	-	-	-
14	-	-	-	0.239R	-	-	-	-	0.239R	-	-	0.115	-
15	0.46	-	-	-	-	-	0.107	-	0.107	-	-	-	-
16	0.453	-	0.118	-	-	-	-	-	0.118*	-	0.111	-	-
MEAN	.4729	.0970	.1180	-	.0987	.1165	.0990	.0990	.1036	.0990	.1110	.1150	.1050
STD DEV	.0243	-	-	-	.0023	.0092	.0085	-	.0099	-	-	-	.0040
REL STD	5.1	-	-	-	2.3	7.9	8.6	-	9.6	-	-	-	3.8
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

LAB	30304 ZN EXT AAS DA	30311 ZN EXT ICP DA	30321 ZN EXT ICP DA	30999 ZINC COMMON	38012 SR TOT DCP DA	38301 SR EXT AAS DA	38311 SR EXT ICP DA	38321 SR EXT ICP DA	38999 STRNTIUM COMMON	42011 MO TOT 5X ICP	42012 MO TOT 5X DCP	42111 MO DIS ICP DA	42121 MO EXT ICP DA
1	-	-	-	0.109	-	-	-	-	-	-	-	0.960	-
2	0.11	-	-	0.11	-	-	-	-	-	-	-	-	-
3	-	-	0.110	0.110	-	-	-	0.371	0.371	-	-	-	0.985
6	-	-	-	0.099	-	-	-	-	-	0.99	-	-	-
8	-	0.10	-	0.10	-	-	-	-	-	-	-	-	-
9	-	-	-	0.105	-	-	-	-	-	-	-	0.96	-
10	-	-	-	0.101	-	0.37	-	-	0.37	-	-	0.94	-
11	0.113	-	-	0.113	-	-	-	-	-	-	-	-	-
13	-	0.10	-	0.10	-	-	-	-	-	-	-	-	-
14	-	-	-	0.115	-	-	-	-	-	-	-	-	-
15	-	0.106	-	0.106	-	-	0.367	-	0.367	-	-	-	-
16	-	-	-	0.111	0.382	-	-	-	0.382	-	0.975	-	-
MEAN	.1115	.1020	.1100	.1066	.3820	.3700	.3670	.3710	.3725	.9900	.9750	.9533	.9850
STD DEV	.0021	.0035	-	.0056	-	-	-	-	.0066	-	-	.0115	-
REL STD	1.9	3.4	-	5.2	-	-	-	-	1.8	-	-	1.2	-
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 35 PP 75 SAMPLE 1

LAB	42311 MO EXT ICP DA	42999 MOLYBNUM COMMON	48011 CD TOT 5X ICP	48012 CD TOT 5X DCP	48111 CD DIS ICP DA	48301 CD EXT AAS DA	48311 CD EXT ICP DA	48321 CD EXT ICP DA	48999 CADMIUM COMMON	56011 BA TOT 5X ICP	56012 BA TOT 5X DCP	56111 BA DIS ICP DA	56301 BA EXT AAS DA
1	-	0.960	-	-	0.100	-	-	-	0.100	-	-	1.000	-
2	-	-	-	-	-	0.1	-	-	0.1	-	-	-	-
3	-	0.985	-	-	-	-	-	0.098	0.098	-	-	-	1.15
6	-	0.99	0.10	-	-	-	-	-	0.10	0.98	-	-	-
8	-	-	-	-	-	0.10	-	-	0.10	-	-	-	-
9	-	0.96	-	-	0.101	-	-	-	0.101	-	-	1.02	-
10	-	0.94	-	-	0.086	-	-	-	0.086*	-	-	0.96	-
11	-	-	-	-	-	0.106	-	-	0.106	-	-	-	-
13	-	-	-	-	-	-	0.09	-	0.09	-	-	-	-
15	0.97	0.97	-	-	-	-	0.10	-	0.10	-	-	-	-
16	-	0.975	-	0.096	-	-	-	-	0.096	-	0.966	-	-
MEAN	.9700	.9686	.1000	.0960	.0957	.1020	.0950	.0980	.0979	.9800	.9660	.9933	1.1500
STD DEV	-	.0170	-	-	.0084	.0035	.0071	-	.0055	-	-	.0306	-
REL STD	-	1.8	-	-	8.8	3.4	7.4	-	5.6	-	-	3.1	-
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

LAB	56311 BA EXT ICP DA	56321 BA EXT ICP DA	56999 BARIUM COMMON	82011 PB TOT 5X ICP	82012 PB TOT 5X DCP	82101 PB DIS AAS DA	82111 PB DIS ICP DA	82301 PB EXT AAS DA	82311 PB EXT ICP DA	82321 PB EXT ICP DA	82999 LEAD COMMON
1	-	-	1.000	-	-	-	0.482	-	-	-	0.482
2	-	-	-	-	-	-	-	0.49	-	-	0.49
3	-	1.00	1.15 *	-	-	-	-	-	-	0.488	0.488
6	-	-	0.98	0.50	-	-	-	-	-	-	0.50
8	-	-	-	-	-	-	-	0.50	-	-	0.50
9	-	-	1.02	-	-	-	0.48	-	-	-	0.48
10	-	-	0.96	-	-	-	0.447	-	-	-	0.447
11	-	-	-	-	-	-	-	0.517	-	-	0.517
13	-	-	-	-	-	-	-	-	0.44	-	0.44
14	-	-	-	-	-	0.375R	-	-	-	-	0.375R
15	1.	-	1.	-	-	-	-	-	0.43	-	0.43
16	-	-	0.966	-	0.451	-	-	-	-	-	0.451
MEAN	1.0000	1.0000	1.0109	.5000	.4510	-	.4697	.5023	.4350	.4880	.4750
STD DEV	-	-	.0648	-	-	-	.0197	.0137	.0071	-	.0284
REL STD	-	-	6.4	-	-	-	4.2	2.7	1.6	-	6.0
DES VAL	-	-	-	-	-	-	-	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 35 PP 75 SAMPLE 2

LAB	00110 IONIC BALANC %	00120 SUM OF CATIONS	00125 SUM OF ANIONS	02011 COLOUR APPARE	02021 COLOUR VIS COM	02023 COLOUR SPECT	02024 COL TRU SPECT	02040 COLOUR COMMON	02041 CONDUCT SPEC 25	02060 CONDUCT COMMON	02073 TURB HACH	02074 TURB NPLMTRI	02077 TURB HACH FZ
1	0.41	8.41	8.48	-	-	-	3.	3.	919.	919.	0.1 L	-	-
2	2.7	8.291	8.754	5. L	-	-	-	5. L	911.	911.	0.1	-	-
3	0.33	8.357	8.302	5. L	-	-	-	5. L	907.	907.	0.06	-	-
4	-	-	-	-	5. L	-	-	5. L	905.	905.	-	-	-
5	-0.37	8.34	8.40	5. L	-	-	-	5. L	865.	865.	0.20	-	-
6	1.03	8.31	8.14	-	-	-	-	-	877.	877.	-	0.15	-
7	-	-	-	11. R	-	-	-	11. R	896.	896.	0.14	-	-
8	1.32	8.20	7.98	5. L	-	-	-	5. L	912.	912.	-	0.07	-
9	0.06	8.37	8.38	-	-	-	-	-	900.	900.	-	-	-
10	-0.18	8.118	8.148	-	-	3.	-	3.	880.	880.	-	0.3	-
11	-	-	-	5.	-	-	-	5.	910.	910.	-	-	0.4
12	-	-	-	-	5.	-	-	5.	970.	970.	0.3	-	-
14	-	-	-	-	-	-	-	-	910.	910.	0.1	-	-
15	-	-	-	5.	-	-	-	5.	880.	880.	-	0.1 L	-
16	-	-	-	-	-	-	-	-	1060.R	1060.R	0.1	-	-
MEAN	.6625	8.2995	8.3230	5.0000	5.0000	3.0000	3.0000	4.2000	903.0000	903.0000	.1429	.1733	.4000
STD DEV	1.0023	.0965	.2396	.0000	-	-	-	1.0954	25.1824	25.1824	.0820	.1168	-
REL STD	151.3	1.2	2.9	-1.0	-	-	-	26.1	2.8	2.8	57.4	67.4	-
DES VAL	-	-	-	-	-	-	-	4.652	-	898.924	-	-	-

LAB	02081 TURB RATIO	02090 TURBIDTY COMMON	05100 BORON ?	05105 BORON AA CARM	05106 BORON F AZOMETH	05107 BORON ICP DA	05111 BORON F ICP DA	05190 BORON COMMON	06009 TOC CO2 IR	06051 TIC COMB IR	06101 DOC IR /DIF	06104 DOC UV CO2 IR	06107 DOC UV CO2 PHE
1	-	0.1 L	-	-	-	0.014	-	0.014	-	-	-	-	15.7 R
2	-	0.1	-	-	-	-	-	-	-	-	-	-	1.5
3	-	0.06	-	-	-	-	-	-	-	-	-	1.9	-
4	0.10	0.10	-	0.174	-	-	-	0.174*	-	-	-	1.71	-
5	-	0.20	-	-	-	-	-	-	-	-	2.7 R	-	-
6	-	0.15	-	-	-	-	-	-	-	-	-	1.3	-
7	-	0.14	-	-	-	-	-	-	-	-	-	-	-
8	-	0.07	-	-	0.05 L	-	-	0.05 L	-	-	-	-	-
10	-	0.3	-	-	-	-	0.04	0.04	-	-	-	-	-
11	-	0.4 *	-	-	-	-	-	-	-	-	-	-	-
12	-	0.3	-	-	-	-	-	-	-	-	1.0 L	-	-
14	-	0.1	-	-	-	-	-	-	-	-	-	-	-
15	-	0.1 L	-	-	-	0.01 L	-	0.01 L	1.	19.	-	-	-
16	-	0.1	0.005L	-	-	-	-	0.005L	-	-	-	-	-
MEAN	.1000	.1683	-	.1740	-	.0140	.0400	.0760	1.0000	19.0000	-	1.6367	1.5000
STD DEV	-	.1089	-	-	-	-	-	.0859	-	-	-	.3066	-
REL STD	-	64.7	-	-	-	-	-	113.0	-	-	-	18.7	-
DES VAL	-	.176	-	-	-	-	-	.053	-	-	-	-	-

LAB	06109 DOC UV CO2 OH	06112 DOC PER IR	06150 D O C COMMON	06151 DIC IR COMBUST	06152 DIC UV CO2 IR	06154 DIC AA CO2 PHE	06159 DIC AA CO2 OH	06490 D I C COMMON	07010 TKN AA SAL	07015 TKN DIG BERTHEL	07016 TKN BLK AMM-SAL	07018 TKN BLK INDOPHE	07021 TKN BLK DIG BER
1	-	-	15.7 R	-	-	16.7	-	16.7	-	-	-	-	0.11
2	-	-	1.5	-	-	-	-	-	-	-	-	-	-
3	-	-	1.9 *	-	16.0	-	-	16.0	0.144	-	-	-	-
4	-	-	1.71	-	17.1	-	-	17.1	-	-	-	-	-
5	-	-	2.7 R	19.0	-	-	-	19.0 *	-	-	-	-	-
6	-	-	1.3	-	-	-	-	-	-	-	0.9 R	-	-
8	-	-	-	-	-	-	-	-	-	0.20	-	-	-
10	1.2	-	1.2	-	-	-	16.1	16.1	-	-	-	-	-
12	-	-	1.0 *	19.6	-	-	-	19.6 *	-	-	-	0.10	-
15	-	-	1. *	-	-	-	-	19. *	-	-	-	-	-
16	-	1.2	1.2	-	14.5	-	-	14.5	-	-	-	-	-
MEAN	1.2000	1.2000	1.4014	19.3000	15.8667	16.7000	16.1000	17.2500	.1440	.2000	-	.1000	.1100
STD DEV	-	-	.3178	.4243	1.3051	-	-	1.7897	-	-	-	-	-
REL STD	-	-	22.7	2.2	8.2	-	-	10.4	-	-	-	-	-
DES VAL	-	-	1.490	-	-	-	-	15.596	-	-	-	-	-

LAB	07090 TKN COMMON	07105 NO3+NO2 DIS AA	07109 NO3+NO2 AA HYD	07110 NO3+NO2 AA2 CD	07111 NO3+NO2 DIS SPEC	07112 NO3+NO2 UF AA CD	07390 NITRATE COMMON	07505 NH3 TOT AA BERT	07540 NH3 TOT AA SAL	07550	07555 NH3 DIS AA PHEN	07557 NH3 DIS AA INDO	07562 NH3 DIS AA EDTA
1	0.11	0.590	-	-	-	-	0.590	-	-	-	-	-	0.002
2	-	-	-	0.63	-	-	0.63	-	-	-	-	-	-
3	0.144	-	-	-	-	0.591	0.591	0.005	-	-	-	-	-
4	-	-	-	0.588	-	-	0.588	-	0.005L	-	-	-	-
5	-	-	-	0.580	-	-	0.580	-	-	-	-	0.002	-
6	0.9 R	-	0.61	-	-	-	0.61	-	-	-	-	0.01 L	-
7	-	-	-	-	-	0.53	0.53	-	-	-	-	-	-
8	0.20 *	-	-	0.61	-	-	0.61	-	-	-	0.003	-	-
9	-	-	0.52	-	-	-	0.52 *	-	-	-	-	-	-
10	-	-	0.55	-	-	-	0.55	-	-	-	0.010L	-	-
11	-	-	-	0.57	-	-	0.57	-	0.026	-	-	-	-
12	0.10	-	-	0.60	-	-	0.60	-	-	-	-	-	-
13	-	-	-	0.6	-	-	0.6	-	0.1 L	-	-	-	-
14	-	-	-	-	0.635	-	0.635	-	-	0.006	-	-	-
15	-	-	-	0.765R	-	-	0.765R	-	-	-	0.008	-	-
MEAN	.1385	.5900	.5600	.5969	.6350	.5605	.5860	.0050	.0260	.0060	.0055	.0020	.0020
STD DEV	.0451	-	.0458	.0199	-	.0431	.0340	-	-	-	.0035	-	-
REL STD	32.6	-	8.2	3.3	-	7.7	5.8	-	-	-	64.3	-	-
DES VAL	.166	-	-	-	-	-	.575	-	-	-	-	-	-

LAB	07563 NH3 DIS AA INDO	07590 AMMONIA COMMON	07601 T N UV AA SUL	07602 T N CALC'D	07605 T N UV HY SUL	07651 T N DIS UV AA	07655 T N DIS UV EDTA	07690 TOT N COMMON	07790 T N DIS COMMON	09100	09103 F DIS COL SP	09105 F DIS SP EL	09106 F DIS EL POT
1	-	0.002	-	-	-	-	-	-	-	-	-	-	-
2	-	-	0.60	-	-	-	-	-	0.60 *	-	-	-	0.07
3	-	0.005	0.743	-	-	-	-	-	0.743	-	-	-	-
4	-	0.005L	-	-	-	0.705	-	-	0.705	-	-	-	-
5	-	0.002	-	-	-	-	0.630	-	0.630	-	-	-	0.063
6	-	0.01 L	-	-	-	-	-	-	-	-	0.1 L	-	-
8	-	0.003	-	-	-	-	-	-	-	-	-	0.085	-
10	-	0.010L	-	-	0.71	-	-	-	0.71	-	-	-	-
11	-	0.026*	-	-	-	-	-	-	-	-	-	0.07	-
12	0.005	0.005	-	0.70	-	-	-	0.70	-	-	-	0.10 L	-
13	-	0.1 L	-	-	-	-	-	-	-	-	-	-	-
14	-	0.006	-	-	-	-	-	-	-	0.1	-	-	-
15	-	0.008	-	-	-	-	-	-	-	-	-	0.1	-
MEAN	.0050	.0071	.6715	.7000	.7100	.7050	.6300	.7000	.6776	.1000	-	.0850	.0665
STD DEV	-	.0079	.1011	-	-	-	-	-	.0599	-	-	.0150	.0049
REL STD	-	110.9	15.1	-	-	-	-	-	8.8	-	-	17.6	7.4
DES VAL	-	.012	-	-	-	-	-	.697	.658	-	-	-	-

LAB	09107 F DIS AUT POT	09108 F DIS SP EL	09115 F DIS AA ALIZ	09116 F DIS IC	09190 FLUORIDE COMMON	10101 ALKLNTY TITR'N	10108 ALKLNTY POT TIT	10109 ALKLNTY POT TIT	10111 ALKLNTY TIT PRO	10112 ALKLNTY TIT CON	10190 ALKLINTY COMMON	10301 PH	10390 PH COMMON
1	0.06	-	-	-	0.06	70.	-	-	-	-	70.	7.90	7.90
2	-	-	-	-	0.07	67.	-	-	-	-	67.	8.0	8.0
3	-	0.08	-	-	0.08	-	-	-	66.3	-	66.3	8.02	8.02
4	-	-	-	-	-	-	-	-	-	-	-	8.05	8.05
5	-	-	-	-	0.063	68.9	-	-	-	-	68.9	8.14	8.14
6	-	-	-	-	0.1 L	-	-	67.	-	-	67.	8.0	8.0
7	-	-	-	-	-	63.6	-	-	-	-	63.6	8.0	8.0
8	-	-	-	-	0.085	-	-	66.0	-	-	66.0	7.95	7.95
9	-	-	-	-	-	-	68.	-	-	-	68.	7.99	7.99
10	-	-	0.05	-	0.05 *	-	-	-	-	66.	66.	7.90	7.90
11	-	-	-	-	0.07	67.	-	-	-	-	67.	7.6	7.6
12	-	-	-	-	0.10 L	66.6	-	-	-	-	66.6	8.1	8.1
13	-	-	-	-	-	69.	-	-	-	-	69.	7.9	7.9
14	-	-	-	-	0.1	69.3	-	-	-	-	69.3	7.89	7.89
15	-	-	-	-	0.1	65.0	-	-	-	-	65.0	8.2	8.2
16	-	-	-	0.10	0.10	65.	-	-	-	-	65.	7.85	7.85
MEAN	.0600	.0800	.0500	.1000	.0778	67.1400	68.0000	66.5000	66.3000	66.0000	66.9800	7.9681	7.9681
STD DEV	-	-	-	-	.0182	2.1454	-	.7071	-	-	1.7949	.1375	.1375
REL STD	-	-	-	-	23.3	3.2	-	1.1	-	-	2.7	1.7	1.7
DES VAL	-	-	-	-	.083	-	-	-	-	-	66.095	-	7.891

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 35 PP 75 SAMPLE 2

LAB	10602 HARDNSS CALC'D	10603 HARDNSS TITR'N	10606 HARDNSS CALC'D	10645 HARDNSS ?	10690 HARDNESS COMMON	11001 NA TOT AAS	11005 NA TOT ICP	11007 NA DIS DCP	11102 NA F AAS	11103 NA DIS FL PH	11105 NA DIS AAS DA	11107 NA UF FL PH	11111 NA DIS ICP
1	268.	-	-	-	268.	-	-	-	-	60.	-	-	-
2	260.8	-	-	-	260.8	-	-	-	-	60.1	-	-	-
3	-	-	265.	-	265.	-	-	-	-	-	-	59.8	-
5	-	-	-	-	-	-	-	-	-	60.0	-	-	-
6	-	265.	-	-	265.	-	-	-	59.	-	-	-	-
7	-	267.7	-	-	267.7	-	-	-	-	-	56.1	-	-
8	260.	-	-	-	260.	-	-	-	-	-	-	-	-
9	-	-	-	260.	260.	-	60.	-	-	-	-	-	-
10	-	-	-	-	-	-	56.	-	-	-	-	-	-
11	270.	-	-	-	270.	-	-	-	60.	-	-	-	-
12	-	-	-	-	-	-	-	-	-	58.5	-	-	-
13	267.8	-	-	-	267.8	-	-	-	-	-	-	-	60.8
14	231.5	-	-	-	231.5*	56.0	-	-	-	-	-	-	-
15	272.	-	-	-	272.	-	-	-	-	-	-	-	60.2
16	265.	-	-	-	265.	-	-	42.1 R	-	-	-	-	-
MEAN	261.8875	266.3500	265.0000	260.0000	262.7333	56.0000	58.0000	-	59.5000	59.6500	56.1000	59.8000	60.5000
STD DEV	12.9738	1.9092	-	-	10.5588	-	2.8284	-	.7071	.7681	-	-	.4243
REL STD	5.0	.7	-	-	4.0	-	4.9	-	1.2	1.3	-	-	.7
DES VAL	-	-	-	-	261.584	-	-	-	-	-	-	-	-

LAB	11311 NA EXT ICP	11990 SODIUM COMMON	12005 MG TOT ICP	12012 MG TOT DCP	12101 MG DIS CALC'D	12102 MG DIS AAS DA	12106 MG UF AAS DA	12107 MG DIS AAS AUT	12111 MG DIS ICP	12303 MG UF AAS AUT	12311 MG EXT ICP	12990 MGNESIUM COMMON	14102 SILICA ANSA AA
1	-	60.	-	-	-	-	-	-	-	22.0	-	22.0	-
2	-	60.1	-	-	-	-	-	21.5	-	-	-	21.5	14.9
3	-	59.8	-	-	-	-	21.3	-	-	-	-	21.3	-
5	-	60.0	-	-	-	21.2	-	-	-	-	-	21.2	-
6	-	59.	-	-	21.5	-	-	-	-	-	-	21.5	-
7	-	56.1	-	-	-	22.0	-	-	-	-	-	22.0	-
8	59.2	59.2	-	-	-	-	-	-	-	-	21.1	21.1	-
9	-	60.	22.	-	-	-	-	-	-	-	-	22.	-
10	-	56.	22.	-	-	-	-	-	-	-	-	22.	-
11	-	60.	-	-	-	22.	-	-	-	-	-	22.	15.
12	-	58.5	-	-	-	-	-	-	-	-	-	-	-
13	-	60.8	-	-	-	-	-	-	21.7	-	-	21.7	-
14	-	56.0	-	-	-	20.1	-	-	-	-	-	20.1	-
15	-	60.2	-	-	-	-	-	-	22.4	-	-	22.4	-
16	-	42.1 R	-	16.5 R	-	-	-	-	-	-	-	16.5 R	-
MEAN	59.2000	58.9786	22.0000	-	21.5000	21.3250	21.3000	21.5000	22.0500	22.0000	21.1000	21.6000	14.9500
STD DEV	-	1.6921	.0000	-	-	.8995	-	-	.4950	-	-	.5930	.0707
REL STD	-	2.9	-1.0	-	-	4.2	-	-	2.2	-	-	2.7	.5
DES VAL	-	59.397	-	-	-	-	-	-	-	-	-	21.458	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 35 PP 75 SAMPLE 2

LAB	14105 SILICA MOLY AA	14106 SILICA MOLY	14107 SILICA MOLY AA	14111 SILICA ICP DA	14112 SILICA DCP DA	14190 SILICA COMMON	15313 T P ACL AA SNCL	15401 T P UV AA ASC	15406 T P UF AA ASC	15409 T P BLK AA ASC	15413 T P ACL AA SNCL	15421 T P BLK DIG ASC	15490 TOT P COMMON
1	-	-	14.5	-	-	14.5	-	-	-	-	-	0.006	0.006
2	-	-	-	-	-	14.9	-	-	-	-	-	-	-
3	-	14.09	-	-	-	14.09	-	-	-	-	0.010	-	0.010
4	-	-	-	-	-	-	-	-	0.003L	-	-	-	0.003*
5	14.8	-	-	-	-	14.8	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	0.02	-	-	0.02 *
8	12.6	-	-	-	-	12.6 *	-	-	-	-	-	-	-
9	-	-	-	14.7	-	14.7	-	-	-	-	-	-	-
10	14.0	-	-	-	-	14.0	-	0.01 L	-	-	-	-	0.01 L
11	-	-	-	-	-	15.	0.005L	-	-	-	-	-	0.005L
12	14.9	-	-	-	-	14.9	-	-	0.003L	-	-	-	0.003*
13	-	-	-	-	-	-	-	-	0.008	-	-	-	0.008
15	-	-	-	6.64 R	-	6.64 R	-	-	-	-	-	-	-
16	-	-	-	-	10.5 R	10.5 R	-	-	-	-	-	-	-
MEAN	14.0750	14.0900	14.5000	14.7000	-	14.3878	-	-	.0080	.0200	.0100	.0060	.0110
STD DEV	1.0626	-	-	-	-	.7595	-	-	-	-	-	-	.0062
REL STD	7.5	-	-	-	-	5.3	-	-	-	-	-	-	56.5
DES VAL	-	-	-	-	-	14.549	-	-	-	-	-	-	.006

LAB	16304 SO4 DIS AUTO BA	16306 SO4 DIS AA MTB	16307 SO4 UF AA MTB	16309 SO4 DIS I C	16310 SO4 DIS AA CALM	16311 SO4 DIS IC	16990 SULFATE COMMON	17203 CL DIS AA FE	17204 CL DIS AG TIT	17206 CL DIS AA HG	17208 CL DIS AA HG	17209 CL DIS I C	17210 CL DIS TIT CON
1	-	72.	-	-	-	-	72.	196.4	-	-	-	-	-
2	72.0	-	-	72.	-	-	72.	-	-	-	-	208.	-
3	-	-	70.9	-	-	-	70.9	-	-	-	183.	-	-
5	-	77.8	-	-	-	-	77.8	-	-	190.	-	-	-
6	72.	-	-	-	-	-	72.	-	188.	-	-	-	-
7	-	66.0	-	-	-	-	66.0	188.1	-	-	-	-	-
8	-	70.	-	-	-	-	70.	-	-	183.	-	-	-
9	-	-	-	71.	-	-	71.	-	-	-	-	195.	-
10	-	-	-	-	70.	-	70.	-	-	-	-	-	189.
12	-	73.2	-	-	-	-	73.2	-	-	195.	-	-	-
13	-	75.5	-	-	-	-	75.5	-	-	190.	-	-	-
14	-	-	-	74.6	-	-	74.6	-	-	-	-	193.	-
15	-	57. R	-	-	-	-	57. R	-	-	-	-	-	-
16	-	-	-	-	-	76.	76.	-	-	-	-	-	-
MEAN	72.0000	72.4167	70.9000	72.5333	70.0000	76.0000	72.3846	192.2500	188.0000	189.5000	183.0000	198.6667	189.0000
STD DEV	.0000	4.1542	-	1.8583	-	-	3.0873	5.8690	-	4.9329	-	8.1445	-
REL STD	-1.0	5.7	-	2.6	-	-	4.3	3.1	-	2.6	-	4.1	-
DES VAL	-	-	-	-	-	-	71.465	-	-	-	-	-	-

LAB	17211 CL DIS IC	17990 CHLORIDE COMMON	19001 K TOT AAS	19005 K TOT ICP	19008 K TOT DCP	19102 K DIS AAS	19103 K DIS FLM PH	19105 K DIS AAS DA	19107 K DIS FLM PH	19111 K DIS ICP	19301 K EXT HNO3 AA	19990 PTASSIUM COMMON	20005 CA TOT ICP
1	-	196.4	-	-	-	-	17.5	-	-	-	-	17.5	-
2	-	208.	-	-	-	-	17.6	-	-	-	-	17.6	-
3	-	183.	-	-	-	-	-	-	18.0	-	-	18.0	-
5	-	190.	-	-	-	-	18.5	-	-	-	-	18.5	-
6	-	188.	-	-	-	17.5	-	-	-	-	-	17.5	-
7	-	188.1	-	-	-	18.6	-	-	-	-	-	18.6	-
8	-	183.	-	-	-	-	-	-	-	-	17.0	17.0	-
9	-	195.	-	20.	-	-	-	-	-	-	-	20.	69.
10	-	189.	-	16.8	-	-	-	-	-	-	-	16.8	69.
12	-	195.	-	-	-	-	18.5	-	-	-	-	18.5	-
13	-	190.	-	-	-	-	-	-	-	18.3	-	18.3	-
14	-	193.	19.3	-	-	-	-	-	-	-	-	19.3	-
15	-	-	-	-	-	-	-	15.3	-	-	-	15.3 *	-
16	174.	174.	-	-	14.1	-	-	-	-	-	-	14.1 *	-
MEAN	174.0000	190.1923	19.3000	18.4000	14.1000	18.0500	18.0250	15.3000	18.0000	18.3000	17.0000	17.6429	69.0000
STD DEV	-	8.0937	-	2.2627	-	.7778	.5500	-	-	-	-	1.5306	.0000
REL STD	-	4.3	-	12.3	-	4.3	3.1	-	-	-	-	8.7	-1.0
DES VAL	-	191.761	-	-	-	-	-	-	-	-	-	18.078	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 35 PP 75 SAMPLE 2

LAB	20007 CA TOT DCP	20050 CA DIS AAS NO	20100 CA DIS CALC'D	20103 CA DIS AAS	20108 CA DIS AAS UF	20110 CA DIS AAS AUT	20111 CA DIS ICP	20311 CA EXT ICP	20990 CALCIUM COMMON
1	-	-	-	-	-	71.0	-	-	71.0
2	-	-	-	-	-	69.	-	-	69.
3	-	-	-	-	71.0	-	-	-	71.0
5	-	-	-	70.4	-	-	-	-	70.4
6	-	-	70.7	-	-	-	-	-	70.7
7	-	-	-	70.4	-	-	-	-	70.4
8	-	-	-	-	-	-	-	69.2	69.2
9	-	-	-	-	-	-	-	-	69.
10	-	-	-	-	-	-	-	-	69.
11	-	-	-	71.	-	-	-	-	71.
13	-	-	-	-	-	-	71.3	-	71.3
14	-	59.7	-	-	-	-	-	-	59.7 *
15	-	-	-	-	-	-	72.	-	72.
16	55.0 R	-	-	-	-	-	-	-	55.0 R
MEAN	-	59.7000	70.7000	70.6000	71.0000	70.0000	71.6500	69.2000	69.5154
STD DEV	-	-	-	.3464	-	1.4142	.4950	-	3.1115
REL STD	-	-	-	.5	-	2.0	.7	-	4.5
DES VAL	-	-	-	-	-	-	-	-	68.624

DATA SUMMARY

FEDERAL-PROVINCIAL & PRAIRIE PROVINCES QUALITY ASSURANCE PROGRAMS

STUDY NO. FP 36 PP 76 DATE: 01/12/88 DUE DATE: 31/12/88

SAMPLE 3 SPIKED SAMPLE. TRACE METALS S/E. (IN 0.2% HNO3)

LAB	13009 AL TOT 5X ICP	13105 AL DIS AAS GF	13111 AL DIS ICP DA	13302 AL EXT AAS DA	13305 AL EXT AAS SE	13306 AL UF AAS OX	13311 AL EXT ICP DA	13322 AL EXT DCP DA	13999 ALUMINUM COMMON	23000	23002 V TOT AAS SE	23009 V TOT 5X ICP	23011 V TOT 5X ICP
1	-	-	-	-	-	0.060	-	-	0.060	-	-	-	-
2	-	-	-	0.055	-	-	-	-	0.055	-	-	-	-
3	0.064	-	-	-	0.062	-	-	-	0.062	-	0.011	0.010	-
6	0.072	-	-	-	-	-	-	-	0.072	-	-	-	0.02 L
8	-	-	-	0.2 L	-	-	-	-	0.2 L	-	-	-	-
9	-	-	0.04	-	-	-	-	-	0.04	-	-	-	-
10	-	-	0.06	-	-	-	-	-	0.06	-	-	-	-
14	-	0.032	-	-	-	-	-	-	0.032*	0.010	-	-	-
15	-	-	-	-	-	-	0.111	-	0.111*	-	-	-	-
16	-	-	-	-	-	-	-	0.077	0.077	-	-	-	-
MEAN	.0680	.0320	.0500	.0550	.0620	.0600	.1110	.0770	.0632	.0100	.0110	.0100	-
STD DEV	.0057	-	.0141	-	-	-	-	-	.0228	-	-	-	-
REL STD	8.3	-	28.3	-	-	-	-	-	36.0	-	-	-	-
DES VAL	-	-	-	-	-	-	-	-	.061	-	-	-	-

LAB	23012 V TOT 5X DCP	23111 V DIS ICP DA	23311 V EXT ICP DA	23999 VANADIUM COMMON	24003 CR TOT AAS SE	24004 CR TOT AAS GF	24009 CR TOT 5X ICP	24011 CR TOT 5X ICP	24012 CR TOT 5X DCP	24111 CR DIS ICP DA	24303 CR EXT AAS SE	24311 CR EXT ICP DA	24999 CHROMIUM COMMON
1	-	0.012	-	0.012	-	-	-	-	-	0.014	-	-	0.014
3	-	-	-	0.011	0.012	-	0.014	-	-	-	-	-	0.012
6	-	-	-	0.02 L	-	-	-	0.011	-	-	-	-	0.011
8	-	-	-	-	-	0.013	-	-	-	-	-	-	0.013
9	-	0.01	-	0.01	-	0.013	-	-	-	-	-	-	0.013
10	-	0.013	-	0.013*	-	-	-	-	-	0.014	-	-	0.014
11	-	-	-	-	-	-	-	-	-	-	0.018	-	0.018*
14	-	-	-	0.010	-	-	-	-	-	-	-	-	-
15	-	-	0.01	0.01	-	-	-	-	-	-	-	0.016	0.016*
16	0.010	-	-	0.010	-	-	-	-	0.014	-	-	-	0.014
MEAN	.0100	.0117	.0100	.0109	.0120	.0130	.0140	.0110	.0140	.0140	.0180	.0160	.0139
STD DEV	-	.0015	-	.0012	-	.0000	-	-	-	.0000	-	-	.0021
REL STD	-	13.1	-	11.2	-	-1.0	-	-	-	-1.0	-	-	15.0
DES VAL	-	-	-	.010	-	-	-	-	-	-	-	-	.013

LAB	25004 MN TOT AAS DA	25005	25010 MN TOT 5X ICP	25011 MN TOT 5X ICP	25012 MN TOT 5X DCP	25107 MN DIS AAS GF	25111 MN DIS ICP DA	25304 MN EXT AAS DA	25311 MN EXT ICP DA	25999 MANGNESE COMMON	26005 FE TOT AAS SE	26009 FE TOT 5X ICP	26011 FE TOT 5X ICP
1	-	-	-	-	-	-	0.011	-	-	0.011	-	-	-
2	-	-	-	-	-	-	-	0.01	-	0.01	-	-	-
3	-	0.011	0.012	-	-	-	-	-	-	0.011	0.028	0.029	-
6	-	-	-	0.011	-	-	-	-	-	0.011	-	-	0.032
8	-	-	-	-	-	-	-	-	0.02 L	0.02 L	-	-	-
9	-	-	-	-	-	-	0.012	-	-	0.012	-	-	-
10	-	-	-	-	-	-	0.012	-	-	0.012	-	-	-
11	0.011	-	-	-	-	-	-	-	-	0.011	-	-	-
14	-	-	-	-	-	0.010	-	-	-	0.010	-	-	-
15	-	-	-	-	-	-	-	-	0.012	0.012	-	-	-
16	-	-	-	-	0.014	-	-	-	-	0.014	-	-	-
MEAN	.0110	.0110	.0120	.0110	.0140	.0100	.0117	.0100	.0120	.0114	.0280	.0290	.0320
STD DEV	-	-	-	-	-	-	.0006	-	-	.0012	-	-	-
REL STD	-	-	-	-	-	-	4.9	-	-	10.3	-	-	-
DES VAL	-	-	-	-	-	-	-	-	-	.012	-	-	-

LAB	26012 FE TOT 5X DCP	26107 FE DIS AAS GF	26111 FE DIS ICP DA	26305 FE EXT AAS SE	26311 FE EXT ICP DA	26999 IRON COMMON	27003 CO TOT AAS GF	27009 CO TOT 5X ICP	27011 CO TOT 5X ICP	27012 CO TOT 5X DCP	27111 CO DIS ICP DA	27302 CO EXT AAS SE	27311 CO EXT ICP DA
1	-	-	0.029	-	-	0.029	-	-	-	-	0.012	-	-
2	-	-	-	0.029	-	0.029	-	-	-	-	-	-	-
3	-	-	-	-	-	0.028	-	0.011	-	-	-	-	-
6	-	-	-	-	-	0.032	-	-	0.011	-	-	-	-
8	-	-	-	-	0.03	0.03	0.011	-	-	-	-	-	-
9	-	-	0.03	-	-	0.03	-	-	-	-	0.01	-	-
10	-	-	0.019	-	-	0.019*	-	-	-	-	0.014	-	-
11	-	-	-	0.039	-	0.039*	-	-	-	-	-	0.012	-
14	-	0.016	-	-	-	0.016*	-	-	-	-	-	-	-
15	-	-	-	-	0.029	0.029	-	-	-	-	-	-	0.011
16	0.026	-	-	-	-	0.026	-	-	-	0.011	-	-	-
MEAN	.0260	.0160	.0260	.0340	.0295	.0279	.0110	.0110	.0110	.0110	.0120	.0120	.0110
STD DEV	-	-	.0061	.0071	.0007	.0061	-	-	-	-	.0020	-	-
REL STD	-	-	23.4	20.8	2.4	22.0	-	-	-	-	16.7	-	-
DES VAL	-	-	-	-	-	.029	-	-	-	-	-	-	-

LAB	27999 COBALT COMMON	28002 NI TOT AAS SE	28009 NI TOT 5X ICP	28011 NI TOT 5X ICP	28012 NI TOT 5X DCP	28111 NI DIS ICP DA	28302 NI EXT AAS SE	28309 NI EXT AAS GF	28311 NI EXT ICP DA	28999 NICKEL COMMON	29005 CU TOT AAS SE	29009 CU TOT 5X ICP	29011 CU TOT 5X ICP
1	0.012	-	-	-	-	0.013	-	-	-	0.013	-	-	-
3	0.011	0.013	0.013	-	-	-	-	-	-	0.013	0.013	0.014	-
6	0.011	-	-	0.011	-	-	-	-	-	0.011	-	-	0.012
8	0.011	-	-	-	-	-	-	0.012	-	0.012	-	-	-
9	0.01	-	-	-	-	0.01	-	-	-	0.01	-	-	-
10	0.014*	-	-	-	-	0.014	-	-	-	0.014	-	-	-
11	0.012	-	-	-	-	-	0.012	-	-	0.012	-	-	-
15	0.011	-	-	-	-	-	-	-	0.02 L	0.02 L	-	-	-
16	0.011	-	-	-	0.013	-	-	-	-	0.013	-	-	-
MEAN	.0114	.0130	.0130	.0110	.0130	.0123	.0120	.0120	-	.0123	.0130	.0140	.0120
STD DEV	.0011	-	-	-	-	.0021	-	-	-	.0013	-	-	-
REL STD	9.9	-	-	-	-	16.9	-	-	-	10.5	-	-	-
DES VAL	.011	-	-	-	-	-	-	-	-	.013	-	-	-

LAB	29012 CU TOT 5X DCP	29107 CU DIS AAS GF	29111 CU DIS ICP DA	29305 CU EXT AAS SE	29308 CU EXT AAS GF	29311 CU EXT ICP DA	29999 COPPER COMMON	30005 ZN TOT AAS SE	30009 ZN TOT 5X ICP	30011 ZN TOT 5X ICP	30012 ZN TOT 5X DCP	30107 ZN DIS AAS GF	30111 ZN DIS ICP DA
1	-	-	0.014	-	-	-	0.014	-	-	-	-	-	0.016
2	-	-	-	0.013	-	-	0.013	-	-	-	-	-	-
3	-	-	-	-	-	-	0.013	0.015	0.016	-	-	-	-
6	-	-	-	-	-	-	0.012	-	-	0.015	-	-	-
8	-	-	-	-	-	0.01	0.01 *	-	-	-	-	-	-
9	-	-	0.011	-	-	-	0.011	-	-	-	-	-	0.015
10	-	-	0.014	-	-	-	0.014	-	-	-	-	-	0.016
11	-	-	-	0.016	-	-	0.016*	-	-	-	-	-	-
14	-	0.016	-	-	-	-	0.016*	-	-	-	-	0.012	-
15	-	-	-	-	0.015	-	0.015	-	-	-	-	-	-
16	0.017	-	-	-	-	-	0.017*	-	-	-	0.018	-	-
MEAN	.0170	.0160	.0130	.0145	.0150	.0100	.0137	.0150	.0160	.0150	.0180	.0120	.0157
STD DEV	-	-	.0017	.0021	-	-	.0022	-	-	-	-	-	.0006
REL STD	-	-	13.3	14.6	-	-	16.0	-	-	-	-	-	3.7
DES VAL	-	-	-	-	-	-	.013	-	-	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 36 PP 76 SAMPLE 3

LAB	30304 ZN EXT AAS DA	30305 ZN EXT AAS SE	30311 ZN EXT ICP DA	30999 ZINC COMMON	38009 SR TOT ICP DA	38012 SR TOT DCP DA	38111 SR DIS ICP DA	38311 SR EXT ICP DA	38999 STRNTIUM COMMON	42011 MO TOT 5X ICP	42012 MO TOT 5X DCP	42111 MO DIS ICP DA	42311 MO EXT ICP DA
1	-	-	-	0.016	-	-	-	-	-	-	-	0.012	-
2	0.018	-	-	0.018	-	-	-	-	-	-	-	-	-
3	-	-	-	0.015	0.358	-	-	-	0.358	-	-	-	-
6	-	-	-	0.015	-	-	-	-	-	0.02 L	-	-	-
8	-	-	0.02	0.02 *	-	-	-	-	-	-	-	-	-
9	-	-	-	0.015	-	-	0.38	-	0.38	-	-	0.01	-
10	-	-	-	0.016	-	-	0.37	-	0.37	-	-	0.012	-
11	-	0.017	-	0.017	-	-	-	-	-	-	-	-	-
14	-	-	-	0.012	-	-	-	-	-	-	-	-	-
15	-	-	0.018	0.018	-	-	-	0.365	0.365	-	-	-	0.01
16	-	-	-	0.018	-	0.423	-	-	0.423*	-	0.018R	-	-
MEAN	.0180	.0170	.0190	.0164	.3580	.4230	.3750	.3650	.3792	-	-	.0113	.0100
STD DEV	-	-	.0014	.0022	-	-	.0071	-	.0258	-	-	.0012	-
REL STD	-	-	7.4	13.2	-	-	1.9	-	6.8	-	-	10.2	-
DES VAL	-	-	-	.015	-	-	-	-	.352	-	-	-	-

LAB	42999 MOLYBNUM COMMON	48002 CD TOT AAS SE	48004	48009 CD TOT 5X ICP	48011 CD TOT 5X ICP	48012 CD TOT 5X DCP	48111 CD DIS ICP DA	48302 CD EXT AAS SE	48309 CD EXT AAS GF	48999 CADMIUM COMMON	56009 BA TOT 5X ICP	56011 BA TOT 5X ICP	56012 BA TOT 5X DCP
1	0.012	-	-	-	-	-	0.011	-	-	0.011	-	-	-
2	-	-	-	-	-	-	-	0.011	-	0.011	-	-	-
3	-	0.011	-	0.011	-	-	-	-	-	0.011	0.052	-	-
6	0.02 L	-	-	-	0.010	-	-	-	-	0.010	-	0.054	-
8	-	-	-	-	-	-	-	-	0.010	0.010	-	-	-
9	0.01	-	0.011	-	-	-	-	-	-	0.011	-	-	-
10	0.012	-	-	-	-	-	0.008	-	-	0.008*	-	-	-
11	-	-	-	-	-	-	-	0.010	-	0.010	-	-	-
15	0.01	-	-	-	-	-	-	-	0.007	0.007*	-	-	-
16	0.018R	-	-	-	-	0.011	-	-	-	0.011	-	-	0.057
MEAN	.0110	.0110	.0110	.0110	.0100	.0110	.0095	.0105	.0085	.0100	.0520	.0540	.0570
STD DEV	.0012	-	-	-	-	-	.0021	.0007	.0021	.0014	-	-	-
REL STD	10.5	-	-	-	-	-	22.3	6.7	25.0	14.1	-	-	-
DES VAL	.011	-	-	-	-	-	-	-	-	.011	-	-	-

LAB	56111 BA DIS ICP DA	56311 BA EXT ICP DA	56999 BARIUM COMMON	82002 PB TOT AAS SE	82004 PB TOT AAS GF	82009 PB TOT 5X ICP	82011 PB TOT 5X ICP	82012 PB TOT 5X DCP	82104 PB DIS AAS GF	82302 PB EXT AAS SE	82309 PB EXT AAS GF	82999 LEAD COMMON
1	0.053	-	0.053	-	-	-	-	-	-	0.009	-	0.009
2	-	-	-	-	-	-	-	-	-	0.011	-	0.011
3	-	-	0.052	0.009	-	0.010	-	-	-	-	-	0.009
6	-	-	0.054	-	-	-	0.008	-	-	-	-	0.008
8	-	-	-	-	-	-	-	-	-	-	0.012	0.012
9	0.05	-	0.05	-	0.010	-	-	-	-	-	-	0.010
10	0.05	-	0.05	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	0.012	-	0.012
14	-	-	-	-	-	-	-	-	0.008	-	-	0.008
15	-	0.054	0.054	-	-	-	-	-	-	-	0.004	0.004*
16	-	-	0.057	-	-	-	-	0.017	-	-	-	0.017*
MEAN	.0510	.0540	.0529	.0090	.0100	.0100	.0080	.0170	.0080	.0107	.0080	.0100
STD DEV	.0017	-	.0025	-	-	-	-	-	-	.0015	.0057	.0034
REL STD	3.4	-	4.7	-	-	-	-	-	-	14.3	70.7	34.0
DES VAL	-	-	.052	-	-	-	-	-	-	-	-	.010

LAB	00110 IONIC BALANC %	00120 SUM OF CATIONS	00125 SUM OF ANIONS	02011 COLOUR APPARE	02021 COLOUR VIS COM	02023 COLOUR SPECT	02024 COL TRU SPECT	02040 COLOUR COMMON	02041 CONDUCT SPEC 25	02060 CONDUCT COMMON	02073 TURB HACH	02074 TURB NPLMTRI	02077 TURB HACH FZ
1	2.83	10.98	11.62	-	-	-	1. L	1. L	1176.	1176.	0.1	-	-
2	22.3	10.92	6.942	5. L	-	-	-	5. L	1170.	1170.	0.2	-	-
3	0.90	11.04	10.85	5. L	-	-	-	5. L	1167.	1167.	0.06	-	-
4	-	-	-	-	5. L	-	-	5. L	1165.	1165.	-	-	-
5	-1.04	11.15	11.39	5. L	-	-	-	5. L	1150.	1150.	0.25	-	-
6	2.46	10.83	10.31	-	-	-	-	-	1120.	1120.	-	0.13	-
7	-	-	-	4.	-	-	-	4.	1159.	1159.	0.16	-	-
8	1.93	10.86	11.29	5. L	-	-	-	5. L	1160.	1160.	-	0.06	-
9	1.79	10.79	10.38	-	-	-	-	-	1145.	1145.	-	-	-
10	0.06	10.62	10.60	-	-	1. L	-	1. L	1140.	1140.	-	0.1	-
11	-	-	-	5. L	-	-	-	5. L	1200.	1200.	-	-	0.3
12	-	-	-	-	5. L	-	-	5. L	1250.	1250.	0.2	-	-
14	-	-	-	-	-	-	-	-	1172.	1172.	0.0	-	-
15	-	-	-	5.	-	-	-	5.	1100.	1100.	-	0.1 L	-
16	-	-	-	-	-	-	-	-	1350.R	1350.R	0.1	-	-
MEAN	3.9038	10.9008	10.4239	4.5000	-	-	-	4.5000	1162.428	1162.428	.1338	.0967	.3000
STD DEV	7.5428	.1641	1.4866	.7071	-	-	-	.7071	35.2108	35.2108	.0833	.0351	-
REL STD	193.2	1.5	14.3	15.7	-	-	-	15.7	3.0	3.0	62.3	36.3	-
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

LAB	02081 TURB RATIO	02090 TURBIDTY COMMON	05100 BORON ?	05105 BORON AA CARM	05106 BORON F AZOMETH	05107 BORON ICP DA	05190 BORON COMMON	06009 TOC CO2 IR	06051 TIC COMB IR	06101 DOC IR /DIF	06104 DOC UV CO2 IR	06107 DOC UV CO2 PHE	06109 DOC UV CO2 OH
1	-	0.1	-	-	-	2.76	2.76	-	-	-	-	29.7	-
2	-	0.2	-	-	-	-	-	-	-	-	-	30.0	-
3	-	0.06	-	-	-	-	-	-	-	-	32.0	-	-
4	0.04	0.04	-	3.50	-	-	3.50 *	-	-	-	28.5	-	-
5	-	0.25	-	-	-	-	-	-	-	30.7	-	-	-
6	-	0.13	-	-	-	-	-	-	-	-	30.2	-	-
7	-	0.16	-	-	-	-	-	-	-	-	-	-	-
8	-	0.06	-	-	2.71	-	2.71	-	-	-	-	-	-
10	-	0.1	-	-	-	-	-	-	-	-	-	-	28.7
11	-	0.3	-	-	-	-	-	-	-	-	-	-	-
12	-	0.2	-	-	-	-	-	-	-	27.0	-	-	-
14	-	0.0	-	-	-	-	-	-	-	-	-	-	-
15	-	0.1 L	-	-	-	2.6	2.6	29.	7.	-	-	-	-
16	-	0.1	2.00	-	-	-	2.00 *	-	-	-	-	-	-
MEAN	.0400	.1308	2.0000	3.5000	2.7100	2.6800	2.7140	29.0000	7.0000	28.8500	30.2333	29.8500	28.7000
STD DEV	-	.0873	-	-	-	.1131	.5345	-	-	2.6163	1.7502	.2121	-
REL STD	-	66.8	-	-	-	4.2	19.7	-	-	9.1	5.8	.7	-
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

LAB	06112 DOC PER IR	06113	06150 D O C COMMON	06151 DIC IR COMBUST	06152 DIC UV CO2 IR	06154 DIC AA CO2 PHE	06490 D I C COMMON	07015 TKN DIG BERTHEL	07016 TKN BLK AMM-SAL	07018 TKN BLK INDOPHE	07021 TKN BLK DIG BER	07090 TKN COMMON	07105 NO3+NO2 DIS AA
1	-	-	29.7	-	-	4.6	4.6 *	-	-	-	0.81	0.81	1.08
2	-	-	30.0	-	-	-	-	-	-	-	-	-	-
3	-	-	32.0	-	4.70	-	4.70 *	-	-	-	-	-	-
4	-	-	28.5	-	5.84	-	5.84	-	-	-	-	-	-
5	-	-	30.7	6.6	-	-	6.6	-	-	-	-	-	-
6	-	-	30.2	-	-	-	-	-	1.6	-	-	1.6 *	-
8	-	-	-	-	-	-	-	1.15	-	-	-	1.15	-
10	-	-	28.7	-	-	-	-	-	-	-	-	-	-
12	-	-	27.0	6.8	-	-	6.8	-	-	0.84	-	0.84	-
15	-	-	29.	-	-	-	7. *	-	-	-	-	-	-
16	26.2	6.0	26.2	-	-	-	-	-	-	-	-	-	-
MEAN	26.2000	6.0000	29.2000	6.7000	5.2700	4.6000	5.9233	1.1500	1.6000	.8400	.8100	1.1000	1.0800
STD DEV	-	-	1.7192	.1414	.8061	-	1.0621	-	-	-	-	.3671	-
REL STD	-	-	5.9	2.1	15.3	-	17.9	-	-	-	-	33.4	-
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

LAB	07109 NO3+NO2 AA HYD	07110 NO3+NO2 AA2 CD	07111 NO3+NO2 DIS SPEC	07112 NO3+NO2 UF AA CD	07390 NITRATE COMMON	07505 NH3 TOT AA BERT	07540 NH3 TOT AA SAL	07550	07555 NH3 DIS AA PHEN	07557 NH3 DIS AA INDO	07562 NH3 DIS AA EDTA	07563 NH3 DIS AA INDO	07590 AMMONIA COMMON
1	-	-	-	-	1.08	-	-	-	-	-	0.026	-	0.026
2	-	0.90	-	-	0.90	-	-	-	-	-	-	-	-
3	-	-	-	1.069	1.069	0.023	-	-	-	-	-	-	0.023
4	-	1.10	-	-	1.10	-	0.027	-	-	-	-	-	0.027
5	-	1.22	-	-	1.22 *	-	-	-	-	0.030	-	-	0.030
6	0.81	-	-	-	0.81 *	-	-	-	-	0.04	-	-	0.04 *
7	-	-	-	0.77	0.77 *	-	-	-	-	-	-	-	-
8	-	1.07	-	-	1.07	-	-	-	0.027	-	-	-	0.027
9	0.92	-	-	-	0.92	-	-	-	-	-	-	-	-
10	0.93	-	-	-	0.93	-	-	-	0.015	-	-	-	0.015*
11	-	1.00	-	-	1.00	-	0.055R	-	-	-	-	-	0.055R
12	-	1.08	-	-	1.08	-	-	-	-	-	-	0.029	0.029
13	-	1.05	-	-	1.05	-	0.1 L	-	-	-	-	-	0.1 L
14	-	-	1.06	-	1.06	-	-	0.027	-	-	-	-	0.027
15	-	1.26	-	-	1.26 *	-	-	-	0.039	-	-	-	0.039*
MEAN	.8867	1.0850	1.0600	.9195	1.0213	.0230	.0270	.0270	.0270	.0350	.0260	.0290	.0283
STD DEV	.0666	.1146	-	.2114	.1358	-	-	-	.0120	.0071	-	-	.0072
REL STD	7.5	10.6	-	23.0	13.3	-	-	-	44.4	20.2	-	-	25.5
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

LAB	07601 T N UV AA SUL	07602 T N CALC'D	07605 T N UV HY SUL	07651 T N DIS UV AA	07655 T N DIS UV EDTA	07690 TOT N COMMON	07790 T N DIS COMMON	09100	09103 F DIS COL SP	09105 F DIS SP EL	09106 F DIS EL POT	09107 F DIS AUT POT	09108 F DIS SP EL
1	-	-	-	-	-	-	-	-	-	-	-	1.00	-
2	1.20	-	-	-	-	-	1.20 *	-	-	-	1.0	-	-
3	1.793	-	-	-	-	-	1.793	-	-	-	-	-	0.96
4	-	-	-	2.20	-	-	2.20	-	-	-	-	-	-
5	-	-	-	-	1.81	-	1.81	-	-	-	0.90	-	-
6	-	-	-	-	-	-	-	-	1.0	-	-	-	-
8	-	-	-	-	-	-	-	-	-	0.97	-	-	-
10	-	-	2.2	-	-	-	2.2	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	0.86	-	-	-
12	-	1.92	-	-	-	1.92	-	-	-	1.00	-	-	-
14	-	-	-	-	-	-	-	0.86	-	-	-	-	-
15	-	-	-	-	-	-	-	-	-	1.8 R	-	-	-
MEAN	1.4965	1.9200	2.2000	2.2000	1.8100	1.9200	1.8406	.8600	1.0000	.9433	.9500	1.0000	.9600
STD DEV	.4193	-	-	-	-	-	.4098	-	-	.0737	.0707	-	-
REL STD	28.0	-	-	-	-	-	22.3	-	-	7.8	7.4	-	-
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

LAB	09115 F DIS AA ALIZ	09116 F DIS IC	09190 FLUORIDE COMMON	10101 ALKLNTY TITR'N	10108 ALKLNTY POT TIT	10109 ALKLNTY POT TIT	10111 ALKLNTY TIT PRO	10112 ALKLNTY TIT CON	10190 ALKLINTY COMMON	10301 PH	10390 PH COMMON	10602 HARDNSS CALC'D	10603 HARDNSS TITR'N
1	-	-	1.00	35.	-	-	-	-	35.	7.36	7.36	409.	-
2	-	-	1.0	39.0	-	-	-	-	39.0 *	7.5	7.5	405.5	-
3	-	-	0.96	-	-	-	33.2	-	33.2	7.55	7.55	-	-
4	-	-	-	-	-	-	-	-	-	7.48	7.48	-	-
5	-	-	0.90	30.9	-	-	-	-	30.9	7.68	7.68	-	-
6	-	-	1.0	-	-	36.	-	-	36.	7.5	7.5	-	408.
7	-	-	-	29.8	-	-	-	-	29.8	7.5	7.5	-	414.4
8	-	-	0.97	-	-	31.0	-	-	31.0	7.45	7.45	406.	-
9	-	-	-	-	34.	-	-	-	34.	7.54	7.54	-	-
10	1.04	-	1.04	-	-	-	-	44. R	44. R	7.51	7.51	-	-
11	-	-	0.86 *	29.	-	-	-	-	29. *	7.1	7.1	420.	-
12	-	-	1.00	33.1	-	-	-	-	33.1	7.4	7.4	-	-
13	-	-	-	34.	-	-	-	-	34.	7.2	7.2	410.2	-
14	-	-	0.86 *	34.9	-	-	-	-	34.9	7.32	7.32	382.2	-
15	-	-	1.8 R	34.0	-	-	-	-	34.0	7.8	7.8	420.	-
16	-	1.04	1.04	32.	-	-	-	-	32.	7.26	7.26	400.	-
MEAN	1.0400	1.0400	.9664	33.1700	34.0000	33.5000	33.2000	-	33.2786	7.4469	7.4469	406.6125	411.2000
STD DEV	-	-	.0652	2.9246	-	3.5355	-	-	2.6344	.1740	.1740	12.0613	4.5255
REL STD	-	-	6.7	8.8	-	10.6	-	-	7.9	2.3	2.3	3.0	1.1
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 36 PP 76 SAMPLE 4

LAB	10606 HARDNSS CALC'D	10645 HARDNSS ?	10690 HARDNESS COMMON	11001 NA TOT AAS	11005 NA TOT ICP	11007 NA DIS DCP	11102 NA F AAS	11103 NA DIS FL PH	11105 NA DIS AAS DA	11107 NA UF FL PH	11111 NA DIS ICP	11311 NA EXT ICP	11990 SODIUM COMMON
1	-	-	409.	-	-	-	-	53.	-	-	-	-	53.
2	-	-	405.5	-	-	-	-	53.0	-	-	-	-	53.0
3	412.	-	412.	-	-	-	-	-	-	52.8	-	-	52.8
5	-	-	-	-	-	-	-	54.0	-	-	-	-	54.0
6	-	-	408.	-	-	-	50.	-	-	-	-	-	50.
7	-	-	414.4	-	-	-	-	-	49.6	-	-	-	49.6
8	-	-	406.	-	-	-	-	-	-	-	-	51.8	51.8
9	-	405.	405.	-	49.	-	-	-	-	-	-	-	49.
10	-	-	-	-	47.	-	-	-	-	-	-	-	47.
11	-	-	420.	-	-	-	52.	-	-	-	-	-	52.
12	-	-	-	-	-	-	-	51.0	-	-	-	-	51.0
13	-	-	410.2	-	-	-	-	-	-	-	54.0	-	54.0
14	-	-	382.2	51.4	-	-	-	-	-	-	-	-	51.4
15	-	-	420.	-	-	-	-	-	-	-	52.1	-	52.1
16	-	-	400.	-	-	44.3 R	-	-	-	-	-	-	44.3 R
MEAN	412.0000	405.0000	407.6917	51.4000	48.0000	-	51.0000	52.7500	49.6000	52.8000	53.0500	51.8000	51.4786
STD DEV	-	-	9.9934	-	1.4142	-	1.4142	1.2583	-	-	1.3435	-	2.0001
REL STD	-	-	2.5	-	2.9	-	2.8	2.4	-	-	2.5	-	3.9
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

LAB	12005 MG TOT ICP	12012 MG TOT DCP	12101 MG DIS CALC'D	12102 MG DIS AAS DA	12106 MG UF AAS DA	12107 MG DIS AAS AUT	12111 MG DIS ICP	12303 MG UF AAS AUT	12311 MG EXT ICP	12990 MGNESIUM COMMON	14102 SILICA ANSA AA	14105 SILICA MOLY AA	14106 SILICA MOLY
1	-	-	-	-	-	-	-	35.	-	35.	-	-	-
2	-	-	-	-	-	34.8	-	-	-	34.8	3.41	-	-
3	-	-	-	-	34.5	-	-	-	-	34.5	-	-	3.41
5	-	-	34.4	-	-	-	-	-	-	34.4	-	3.5	-
6	-	-	35.2	-	-	-	-	-	-	35.2	-	-	-
7	-	-	-	35.2	-	-	-	-	-	35.2	-	-	-
8	-	-	-	-	-	-	-	-	34.3	34.3	-	3.0	-
9	35.	-	-	-	-	-	-	-	-	35.	-	-	-
10	35.	-	-	-	-	-	-	-	-	35.	-	3.35	-
11	-	-	-	35.	-	-	-	-	-	35.	3.5	-	-
12	-	-	-	-	-	-	-	-	-	-	-	3.5	-
13	-	-	-	-	-	-	34.6	-	-	34.6	-	-	-
14	-	-	-	33.1	-	-	-	-	-	33.1	-	-	-
15	-	-	-	-	-	-	35.8	-	-	35.8	-	-	-
16	-	31.0	-	-	-	-	-	-	-	31.0	-	-	-
MEAN	35.0000	31.0000	34.8000	34.4333	34.5000	34.8000	35.2000	35.0000	34.3000	34.4929	3.4550	3.3375	3.4100
STD DEV	.0000	-	.5657	1.1590	-	-	.8485	-	-	1.1777	.0636	.2358	-
REL STD	-1.0	-	1.6	3.4	-	-	2.4	-	-	3.4	1.8	7.1	-
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 36 PP 76 SAMPLE 4

LAB	14107 SILICA MOLY AA	14111 SILICA ICP DA	14112 SILICA DCP DA	14190 SILICA COMMON	15313 T P ACL AA SNCL	15401 T P UV AA ASC	15406 T P UF AA ASC	15409 T P BLK AA ASC	15413 T P ACL AA SNCL	15421 T P BLK DIG ASC	15490 TOT P COMMON	16304 SO4 DIS AUTO BA	16306 SO4 DIS AA MTB
1	3.3	-	-	3.3	-	-	-	-	-	0.002	0.002	-	120.
2	-	-	-	3.41	-	-	-	-	-	-	-	117.0	-
3	-	-	-	3.41	-	-	-	-	0.001L	-	0.001L	-	-
4	-	-	-	-	-	-	0.003L	-	-	-	0.003L	-	-
5	-	-	-	3.5	-	-	-	-	-	-	-	-	118.
6	-	-	-	-	-	-	-	0.01	-	-	0.01	119.	-
7	-	-	-	-	-	-	-	-	-	-	-	-	105.6
8	-	-	-	3.0 *	-	-	-	-	-	-	-	-	116.
9	-	3.42	-	3.42	-	-	-	-	-	-	-	-	-
10	-	-	-	3.35	-	0.01 L	-	-	-	-	0.01 L	-	-
11	-	-	-	3.5	0.005L	-	-	-	-	-	0.005L	-	120.
12	-	-	-	3.5	-	-	0.003L	-	-	-	0.003L	-	113.
13	-	-	-	-	-	-	-	-	-	-	-	-	115.7
15	-	1.69 R	-	1.69 R	-	-	-	-	-	-	-	-	110.
16	-	-	1.16 R	1.16 R	-	-	-	-	-	-	-	-	-
MEAN	3.3000	3.4200	-	3.3767	-	-	-	.0100	-	.0020	.0060	118.0000	114.7875
STD DEV	-	-	-	.1574	-	-	-	-	-	-	.0057	1.4142	5.0354
REL STD	-	-	-	4.7	-	-	-	-	-	-	94.3	1.2	4.4
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

LAB	16307 SO4 UF AA MTB	16309 SO4 DIS I C	16310 SO4 DIS AA CALM	16311 SO4 DIS IC	16990 SULFATE COMMON	17203 CL DIS AA FE	17204 CL DIS AG TIT	17206 CL DIS AA HG	17208 CL DIS AA HG	17209 CL DIS I C	17210 CL DIS TIT CON	17211 CL DIS IC	17990 CHLORIDE COMMON
1	-	-	-	-	120.	295.	-	-	-	-	-	-	295. *
2	-	120.	-	-	120.	-	-	-	-	128.	-	-	128.
3	114.	-	-	-	114.	-	-	-	270.	-	-	-	270. *
5	-	-	-	-	118.	-	-	290.	-	-	-	-	290. *
6	-	-	-	-	119.	-	252.	-	-	-	-	-	252. *
7	-	-	-	-	105.6	320.0	-	-	-	-	-	-	320.0*
8	-	-	-	-	116.	-	-	290.	-	-	-	-	290. *
9	-	120.	-	-	120.	-	-	-	-	120.	-	-	120.
10	-	-	112.	-	112.	-	-	-	-	-	258.	-	258. *
11	-	-	-	-	120.	-	-	380.	-	-	-	-	380. *
12	-	-	-	-	113.	-	-	320.	-	-	-	-	320. *
13	-	-	-	-	115.7	-	-	425.	-	-	-	-	425. *
14	-	115.	-	-	115.	-	-	-	-	126.	-	-	126.
15	-	-	-	-	110.	-	-	-	-	-	-	-	-
16	-	-	-	110.	110.	-	-	-	-	-	-	124.	124.
MEAN	114.0000	118.3333	112.0000	110.0000	115.2200	307.5000	252.0000	341.0000	270.0000	124.6667	258.0000	124.0000	257.0000
STD DEV	-	2.8868	-	-	4.4571	17.6777	-	59.6238	-	4.1633	-	-	98.2023
REL STD	-	2.4	-	-	3.9	5.7	-	17.5	-	3.3	-	-	38.2
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	124.5

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 36 PP 76 SAMPLE 4

LAB	19001 K TOT AAS	19005 K TOT ICP	19008 K TOT DCP	19102 K DIS AAS	19103 K DIS FLM PH	19105 K DIS AAS DA	19106 K DIS AAS LI	19107 K DIS FLM PH	19111 K DIS ICP	19301 K EXT HNO3 AA	19990 PTASSIUM COMMON	20005 CA TOT ICP	20007 CA TOT DCP
1	-	-	-	-	20.0	-	-	-	-	-	20.0	-	-
2	-	-	-	-	21.0	-	-	-	-	-	21.0	-	-
3	-	-	-	-	-	-	-	20.4	-	-	20.4	-	-
5	-	-	-	-	21.0	-	-	-	-	-	21.0	-	-
6	-	-	-	20.0	-	-	-	-	-	-	20.0	-	-
7	-	-	-	20.5	-	-	-	-	-	-	20.5	-	-
8	-	-	-	-	-	-	-	-	-	19.5	19.5	-	-
9	-	21.	-	-	-	-	-	-	-	-	21.	105.	-
10	-	19.8	-	-	-	-	-	-	-	-	19.8	104.	-
11	-	-	-	-	-	-	24. R	-	-	-	24. R	-	-
12	-	-	-	-	20.6	-	-	-	-	-	20.6	-	-
13	-	-	-	-	-	-	-	-	20.3	-	20.3	-	-
14	19.8	-	-	-	-	-	-	-	-	-	19.8	-	-
15	-	-	-	-	-	18.3	-	-	-	-	18.3	-	-
16	-	-	20.0	-	-	-	-	-	-	-	20.0	-	96.0
MEAN	19.8000	20.4000	20.0000	20.2500	20.6500	18.3000	-	20.4000	20.3000	19.5000	20.1571	104.5000	96.0000
STD DEV	-	.8485	-	.3536	.4726	-	-	-	-	-	.7197	.7071	-
REL STD	-	4.2	-	1.7	2.3	-	-	-	-	-	3.6	.7	-
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

LAB	20050 CA DIS AAS NO	20100 CA DIS CALC'D	20103 CA DIS AAS	20108 CA DIS AAS UF	20110 CA DIS AAS AUT	20111 CA DIS ICP	20311 CA EXT ICP	20990 CALCIUM COMMON
1	-	-	-	-	106.	-	-	106.
2	-	-	-	-	105.	-	-	105.
3	-	-	-	108.	-	-	-	108.
5	-	-	109.	-	-	-	-	109.
6	-	105.	-	-	-	-	-	105.
7	-	-	105.6	-	-	-	-	105.6
8	-	-	-	-	-	-	106.	106.
9	-	-	-	-	-	-	-	105.
10	-	-	-	-	-	-	-	104.
11	-	-	110.	-	-	-	-	110.
13	-	-	-	-	-	107.2	-	107.2
14	98.6	-	-	-	-	-	-	98.6
15	-	-	-	-	-	109.	-	109.
16	-	-	-	-	-	-	-	96.0
MEAN	98.6000	105.0000	108.2000	108.0000	105.5000	108.1000	106.0000	105.3143
STD DEV	-	-	2.3065	-	.7071	1.2728	-	3.8708
REL STD	-	-	2.1	-	.7	1.2	-	3.7
DES VAL	-	-	-	-	-	-	-	-

DATES RECEIVED

1 88/12/05	2 89/01/04	3 88/12/08	3 89/01/24	4 89/01/10
5 89/01/24	6 88/11/28	6 89/01/19	7 89/01/17	8 89/01/04
9 88/12/21	10 88/12/22	11 88/12/19	12 89/01/04	13 89/01/05
14 88/01/23	15 88/12/21	16 89/01/06		

NOTE: ALL CONCENTRATION UNITS ARE EXPRESSED IN MG/L OF EACH ELEMENT, THE EXCEPTIONS BEING: COLOUR IN RELATIVE UNITS, CONDUCTIVITY IN USIE/CM, TURBIDITY IN JTU OR NTU, NITROGEN ANALYSES IN "N", ALKALINITY & HARDNESS IN CACO3, SILICA IN SIO2, AND SULFATE IN SO4.

Research & Applications Branch
National Water Reseaarch Institute
867 Lakeshore Road, P.O. Box 5050
Burlington, Ontario
L7N 3E6

June 7 Juin, 1989.

To: Participants & Managers in:
A: Participants et Directeurs dans:

Federal-Provicial Quality Assurance Program
Programme d'Assurance-Qualité Fédéral-Provincial (PAQFP)

Final Report/Rapport Dernier: FPQA Studies/Etudes 37-38

Vous trouverez en annexe le résumé dernier de l'étude F/P susmentionées.

Si vous avez de commentaire sur ce résumé, ou des corrections valides à notre base de données, veuillez me les transmettre.

I have enclosed the final report for the above mentioned studies.

If you have any comments on this report, or any legitimate corrections to the data base, please do not hesitate to communicate them.

Harry A.

H. Alkema
Quality Assurance Project

Attachment: Distribution List
En annexe: Liste de diffusion

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RESEARCH & APPLICATIONS BRANCH

FINAL REPORT

REPORT NO. RAB 89–11 (Eng)

FEDERAL PROVINCIAL QUALITY ASSURANCE PROGRAM

STUDIES 37 AND 38

for January and February 1989

TRACE METALS, MAJOR IONS, NUTRIENTS AND PHYSICAL PARAMETERS IN SURFACE WATERS

by

H. Alkema

Quality Assurance Section
National Water Research Institute
Burlington, Ontario

June 1989

(Ce rapport est aussi disponible en français)

Introduction

As part of an on-going study, the Quality Assurance Section, NWRI in Burlington, Ontario, has been sending reference water samples bi-monthly to chemical laboratories participating in the FP program. This report summarizes the most recent FP interlaboratory quality assurance studies: FP 37 and 38, for the months January and February, 1989. These two studies dealt with trace metals, major ions, nutrients and physical parameters. The levels were low for trace metals, and medium to high for major ions.

Study Design

Four water samples were submitted to each laboratory for chemical analyses. Two samples were submitted for trace metals analysis, while the remaining two were submitted for major ions, nutrients and some physical measurements. The following is a breakdown of the four samples:

FP 37 – Sample 1 – 125 ml, high level* for trace metals (3% HNO_3)
Sample 2 – up to 1 L, major ions etc., stored at 4°C

FP 38 – Sample 3 – 1 L, low level* for trace metals (0.2% HNO_3)
Sample 4 – up to 1 L, major ions, etc., stored at 4°C

* for definitions see Appendix 1

Treatment of Data

Each laboratory was asked to perform only those analyses which were routine to their particular laboratory, using the general methodology guidelines listed above. Results for these analyses were reported as required by the standard report sheets provided with the QA samples. Submitted results were tabulated for each parameter, first for each method reported, and then for

all methods combined. These data, and the resulting statistics are presented in the Data Summary. (attached)

Preliminary data summaries (RAB # 89-05), including problematic results, were sent March 1 or March 7, and April 7. Each laboratory was given three weeks to notify us of any errors in data transcription, compilation, or flags.

Performance Indicators

In the Federal Provincial QA program, two types of reference samples are used for the accuracy assessment. These are Reference Waters (RMs) and Certified Reference waters (CRMs) which have Design Values for the stable parameters. Also, regional samples are used occasionally as natural representative samples. The means for these regional samples, and the Design Values for the reference waters are used to test each reported result for accuracy.

Percentage deviations from the reference values are used as an indication by the laboratory head to determine the extent of the discrepancies between the laboratory result and the reference value. However, please keep in mind that at low levels, high % deviations are often seen, and may be misleading if interpreted too strictly.

A result which deviates more than the greater of 10% or 1 standard deviation from the reference value is marked with an asterisk in the data table and its value tabulated in the flagged data table (Table 1). Results reported with an "L" (less than) or flagged with an "R" (rejectable) are not used in the statistical calculations. Performance indicators are fully explained in Appendix II.

Comments on Laboratory Performance

Results accompanied with a 'less than' are difficult to appraise. If a design value or mean is significantly lower than the detection limit given by a particular laboratory, then that detection limit is too high. Such a result is assigned an 'HDL' and is tabulated for each laboratory in Table 1.

If, on the other hand, the detection limit reported is far lower than the mean or design value, then the use of 'less than' is clearly inadequate and the result is flagged low. The magnitude of the deviation from the mean in such a case is taken from the detection limit given.

Attached are two tables listing flagged data by laboratory (Table 1), and listing parameters for which there was a high standard deviation (Table 2). Formerly called a high coefficient of variation, the standard deviation is generated with standardized criteria that are included with the automated flagging routine. These automated criteria have been in use since March 1988 (Study FP 27), and should provide a more accurate and consistent listing of the difficult to analyze parameters or levels. A listing of the criteria used to indicate high deviation of analysis is available on request. Your comments would be appreciated.

Provincial laboratories average number of deviations per sample was 1.4.
Federal laboratories average number of deviations per sample was 2.4.

APPENDIX I

Definitions of Types of Metals Analysis

1. HIGH LEVEL ANALYSIS

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

2. LOW LEVEL ANALYSIS

Analysis is 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, or DCP.
3. Digestion of aqueous phase and ICAP or DCP analysis.
4. Graphite tube (flameless) AAS.

Updated March 1989.

APPENDIX II

Performance Indicators

1. Flagged Results

As a first indication that analysis results are appreciably deviant from the expected value, each submitted result is tested with the 10% or 1 Standard Deviation Rule. When a result is found to deviate more than 10%, or more than 1 standard deviation when this is greater than 10%, the result is flagged with an asterisk in the data summary and tabled for that laboratory in the Flagged Data Table. Typically at low levels the 10% criteria is too small and the 1 standard deviation criteria effectively indicates deviant analytical results. As performance indicator, the flagged results indicate to laboratory heads that in-house QC procedures and the methodology concerned need to be ivestigated. Results may still be comparable.

2. Grubbs' Rejectable Results

For every parameter, each laboratory result is statistically tested to see if it is outlying. Outlying results are caused by non random causes such as a faulty calibration or incorrect transcription. These outlying results, calculated by the Grubbs' procedure,* and indicated in the data tables with an 'R', are noncomparable with the other data for that parameter.

3. A High Standard Deviation for a Parameter

Occasionally data for a difficult to analyse parameter yields a very high relative standard deviation (RSD). When a high RSD is not due to outlying results, there are noncomparable results within the data set. In such a case, the RSD for that parameter is indicated in Table 2, entitiled: High Standard Deviations.

4. High Detection Limits (HDL's)

Each laboratory determines its own detection limits according to its own requirements. When major differences in detection limits occur, an HDL is indicated for the particular laboratory in the Flagged Data Table. An HDL indicates that low level analysis may not be comparable with the analyses of other laboratories.

* reference : Frank E. Grubbs, Technometrics, 1969, p. 1.

TABLE 1: FED-PROV LABORATORIES FLAGGED DATA - STUDIES FP 37-38

LAB 2	FLAGS :	D O C	-17%		D O C	-21%		NITRATE	19%
		T N DIS	-18%		TOT P	-68%			
	HDL :	MANGNESE			ZINC				
LAB 3	FLAGS :	D I C	12%		TKN	-11%		COLOUR	-27%
		T N DIS	13%		PH	12%			
LAB 4	FLAGS :	BORON	357%		D I C	16%		TURBIDTY	184% R
		NITRATE	12%						
LAB 5	FLAGS :	D O C	13%		D I C	18%		TURBIDTY	213% R
		D O C	41%		D I C	18%			
LAB 7	FLAGS :	NITRATE	-30%	R	COLOUR	30%		NITRATE	-14%
LAB 9	FLAGS :	PTASSIUM	13%		ALUMINUM	-50%		NITRATE	-14%
	HDL :	VANADIUM			IRON			COBALT	
		NICKEL			MOLYBNUM				
LAB 10	FLAGS :	CHROMIUM	-21%	R	COBALT	-11%		CADMIUM	-17%
		AMMONIA	-31%		ALUMINUM	-75%	L	VANADIUM	75%
		IRON	-50%		COBALT	100%		BARIUM	-57%
		BORON	-87%	L	NITRATE	-12%		FLUORIDE	19%
		SULFATE	-12%						
	HDL :	TOT P			AMMONIA			TOT P	
LAB 11	FLAGS :	MANGNESE	22%		COBALT	15%		COPPER	-17%
		LEAD	24%		AMMONIA	42%		IRON	67%
		AMMONIA	4567%	R					
LAB 13	FLAGS :	AMMONIA	-48%						
	HDL :	AMMONIA							
LAB 14	FLAGS :	ALUMINUM	48%	R	MANGNESE	26%		IRON	18% R
		COPPER	33%		ZINC	27%	R	LEAD	-30%
		SULFATE	12%		ALUMINUM	-68%			
LAB 15	FLAGS :	D O C	-18%		D I C	-12%		FLUORIDE	207% R
		ALUMINUM	140%	R	LEAD	-60%		BORON	-87% L
		D O C	-25%		D I C	-20%		NITRATE	63% R
		FLUORIDE	61%	R	SILICA	-55%	R		
	HDL :	VANADIUM			IRON			COBALT	
		NICKEL			MOLYBNUM				
LAB 16	FLAGS :	ALUMINUM	30%		CHROMIUM	30%	R	MANGNESE	33%
		IRON	20%	R	COPPER	104%	R	ZINC	76% R
		STRNTIUM	47%	R	MOLYBNUM	12%		BARIUM	22% R
		LEAD	27%		SODIUM	-14%		ALUMINUM	50%
		VANADIUM	150%		CHROMIUM	43%	R	IRON	183% R
		NICKEL	50%		COPPER	75%	R	ZINC	157% R
		STRNTIUM	58%	R	MOLYBNUM	43%		CADMIUM	60% R
		LEAD	80%		CONDUCT	13%	R	D O C	-88% R
		D I C	82%	R	SODIUM	-15%		SULFATE	18%

NOTE: A VERY HIGH FREQUENCY OF FLAGGED RESULTS (OR A HIGH %) IS INDICATIVE OF POOR PERFORMANCE. ON THE OTHER HAND, LABS WITH FEW IF ANY FLAGS ARE JUDGED TO HAVE VERY GOOD PERFORMANCE.

ALSO, AN "R" FLAG INDICATES A NON COMPARABLE RESULT, THAT IS, ONE PRODUCED WITH NON RANDOM FACTORS. AN "L" FLAG INDICATES A 'LESS THAN' RESULT LOWER THAN THE COMPARATOR.

TABLE 2: HIGH STANDARD DEVIATION

PARAMETER		LEVEL
BORON	AT	.047 PPM
ALUMINUM	AT	.040 PPM
VANADIUM	AT	.004 PPM
IRON	AT	.006 PPM
LEAD	AT	.005 PPM
COLOUR	AT	40.889 PPM
BORON	AT	.076 PPM
D O C	AT	6.705 PPM

DATA SUMMARY

FEDERAL-PROVINCIAL & PRAIRIE PROVINCES QUALITY ASSURANCE PROGRAMS

STUDY NO. FP 37 PP 77 DATE: 01/01/89 DUE DATE: 28/02/89 PAGE 1

SAMPLE 1 SPIKED SAMPLE. TRACE METALS D/A. (IN 3.0% HNO3)

LAB	13009 AL TOT 5X ICP	13030 AL ?	13105 AL DIS AAS GF	13111 AL DIS ICP DA	13302 AL EXT AAS DA	13311 AL EXT ICP DA	13321 AL EXT ICP DA	13322 AL EXT DCP DA	13999 ALUMINUM COMMON	23009 V TOT 5X ICP	23011 V TOT 5X ICP	23012 V TOT 5X DCP	23111 V DIS ICP DA
1	-	0.479	-	-	-	-	-	-	0.479	0.493	-	-	-
2	-	-	-	-	0.5	-	-	-	0.5	-	-	-	-
3	-	-	-	-	0.495	-	0.530	-	0.495	-	-	-	-
6	0.49	-	-	-	-	-	-	-	0.49	-	0.49	-	-
8	-	-	-	-	0.5	-	-	-	0.5	-	-	-	-
9	-	-	-	0.50	-	-	-	-	0.50	-	-	-	0.49
10	-	-	-	0.44	-	-	-	-	0.44	-	-	-	0.465
14	-	-	0.76 R	-	-	-	-	-	0.76 R	-	-	-	-
15	-	-	-	-	-	0.47	-	-	0.47	-	-	-	-
16	-	-	-	-	-	-	-	0.67	0.67 *	-	-	0.52	-
MEAN	.4900	.4790	-	.4700	.4983	.4700	.5300	.6700	.5049	.4930	.4900	.5200	.4775
STD DEV	-	-	-	.0424	.0029	-	-	-	.0650	-	-	-	.0177
REL STD	-	-	-	9.0	.6	-	-	-	12.9	-	-	-	3.7
DES VAL	-	-	-	-	-	-	-	-	.514	-	-	-	-

LAB	23311 V EXT ICP DA	23321 V EXT ICP DA	23999 VANADIUM COMMON	24004 CR TOT AAS GF	24009 CR TOT 5X ICP	24011 CR TOT 5X ICP	24012 CR TOT 5X DCP	24111 CR DIS ICP DA	24302 CR EXT AAS DA	24311 CR EXT ICP DA	24321 CR EXT ICP DA	24999 CHROMIUM COMMON	25003 MN TOT 5X ICP
1	-	-	0.493	-	0.053	-	-	-	-	-	-	0.053	0.048
3	-	0.492	0.492	-	-	-	-	-	-	-	0.052	0.052	-
6	-	-	0.49	-	-	0.050	-	-	-	-	-	0.050	-
8	-	-	-	0.075R	-	-	-	-	-	-	-	0.075R	-
9	-	-	0.49	-	-	-	-	0.049	-	-	-	0.049	-
10	-	-	0.465	-	-	-	-	0.042R	-	-	-	0.042R	-
11	-	-	-	-	-	-	-	-	0.054	-	-	0.054	-
13	-	-	-	-	-	-	-	-	-	0.05	-	0.05	-
15	0.51	-	0.51	-	-	-	-	-	-	0.049	-	0.049	-
16	-	-	0.52	-	-	-	0.069R	-	-	-	-	0.069R	-
MEAN	.5100	.4920	.4943	-	.0530	.0500	-	.0490	.0540	.0495	.0520	.0510	.0480
STD DEV	-	-	.0174	-	-	-	-	-	-	.0007	-	.0020	-
REL STD	-	-	3.5	-	-	-	-	-	-	1.4	-	3.9	-
DES VAL	-	-	.491	-	-	-	-	-	-	-	-	.053	-

LAB	25004 MN TOT AAS DA	25011 MN TOT 5X ICP	25012 MN TOT 5X DCP	25104 MN DIS AAS DA	25111 MN DIS ICP DA	25304 MN EXT AAS DA	25311 MN EXT ICP DA	25321 MN EXT ICP DA	25999 MANGNESE COMMON	26009 FE TOT 5X ICP	26011 FE TOT 5X ICP	26012 FE TOT 5X DCP	26104 FE DIS AAS DA
1	-	-	-	-	-	-	-	-	0.048	0.254	-	-	-
2	-	-	-	-	-	0.05	-	-	0.05	-	-	-	-
3	-	-	-	-	-	0.048	-	0.047	0.048	-	-	-	-
6	-	0.044	-	-	-	-	-	-	0.044	-	0.24	-	-
8	-	-	-	-	-	-	0.04	-	0.04	-	-	-	-
9	-	-	-	-	0.048	-	-	-	0.048	-	-	-	-
10	-	-	-	-	0.044	-	-	-	0.044	-	-	-	-
11	0.056	-	-	-	-	-	-	-	0.056*	-	-	-	-
13	-	-	-	-	-	-	0.04	-	0.04	-	-	-	-
14	-	-	-	0.058	-	-	-	-	0.058*	-	-	-	0.294R
15	-	-	-	-	-	-	0.048	-	0.048	-	-	-	-
16	-	-	0.061	-	-	-	-	-	0.061*	-	-	0.300R	-
MEAN	.0560	.0440	.0610	.0580	.0460	.0490	.0427	.0470	.0488	.2540	.2400	-	-
STD DEV	-	-	-	-	.0028	.0014	.0046	-	.0067	-	-	-	-
REL STD	-	-	-	-	6.1	2.9	10.8	-	13.7	-	-	-	-
DES VAL	-	-	-	-	-	-	-	-	.046	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 37 PP 77 SAMPLE 1

LAB	26111 FE DIS ICP DA	26304 FE EXT AAS DA	26311 FE EXT ICP DA	26321 FE EXT ICP DA	26999 IRON COMMON	27001	27009 CO TOT 5X ICP	27011 CO TOT 5X ICP	27012 CO TOT 5X DCP	27111 CO DIS ICP DA	27301 CO EXT AAS DA	27311 CO EXT ICP DA	27321 CO EXT ICP DA
1	-	-	-	-	0.254	-	0.230	-	-	-	-	-	-
2	-	0.25	-	-	0.25	-	-	-	-	-	-	-	-
3	-	0.254	-	0.252	0.254	-	-	-	-	-	-	-	0.225
6	-	-	-	-	0.24	-	-	0.21	-	-	-	-	-
8	-	-	0.24	-	0.24	-	-	-	-	-	0.25	-	-
9	0.25	-	-	-	0.25	-	-	-	-	0.22	-	-	-
10	0.235	-	-	-	0.235	-	-	-	-	0.202	-	-	-
11	-	0.26	-	-	0.26	0.26	-	-	-	-	-	-	-
13	-	-	0.24	-	0.24	-	-	-	-	-	-	-	-
14	-	-	-	-	0.294R	-	-	-	-	-	-	-	-
15	-	-	0.247	-	0.247	-	-	-	-	-	-	0.228	-
16	-	-	-	-	0.300R	-	-	-	0.25	-	-	-	-
MEAN	.2425	.2547	.2423	.2520	.2470	.2600	.2300	.2100	.2500	.2110	.2500	.2280	.2250
STD DEV	.0106	.0050	.0040	-	.0080	-	-	-	-	.0127	-	-	-
REL STD	4.4	2.0	1.7	-	3.2	-	-	-	-	6.0	-	-	-
DES VAL	-	-	-	-	.250	-	-	-	-	-	-	-	-

LAB	27999 COBALT COMMON	28009 NI TOT 5X ICP	28011 NI TOT 5X ICP	28012 NI TOT 5X DCP	28111 NI DIS ICP DA	28301 NI EXT AAS DA	28311 NI EXT ICP DA	28321 NI EXT ICP DA	28999 NICKEL COMMON	29009 CU TOT 5X ICP	29011 CU TOT 5X ICP	29012 CU TOT 5X DCP	29106 CU DIS AAS DA
1	0.230	0.269	-	-	-	-	-	-	0.269	0.046	-	-	-
3	0.225	-	-	-	-	-	-	0.257	0.257	-	-	-	-
6	0.21	-	0.26	-	-	-	-	-	0.26	-	0.042	-	-
8	0.25	-	-	-	-	-	0.24	-	0.24	-	-	-	-
9	0.22	-	-	-	0.25	-	-	-	0.25	-	-	-	-
10	0.202*	-	-	-	0.247	-	-	-	0.247	-	-	-	-
11	0.26 *	-	-	-	-	0.28	-	-	0.28	-	-	-	-
13	-	-	-	-	-	-	0.27	-	0.27	-	-	-	-
14	-	-	-	-	-	-	-	-	-	-	-	-	0.061
15	0.228	-	-	-	-	-	0.27	-	0.27	-	-	-	-
16	0.25	-	-	0.29	-	-	-	-	0.29	-	-	0.094R	-
MEAN	.2306	.2690	.2600	.2900	.2485	.2800	.2600	.2570	.2633	.0460	.0420	-	.0610
STD DEV	.0194	-	-	-	.0021	-	.0173	-	.0155	-	-	-	-
REL STD	8.4	-	-	-	.9	-	6.7	-	5.9	-	-	-	-
DES VAL	.227	-	-	-	-	-	-	-	.264	-	-	-	-

LAB	29111 CU DIS ICP DA	29306 CU EXT AAS DA	29311 CU EXT ICP DA	29321 CU EXT ICP DA	29999 COPPER COMMON	30009 ZN TOT 5X ICP	30011 ZN TOT 5X ICP	30012 ZN TOT 5X DCP	30104 ZN DIS AAS DA	30111 ZN DIS ICP DA	30304 ZN EXT AAS DA	30311 ZN EXT ICP DA	30321 ZN EXT ICP DA
1	-	-	-	-	0.046	0.059	-	-	-	-	-	-	-
2	-	0.05	-	-	0.05	-	-	-	-	-	0.06	-	-
3	-	-	-	0.045	0.045	-	-	-	-	-	-	-	0.056
6	-	-	-	-	0.042	-	0.051	-	-	-	-	-	-
8	-	-	0.08 R	-	0.08 R	-	-	-	-	-	-	0.05	-
9	0.043	-	-	-	0.043	-	-	-	-	0.055	-	-	-
10	0.045	-	-	-	0.045	-	-	-	-	0.054	-	-	-
11	-	0.038	-	-	0.038*	-	-	-	-	-	0.058	-	-
13	-	-	0.04	-	0.04	-	-	-	-	-	-	0.06	-
14	-	-	-	-	0.061*	-	-	-	0.070R	-	-	-	-
15	-	-	0.047	-	0.047	-	-	-	-	-	-	0.056	-
16	-	-	-	-	0.094R	-	-	0.097R	-	-	-	-	-
MEAN	.0440	.0440	.0435	.0450	.0457	.0590	.0510	-	-	.0545	.0590	.0553	.0560
STD DEV	.0014	.0085	.0049	-	.0064	-	-	-	-	.0007	.0014	.0050	-
REL STD	3.2	19.3	11.4	-	14.0	-	-	-	-	1.3	2.4	9.1	-
DES VAL	-	-	-	-	.046	-	-	-	-	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 37 PP 77 SAMPLE 1

LAB	30999 ZINC COMMON	38011 SR TOT ICP DA	38012 SR TOT DCP DA	38111 SR DIS ICP DA	38301 SR EXT AAS DA	38311 SR EXT ICP DA	38321 SR EXT ICP DA	38999 STRNTIUM COMMON	42009 MO TOT 5X ICP	42011 MO TOT 5X ICP	42012 MO TOT 5X DCP	42111 MO DIS ICP DA	42121 MO EXT ICP DA
1	0.059	-	-	-	-	-	-	-	0.894	-	-	-	-
2	0.06	-	-	-	-	-	-	-	-	-	-	-	-
3	0.056	-	-	-	-	-	0.173	0.173	-	-	-	-	0.898
6	0.051	0.08 R	-	-	-	-	-	0.08 R	-	0.89	-	-	-
8	0.05	-	-	-	-	-	-	-	-	-	-	-	-
9	0.055	-	-	0.17	-	-	-	0.17	-	-	-	0.87	-
10	0.054	-	-	-	0.17	-	-	0.17	-	-	-	0.892	-
11	0.058	-	-	-	-	-	-	-	-	-	-	-	-
13	0.06	-	-	-	-	-	-	-	-	-	-	-	-
14	0.070R	-	-	-	-	-	-	-	-	-	-	-	-
15	0.056	-	-	-	-	0.169	-	0.169	-	-	-	-	-
16	0.097R	-	0.244R	-	-	-	-	0.244R	-	-	1.00	-	-
MEAN	.0559	-	-	.1700	.1700	.1690	.1730	.1705	.8940	.8900	1.0000	.8810	.8980
STD DEV	.0035	-	-	-	-	-	-	.0017	-	-	-	.0156	-
REL STD	6.3	-	-	-	-	-	-	1.0	-	-	-	1.8	-
DES VAL	.055	-	-	-	-	-	-	.166	-	-	-	-	-

LAB	42311 MO EXT ICP DA	42999 MOLYBNUM COMMON	48009 CD TOT 5X ICP	48011 CD TOT 5X ICP	48012 CD TOT 5X DCP	48111 CD DIS ICP DA	48301 CD EXT AAS DA	48311 CD EXT ICP DA	48321 CD EXT ICP DA	48999 CADMIUM COMMON	56009 BA TOT 5X ICP	56011 BA TOT 5X ICP	56012 BA TOT 5X DCP
1	-	0.894	0.040	-	-	-	-	-	-	0.040	0.447	-	-
2	-	-	-	-	-	-	0.04	-	-	0.04	-	-	-
3	-	0.898	-	-	-	-	-	-	0.040	0.040	-	-	-
6	-	0.89	-	0.035	-	-	-	-	-	0.035	-	0.42	-
8	-	-	-	-	-	-	0.04	-	-	0.04	-	-	-
9	-	0.87	-	-	-	0.041	-	-	-	0.041	-	-	-
10	-	0.892	-	-	-	0.034	-	-	-	0.034*	-	-	-
11	-	-	-	-	-	-	0.041	-	-	0.041	-	-	-
13	-	-	-	-	-	-	-	0.04	-	0.04	-	-	-
15	0.86	0.86	-	-	-	-	-	0.041	-	0.041	-	-	-
16	-	1.00 *	-	-	0.047	-	-	-	-	0.047	-	-	0.55 R
MEAN	.8600	.9006	.0400	.0350	.0470	.0375	.0403	.0405	.0400	.0399	.4470	.4200	-
STD DEV	-	.0460	-	-	-	.0049	.0006	.0007	-	.0034	-	-	-
REL STD	-	5.1	-	-	-	13.2	1.4	1.7	-	8.4	-	-	-
DES VAL	-	.891	-	-	-	-	-	-	-	.041	-	-	-

LAB	56111 BA DIS ICP DA	56301 BA EXT AAS DA	56311 BA EXT ICP DA	56321 BA EXT ICP DA	56999 BARIUM COMMON	82011 PB TOT 5X ICP	82012 PB TOT 5X DCP	82101 PB DIS AAS DA	82111 PB DIS ICP DA	82301 PB EXT AAS DA	82302 PB EXT AAS SE	82311 PB EXT ICP DA	82999 LEAD COMMON
1	-	-	-	-	0.447	-	-	-	-	-	0.292	-	0.292
2	-	-	-	-	-	-	-	-	-	0.28	-	-	0.28
3	-	0.478	-	0.434	0.478	-	-	-	-	-	-	0.277	0.277
6	-	-	-	-	0.42	0.26	-	-	-	-	-	-	0.26
8	-	-	-	-	-	-	-	-	-	-	-	0.30	0.30
9	0.45	-	-	-	0.45	-	-	-	0.27	-	-	-	0.27
10	0.42	-	-	-	0.42	-	-	-	0.251	-	-	-	0.251
11	-	-	-	-	-	-	-	-	-	0.34	-	-	0.34 *
13	-	-	-	-	-	-	-	-	-	-	-	0.29	0.29
14	-	-	-	-	-	-	-	0.193	-	-	-	-	0.193*
15	-	-	0.437	-	0.437	-	-	-	-	-	-	0.26	0.26
16	-	-	-	-	0.55 R	-	0.35	-	-	-	-	-	0.35 *
MEAN	.4350	.4780	.4370	.4340	.4420	.2600	.3500	.1930	.2605	.3100	.2920	.2818	.2803
STD DEV	.0212	-	-	-	.0218	-	-	-	.0134	.0424	-	.0173	.0410
REL STD	4.9	-	-	-	4.9	-	-	-	5.2	13.7	-	6.1	14.6
DES VAL	-	-	-	-	.452	-	-	-	-	-	-	-	.275

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 37 PP 77 SAMPLE 2

LAB	00110 IONIC BALANC %	00120 SUM OF CATIONS	00125 SUM OF ANIONS	02011 COLOUR APPARE	02021 COLOUR VIS COM	02023 COLOUR SPECT	02024 COL TRU SPECT	02040 COLOUR COMMON	02041 CONDUCT SPEC 25	02060 CONDUCT COMMON	02073 TURB HACH	02074 TURB NPLMTRI	02077 TURB HACH FZ
1	3.53	6.21	5.79	-	-	-	3.	3.	621.	621.	0.1	-	-
2	2.13	5.946	5.698	5. L	-	-	-	5. L	622.	622.	0.2	-	-
3	1.91	5.998	5.773	5. L	-	-	-	5. L	647.1	647.1	0.13	-	-
4	-	-	-	-	5. L	-	-	5. L	622.	622.	-	-	-
5	1.29	6.00	5.85	5. L	-	-	-	5. L	600.	600.	0.25	-	-
6	4.38	6.25	5.72	-	-	-	-	-	593.	593.	-	0.22	-
7	3.4	6.04	5.64	3.	-	-	-	3.	606.	606.	0.1	-	-
8	1.89	5.94	5.72	5. L	-	-	-	5. L	624.	624.	-	0.05	-
9	1.5	6.09	5.91	-	-	-	-	-	590.	590.	-	-	-
10	1.63	5.859	5.671	-	-	1.	-	1.	585.	585.	-	0.1	-
11	-	-	-	5. L	-	-	-	5. L	600.	600.	-	-	0.2
14	-	-	-	-	-	-	-	-	615.5	615.5	-	-	-
15	-	-	-	-	-	-	-	-	600.	600.	-	-	-
16	-	-	-	-	-	-	-	-	660.	660.	0.17	-	-
MEAN	2.4067	6.0370	5.7524	3.0000	-	1.0000	3.0000	2.3333	613.2571	613.2571	.1583	.1233	.2000
STD DEV	1.0843	.1277	.0870	-	-	-	-	1.1547	21.4712	21.4712	.0598	.0874	-
REL STD	45.1	2.1	1.5	-	-	-	-	49.5	3.5	3.5	37.8	70.8	-
DES VAL	-	-	-	-	-	-	-	2.800	-	606.436	-	-	-

LAB	02081 TURB RATIO	02090 TURBIDTY COMMON	05100 BORON ?	05105 BORON AA CARM	05106 BORON F AZOMETH	05107 BORON ICP DA	05111 BORON F ICP DA	05190 BORON COMMON	06009 TOC CO2 IR	06051 TIC COMB IR	06101 DOC IR /DIF	06104 DOC UV CO2 IR	06107 DOC UV CO2 PHE
1	-	0.1	-	-	-	0.015	-	0.015	-	-	-	-	15.5
2	-	0.2	-	-	-	-	-	-	-	-	-	-	12.1
3	-	0.13	-	-	-	-	-	-	-	-	-	14.7	-
4	0.08	0.08	-	0.215	-	-	-	0.215*	-	-	-	15.4	-
5	-	0.25	-	-	-	-	-	-	-	-	16.5	-	-
6	-	0.22	-	-	-	-	-	-	-	-	-	17.	-
7	-	0.1	-	-	-	-	-	-	-	-	-	-	-
8	-	0.05	-	-	0.05 L	-	-	0.05 L	-	-	-	-	-
10	-	0.1	-	-	-	-	0.05	0.05	-	-	-	-	-
11	-	0.2	-	-	-	-	-	-	-	-	-	-	-
15	-	-	-	-	-	0.01 L	-	0.01 L	12.0	15.5	-	-	-
16	-	0.17	0.05 L	-	-	-	-	0.05 L	-	-	-	-	-
MEAN	.0800	.1455	-	.2150	-	.0150	.0500	.0933	12.0000	15.5000	16.5000	15.7000	13.8000
STD DEV	-	.0655	-	-	-	-	-	.1068	-	-	-	1.1790	2.4042
REL STD	-	45.0	-	-	-	-	-	114.4	-	-	-	7.5	17.4
DES VAL	-	.197	-	-	-	-	-	.047	-	-	-	-	-

LAB	06109 DOC UV CO2 OH	06112 DOC PER IR	06150 D O C COMMON	06151 DIC IR COMBUST	06152 DIC UV CO2 IR	06154 DIC AA CO2 PHE	06159 DIC AA CO2 OH	06490 D I C COMMON	07010 TKN AA SAL	07015 TKN DIG BERTHEL	07016 TKN BLK AMM-SAL	07021 TKN BLK DIG BER	07090 TKN COMMON
1	-	-	15.5	-	-	18.8	-	18.8	-	-	-	0.8	0.8
2	-	-	12.1 *	-	-	-	-	-	-	-	-	-	-
3	-	-	14.7	-	19.8	-	-	19.8 *	0.725	-	-	-	0.725*
4	-	-	15.4	-	20.5	-	-	20.5 *	-	-	-	-	-
5	-	-	16.5 *	20.7	-	-	-	20.7 *	-	-	-	-	-
6	-	-	17. *	-	-	-	-	-	-	-	0.9	-	0.9
8	-	-	-	-	-	-	-	-	-	0.85	-	-	0.85
10	14.8	-	14.8	-	-	-	18.2	18.2	-	-	-	-	-
15	-	-	12.0 *	-	-	-	-	15.5 *	-	-	-	-	-
16	-	13.9	13.9	-	19.0	-	-	19.0	-	-	-	-	-
MEAN	14.8000	13.9000	14.6556	20.7000	19.7667	18.8000	18.2000	18.9286	.7250	.8500	.9000	.8000	.8188
STD DEV	-	-	1.7444	-	.7506	-	-	1.7642	-	-	-	-	.0747
REL STD	-	-	11.9	-	3.8	-	-	9.3	-	-	-	-	9.1
DES VAL	-	-	20.061	-	-	-	-	17.617	-	-	-	-	.836

LAB	07109 NO3+NO2 AA HYD	07110 NO3+NO2 AA2 CD	07111 NO3+NO2 DIS SPEC	07112 NO3+NO2 UF AA CD	07390 NITRATE COMMON	07505 NH3 TOT AA BERT	07540 NH3 TOT AA SAL	07555 NH3 DIS AA PHEN	07557 NH3 DIS AA INDO	07562 NH3 DIS AA EDTA	07590 AMMONIA COMMON	07601 T N UV AA SUL	07651 T N DIS UV AA
1	-	-	1.98	-	1.98	-	-	-	-	0.30	0.30	-	-
2	-	2.05	-	-	2.05	-	-	-	-	-	-	2.4	-
3	-	-	-	1.98	1.98	0.295	-	-	-	-	0.295	2.51	-
4	-	2.07	-	-	2.07	-	0.298	-	-	-	0.298	-	2.44
5	-	2.12	-	-	2.12	-	-	-	0.240	-	0.240	-	-
6	1.83	-	-	-	1.83	-	-	-	0.33	-	0.33	-	-
7	-	-	-	1.40 R	1.40 R	-	-	-	-	-	-	-	-
8	-	2.15	-	-	2.15	-	-	0.315	-	-	0.315	-	-
9	2.07	-	-	-	2.07	-	-	-	-	-	-	-	-
10	1.88	-	-	-	1.88	-	-	0.20	-	-	0.20 *	-	-
11	-	1.9	-	-	1.9	-	0.41	-	-	-	0.41 *	-	-
13	-	2.0	-	-	2.0	-	0.15	-	-	-	0.15 *	-	-
14	-	-	1.9	-	1.9	0.298	-	-	-	-	0.298	-	-
15	-	2.19	-	-	2.19	-	-	0.331	-	-	0.331	-	-
MEAN	1.9267	2.0686	1.9400	1.9800	2.0092	.2965	.2860	.2820	.2850	.3000	.2879	2.4550	2.4400
STD DEV	.1266	.0979	.0566	-	.1112	.0021	.1304	.0715	.0636	-	.0698	.0778	-
REL STD	6.6	4.7	2.9	-	5.5	.7	45.6	25.3	22.3	-	24.2	3.2	-
DES VAL	-	-	-	-	2.036	-	-	-	-	-	.086	-	-

LAB	07655 T N DIS UV EDTA	07790 T N DIS COMMON	09103 F DIS COL SP	09105 F DIS SP EL	09106 F DIS EL POT	09107 F DIS AUT POT	09108 F DIS SP EL	09115 F DIS AA ALIZ	09116 F DIS IC	09190 FLUORIDE COMMON	10101 ALKLNTY TITR'N	10108 ALKLNTY POT TIT	10109 ALKLNTY POT TIT
1	-	-	-	-	-	1.1	-	-	-	1.1	85.	-	-
2	-	2.4	-	-	-	-	-	-	-	-	83.1	-	-
3	-	2.51	-	-	-	-	1.09	-	-	1.09	-	-	-
4	-	2.44	-	-	-	-	-	-	-	-	83.5	-	-
5	2.30	2.30	-	-	1.05	-	-	-	-	1.05	82.5	-	-
6	-	-	1.2	-	-	-	-	-	-	1.2	-	-	82.
7	-	-	-	-	-	-	-	-	-	-	80.7	-	-
8	-	-	-	1.12	-	-	-	-	-	1.12	-	-	82.0
9	-	-	-	-	-	-	-	-	-	-	-	82.	-
10	-	-	-	-	-	-	-	1.14	-	1.14	-	-	-
11	-	-	-	1.0	-	-	-	-	-	1.0	81.	-	-
13	-	-	-	-	-	-	-	-	-	-	81.	-	-
14	-	-	-	-	-	-	-	-	-	-	85.8	-	-
15	-	-	-	3.4 R	-	-	-	-	-	3.4 R	86.2	-	-
16	-	-	-	-	-	-	-	-	1.11	1.11	85.	-	-
MEAN	2.3000	2.4125	1.2000	1.0600	1.0500	1.1000	1.0900	1.1400	1.1100	1.1013	83.3800	82.0000	82.0000
STD DEV	-	.0877	-	.0849	-	-	-	-	-	.0594	2.0666	-	.0000
REL STD	-	3.6	-	8.0	-	-	-	-	-	5.4	2.5	-	-1.0
DES VAL	-	2.419	-	-	-	-	-	-	-	1.109	-	-	-

LAB	10111 ALKLNTY TIT PRO	10112 ALKLNTY TIT CON	10190 ALKLINTY COMMON	10301 PH	10390 PH COMMON	10602 HARDNSS CALC'D	10603 HARDNSS TITR'N	10645 HARDNSS ?	10690 HARDNESS COMMON	11001 NA TOT AAS	11005 NA TOT ICP	11007 NA DIS DCP	11102 NA F AAS
1	-	-	85.	7.83	7.83	208.3	-	-	208.3	-	-	-	-
2	-	-	83.1	7.7	7.7	191.0	-	-	191.0	-	-	-	-
3	85.6	-	85.6	8.42	8.42	196.	-	-	196.	-	-	-	-
4	-	-	83.5	8.28	8.28	-	-	-	-	-	-	-	-
5	-	-	82.5	8.10	8.10	-	-	-	-	-	-	-	-
6	-	-	82.	8.1	8.1	-	207.	-	207.	-	-	-	39.
7	-	-	80.7	8.1	8.1	-	200.6	-	200.6	-	-	-	-
8	-	-	82.0	7.95	7.95	199.	-	-	199.	-	-	-	-
9	-	-	82.	7.8	7.8	-	-	195.	195.	-	39.	-	-
10	-	83.	83.	7.98	7.98	-	-	-	-	-	34.7	-	-
11	-	-	81.	7.9	7.9	200.	-	-	200.	-	-	-	35.
13	-	-	81.	7.8	7.8	204.0	-	-	204.0	-	-	-	-
14	-	-	85.8	7.93	7.93	181.8	-	-	181.8	36.4	-	-	-
15	-	-	86.2	8.3	8.3	203.	-	-	203.	-	-	-	-
16	-	-	85.	7.86	7.86	190.	-	-	190.	-	-	32.7	-
MEAN	85.6000	83.0000	83.2267	8.0033	8.0033	197.0111	203.8000	195.0000	197.9750	36.4000	36.8500	32.7000	37.0000
STD DEV	-	-	1.8683	.2089	.2089	8.2366	4.5255	-	7.6769	-	3.0406	-	2.8284
REL STD	-	-	2.2	2.6	2.6	4.2	2.2	-	3.9	-	8.3	-	7.6
DES VAL	-	-	79.125	-	7.793	-	-	-	199.682	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 37 PP 77 SAMPLE 2

LAB	11103 NA DIS FL PH	11105 NA DIS AAS DA	11107 NA UF FL PH	11111 NA DIS ICP	11311 NA EXT ICP	11990 SODIUM COMMON	12005 MG TOT ICP	12012 MG TOT DCP	12101 MG DIS CALC'D	12102 MG DIS AAS DA	12105	12106 MG UF AAS DA	12107 MG DIS AAS AUT
1	38.	-	-	-	-	38.	-	-	-	-	34.4	-	-
2	38.9	-	-	-	-	38.9	-	-	-	-	-	-	30.5
3	-	-	37.8	-	-	37.8	-	-	-	-	-	31.6	-
5	37.5	-	-	-	-	37.5	-	-	-	31.7	-	-	-
6	-	-	-	-	-	39.	-	-	33.	-	-	-	-
7	-	39.0	-	-	-	39.0	-	-	-	31.2	-	-	-
8	-	-	-	-	36.1	36.1	-	-	-	-	-	-	-
9	-	-	-	-	-	39.	32.	-	-	-	-	-	-
10	-	-	-	-	-	34.7	31.6	-	-	-	-	-	-
11	-	-	-	-	-	35.	-	-	-	32.	-	-	-
13	-	-	-	39.0	-	39.0	-	-	-	-	-	-	-
14	-	-	-	-	-	36.4	-	-	-	28.4	-	-	-
15	-	-	-	38.3	-	38.3	-	-	-	-	-	-	-
16	-	-	-	-	-	32.7 *	-	31.3	-	-	-	-	-
MEAN	38.1333	39.0000	37.8000	38.6500	36.1000	37.2429	31.8000	31.3000	33.0000	30.8250	34.4000	31.6000	30.5000
STD DEV	.7095	-	-	.4950	-	1.9868	.2828	-	-	1.6500	-	-	-
REL STD	1.9	-	-	1.3	-	5.3	.9	-	-	5.4	-	-	-
DES VAL	-	-	-	-	-	37.806	-	-	-	-	-	-	-

LAB	12111 MG DIS ICP	12311 MG EXT ICP	12990 MGNESIUM COMMON	14105 SILICA MOLY AA	14106 SILICA MOLY	14107 SILICA MOLY AA	14111 SILICA ICP DA	14112 SILICA DCP DA	14190 SILICA COMMON	15313 T P ACL AA SNCL	15401 T P UV AA ASC	15406 T P UF AA ASC	15409 T P BLK AA ASC
1	-	-	34.4	-	-	1.	-	-	1.	-	-	-	-
2	-	-	30.5	-	-	-	-	-	-	-	-	-	-
3	-	-	31.6	-	1.13	-	-	-	1.13	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-	-	0.003L	-
5	-	-	31.7	1.1	-	-	-	-	1.1	-	-	-	-
6	-	-	33.	-	-	-	-	-	-	-	-	-	0.03 R
7	-	-	31.2	-	-	-	-	-	-	-	-	-	-
8	-	32.0	32.0	1.0	-	-	-	-	1.0	-	-	-	-
9	-	-	32.	-	-	-	1.18	-	1.18	-	-	-	-
10	-	-	31.6	1.15	-	-	-	-	1.15	-	0.010L	-	-
11	-	-	32.	1.2	-	-	-	-	1.2	0.005L	-	-	-
13	32.3	-	32.3	-	-	-	-	-	-	-	-	0.003	-
14	-	-	28.4	-	-	-	-	-	-	-	-	-	-
15	32.3	-	32.3	-	-	-	1.02	-	1.02	-	-	0.002L	-
16	-	-	31.3	-	-	-	-	1.13	1.13	-	-	-	-
MEAN	32.3000	32.0000	31.7357	1.1125	1.1300	1.0000	1.1000	1.1300	1.1011	-	-	.0030	-
STD DEV	.0000	-	1.3218	.0854	-	-	.1131	-	.0767	-	-	-	-
REL STD	-1.0	-	4.2	7.7	-	-	10.3	-	7.0	-	-	-	-
DES VAL	-	-	31.633	-	-	-	-	-	1.118	-	-	-	-

LAB	15413 T P ACL AA SNCL	15421 T P BLK DIG ASC	15490 TOT P COMMON	16304 SO4 DIS AUTO BA	16306 SO4 DIS AA MTB	16307 SO4 UF AA MTB	16309 SO4 DIS I C	16310 SO4 DIS AA CALM	16311 SO4 DIS IC	16990 SULFATE COMMON	17203 CL DIS AA FE	17204 CL DIS AG TIT	17206 CL DIS AA HG
1	-	0.003	0.003	-	112.	-	-	-	-	112.	-	-	55.2
2	0.001L	-	0.001L	111.	-	-	115.	-	-	115.	-	-	-
3	0.002	-	0.002	-	-	109.	-	-	-	109.	-	-	55.7
4	-	-	0.003L	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	114.	-	-	-	-	114.	-	-	57.5
6	-	-	0.03 R	114.	-	-	-	-	-	114.	-	56.	-
7	-	-	-	-	114.0	-	-	-	-	114.0	55.2	-	-
8	0.005	-	0.005	-	110.	-	-	-	-	110.	-	-	58.
9	-	-	-	-	-	-	121.	-	-	121.	-	-	-
10	-	-	0.010L	-	-	-	-	105.	-	105.	-	-	-
11	-	-	0.005L	-	120.	-	-	-	-	120.	-	-	53.
13	-	-	0.003	-	115.0	-	-	-	-	115.0	-	-	58.0
14	-	-	-	-	-	-	125.5	-	-	125.5*	-	-	-
15	-	-	0.002L	-	-	-	-	-	-	-	-	-	55.3
16	-	-	-	-	-	-	-	-	123.	123.	-	-	-
MEAN	.0035	.0030	.0033	112.5000	114.1667	109.0000	120.5000	105.0000	123.0000	115.1923	55.2000	56.0000	56.1000
STD DEV	.0021	-	.0013	2.1213	3.3714	-	5.2678	-	-	5.8293	-	-	1.8439
REL STD	60.6	-	38.7	1.9	3.0	-	4.4	-	-	5.1	-	-	3.3
DES VAL	-	-	.003	-	-	-	-	-	-	111.898	-	-	-

LAB	17209 CL DIS I C	17210 CL DIS TIT CON	17211 CL DIS IC	17990 CHLORIDE COMMON	19001 K TOT AAS	19005 K TOT ICP	19008 K TOT DCP	19102 K DIS AAS	19103 K DIS FLM PH	19105 K DIS AAS DA	19106 K DIS AAS LI	19107 K DIS FLM PH	19111 K DIS ICP
1	-	-	-	55.2	-	-	-	-	15.5	-	-	-	-
2	56.	-	-	56.	-	-	-	-	17.1	-	-	-	-
3	-	-	-	55.7	-	-	-	-	-	-	-	15.9	-
5	-	-	-	57.5	-	-	-	-	16.3	-	-	-	-
6	-	-	-	56.	-	-	-	16.	-	-	-	-	-
7	-	-	-	55.2	-	-	-	16.5	-	-	-	-	-
8	-	-	-	58.	-	-	-	-	-	-	-	-	-
9	57.	-	-	57.	-	18.	-	-	-	-	-	-	-
10	-	60.	-	60.	-	16.2	-	-	-	-	-	-	-
11	-	-	-	53.	-	-	-	-	-	-	16.	-	-
13	-	-	-	58.0	-	-	-	-	-	-	-	-	16.4
14	53.3	-	-	53.3	15.5	-	-	-	-	-	-	-	-
15	-	-	-	55.3	-	-	-	-	-	15.9	-	-	-
16	-	-	58.	58.	-	-	14.5	-	-	-	-	-	-
MEAN	55.4333	60.0000	58.0000	56.3000	15.5000	17.1000	14.5000	16.2500	16.3000	15.9000	16.0000	15.9000	16.4000
STD DEV	1.9140	-	-	1.9243	-	1.2728	-	.3536	.8000	-	-	-	-
REL STD	3.5	-	-	3.4	-	7.4	-	2.2	4.9	-	-	-	-
DES VAL	-	-	-	56.872	-	-	-	-	-	-	-	-	-

LAB	19301 K EXT HNO3 AA	19990 PTASSIUM COMMON	20005 CA TOT ICP	20007 CA TOT DCP	20050 CA DIS AAS NO	20100 CA DIS CALC'D	20103 CA DIS AAS	20107	20108 CA DIS AAS UF	20110 CA DIS AAS AUT	20111 CA DIS ICP	20311 CA EXT ICP	20990 CALCIUM COMMON
1	-	15.5	-	-	-	-	-	26.7	-	-	-	-	26.7
2	-	17.1	-	-	-	-	-	-	-	26.2	-	-	26.2
3	-	15.9	-	-	-	-	-	-	26.9	-	-	-	26.9
5	-	16.3	-	-	-	-	27.0	-	-	-	-	-	27.0
6	-	16.	-	-	-	28.	-	-	-	-	-	-	28.
7	-	16.5	-	-	-	-	27.2	-	-	-	-	-	27.2
8	15.5	15.5	-	-	-	-	-	-	-	-	-	26.9	26.9
9	-	18. *	26.	-	-	-	-	-	-	-	-	-	26.
10	-	16.2	26.5	-	-	-	-	-	-	-	-	-	26.5
11	-	16.	-	-	-	-	26.	-	-	-	-	-	26.
13	-	16.4	-	-	-	-	-	-	-	-	27.5	-	27.5
14	-	15.5	-	-	26.1	-	-	-	-	-	-	-	26.1
15	-	15.9	-	-	-	-	-	-	-	-	28.	-	28.
16	-	14.5	-	26.8	-	-	-	-	-	-	-	-	26.8
MEAN	15.5000	16.0929	26.2500	26.8000	26.1000	28.0000	26.7333	26.7000	26.9000	26.2000	27.7500	26.9000	26.8429
STD DEV	-	.8157	.3536	-	-	-	.6429	-	-	-	.3536	-	.6676
REL STD	-	5.1	1.3	-	-	-	2.4	-	-	-	1.3	-	2.5
DES VAL	-	15.920	-	-	-	-	-	-	-	-	-	-	26.567

DATA SUMMARY

FEDERAL-PROVINCIAL & PRAIRIE PROVINCES QUALITY ASSURANCE PROGRAMS

STUDY NO. FP 38 PP 78 DATE: 01/02/89 DUE DATE: 28/02/89

SAMPLE 3 SPIKED SAMPLE. TRACE METALS S/E. (IN 0.2% HNO3)

LAB	13009 AL TOT 5X ICP	13030	13105 AL DIS AAS GF	13111 AL DIS ICP DA	13302 AL EXT AAS DA	13305 AL EXT AAS SE	13311 AL EXT ICP DA	13322 AL EXT DCP DA	13999 ALUMINUM COMMON	23000	23002 V TOT AAS SE	23009 V TOT 5X ICP	23011 V TOT 5X ICP
1	-	0.044	-	-	-	-	-	-	0.044	-	-	0.005	-
2	-	-	-	-	-	0.033	-	-	0.033	-	-	-	-
3	0.041	-	-	-	-	0.039	-	-	0.039	-	0.005	0.004	-
6	0.040	-	-	-	-	-	-	-	0.040	-	-	-	0.01 L
8	-	-	-	-	0.2 L	-	-	-	0.2 L	-	-	-	-
9	-	-	-	0.02	-	-	-	-	0.02 *	-	-	-	-
10	-	-	-	0.01 L	-	-	-	-	0.01 *	-	-	-	-
14	-	-	0.013	-	-	-	-	-	0.013*	0.004	-	-	-
15	-	-	-	-	-	-	0.096R	-	0.096R	-	-	-	-
16	-	-	-	-	-	-	-	0.060	0.060*	-	-	-	-
MEAN	.0405	.0440	.0130	.0200	-	.0360	-	.0600	.0356	.0040	.0050	.0045	-
STD DEV	.0007	-	-	-	-	.0042	-	-	.0156	-	-	.0007	-
REL STD	1.7	-	-	-	-	11.8	-	-	43.8	-	-	15.7	-
DES VAL	-	-	-	-	-	-	-	-	.040	-	-	-	-

LAB	23012 V TOT 5X DCP	23111 V DIS ICP DA	23311 V EXT ICP DA	23999 VANADIUM COMMON	24003 CR TOT AAS SE	24004 CR TOT AAS GF	24009 CR TOT 5X ICP	24011 CR TOT 5X ICP	24012 CR TOT 5X DCP	24111 CR DIS ICP DA	24303 CR EXT AAS SE	24999 CHROMIUM COMMON	25003 MN TOT 5X ICP
1	-	-	-	0.005	-	-	0.007	-	-	-	-	0.007	0.006
3	-	-	-	0.005	0.006	-	0.006	-	-	-	-	0.006	-
6	-	-	-	0.01 L	-	-	-	0.008	-	-	-	0.008	-
8	-	-	-	-	-	0.007	-	-	-	-	-	0.007	-
9	-	0.01 L	-	0.01 L	-	0.006	-	-	-	-	-	0.006	-
10	-	0.007	-	0.007*	-	-	-	-	-	0.007	-	0.007	-
11	-	-	-	-	-	-	-	-	-	-	0.007	0.007	-
14	-	-	-	0.004	-	-	-	-	-	-	-	-	-
15	-	-	0.01 L	0.01 L	-	-	-	0.008	-	-	-	0.008	-
16	0.010	-	-	0.010*	-	-	-	-	0.010R	-	-	0.010R	-
MEAN	.0100	.0070	-	.0062	.0060	.0065	.0065	.0080	-	.0070	.0070	.0070	.0060
STD DEV	-	-	-	.0024	-	.0007	.0007	.0000	-	-	-	.0008	-
REL STD	-	-	-	38.5	-	10.9	10.9	-1.0	-	-	-	10.8	-
DES VAL	-	-	-	.004	-	-	-	-	-	-	-	.007	-

LAB	25004 MN TOT AAS DA	25010 MN TOT 5X ICP	25011 MN TOT 5X ICP	25012 MN TOT 5X DCP	25111 MN DIS ICP DA	25304 MN EXT AAS DA	25311 MN EXT ICP DA	25999 MANGNESE COMMON	26005 FE TOT AAS SE	26009 FE TOT 5X ICP	26011 FE TOT 5X ICP	26012 FE TOT 5X DCP	26107 FE DIS AAS GF
1	-	-	-	-	-	-	-	0.006	-	0.007	-	-	-
2	-	-	-	-	-	0.01 L	-	0.01 L	-	-	-	-	-
3	0.006	0.006	-	-	-	-	-	0.006	0.007	0.007	-	-	-
6	-	-	0.006	-	-	-	-	0.006	-	-	0.010	-	-
8	-	-	-	-	-	-	0.02 L	0.02 L	-	-	-	-	-
9	-	-	-	-	0.006	-	-	0.006	-	-	-	-	-
10	-	-	-	-	0.006	-	-	0.006	-	-	-	-	-
11	0.006	-	-	-	-	-	-	0.006	-	-	-	-	-
14	-	-	-	-	-	-	-	-	-	-	-	-	0.004
15	-	-	-	-	-	-	0.006	0.006	-	-	0.005L	-	-
16	-	-	-	0.010R	-	-	-	0.010R	-	-	-	0.017R	-
MEAN	.0060	.0060	.0060	-	.0060	-	.0060	.0060	.0070	.0070	.0100	-	.0040
STD DEV	.0000	-	-	-	.0000	-	-	.0000	-	.0000	-	-	-
REL STD	-1.0	-	-	-	-1.0	-	-	-1.0	-	-1.0	-	-	-
DES VAL	-	-	-	-	-	-	-	.006	-	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 38 PP 78 SAMPLE 3

LAB	26111 FE DIS ICP DA	26305 FE EXT AAS SE	26311 FE EXT ICP DA	26999 IRON COMMON	27002 CO TOT AAS SE	27003 CO TOT AAS GF	27009 CO TOT 5X ICP	27011 CO TOT 5X ICP	27012 CO TOT 5X DCP	27111 CO DIS ICP DA	27999 COBALT COMMON	28002 NI TOT AAS SE	28009 NI TOT 5X ICP
1	-	-	-	0.007	-	-	0.005	-	-	-	0.005	-	0.007
2	-	0.006	-	0.006	-	-	-	-	-	-	-	-	-
3	-	-	-	0.007	0.005	-	-	-	-	-	0.005	0.007	0.007
6	-	-	-	0.010*	-	-	-	0.008	-	-	0.008*	-	-
8	-	-	0.02 L	0.02 L	-	0.006	-	-	-	-	0.006	-	-
9	0.01 L	-	-	0.01 L	-	-	-	-	-	0.01 L	0.01 L	-	-
10	0.003	-	-	0.003*	-	-	-	-	-	0.010	0.010*	-	-
11	-	0.010	-	0.010*	0.006	-	-	-	-	-	0.006	-	-
14	-	-	-	0.004	-	-	-	-	-	-	-	-	-
15	-	-	-	0.005L	-	-	-	0.005L	-	-	0.005L	-	-
16	-	-	-	0.017R	-	-	-	-	0.007	-	0.007	-	-
MEAN	.0030	.0080	-	.0067	.0055	.0060	.0050	.0080	.0070	.0100	.0067	.0070	.0070
STD DEV	-	.0028	-	.0027	.0007	-	-	-	-	-	.0018	-	.0000
REL STD	-	35.4	-	40.1	12.9	-	-	-	-	-	26.8	-	-1.0
DES VAL	-	-	-	.006	-	-	-	-	-	-	.005	-	-

LAB	28011 NI TOT 5X ICP	28012 NI TOT 5X DCP	28111 NI DIS ICP DA	28302 NI EXT AAS SE	28309 NI EXT AAS GF	28999 NICKEL COMMON	29005 CU TOT AAS SE	29009 CU TOT 5X ICP	29011 CU TOT 5X ICP	29012 CU TOT 5X DCP	29107 CU DIS AAS GF	29111 CU DIS ICP DA	29305 CU EXT AAS SE
1	-	-	-	-	-	0.007	-	0.008	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-	0.008
3	-	-	-	-	-	0.007	0.006	0.007	-	-	-	-	-
6	0.006	-	-	-	-	0.006	-	-	0.008	-	-	-	-
8	-	-	-	-	0.006	0.006	-	-	-	-	-	-	-
9	-	-	0.01 L	-	-	0.01 L	-	-	-	-	-	0.008	-
10	-	-	0.008	-	-	0.008	-	-	-	-	-	0.009	-
11	-	-	-	0.006	-	0.006	-	-	-	-	-	-	0.008
14	-	-	-	-	-	-	-	-	-	-	0.007	-	-
15	0.02 L	-	-	-	-	0.02 L	-	-	-	-	-	-	-
16	-	0.009	-	-	-	0.009*	-	-	-	0.014R	-	-	-
MEAN	.0060	.0090	.0080	.0060	.0060	.0070	.0060	.0075	.0080	-	.0070	.0085	.0080
STD DEV	-	-	-	-	-	.0012	-	.0007	-	-	-	.0007	.0000
REL STD	-	-	-	-	-	16.5	-	9.4	-	-	-	8.3	-1.0
DES VAL	-	-	-	-	-	.006	-	-	-	-	-	-	-

LAB	29308 CU EXT AAS GF	29311 CU EXT ICP DA	29999 COPPER COMMON	30005 ZN TOT AAS SE	30009 ZN TOT 5X ICP	30011 ZN TOT 5X ICP	30012 ZN TOT 5X DCP	30111 ZN DIS ICP DA	30304 ZN EXT AAS DA	30305 ZN EXT AAS SE	30311 ZN EXT ICP DA	30999 ZINC COMMON	38009 SR TOT ICP DA
1	-	-	0.008	-	0.007	-	-	-	-	-	-	0.007	-
2	-	-	0.008	-	-	-	-	-	0.01 L	-	-	0.01 L	-
3	-	-	0.006	0.007	0.007	-	-	-	-	-	-	0.007	0.167
6	-	-	0.008	-	-	0.010	-	-	-	-	-	0.010*	-
8	-	0.01	0.01	-	-	-	-	-	-	-	0.01 L	0.01 L	-
9	-	-	0.008	-	-	-	-	0.008	-	-	-	0.008	-
10	-	-	0.009	-	-	-	-	0.008	-	-	-	0.008	-
11	-	-	0.008	-	-	-	-	-	-	0.008	-	0.008	-
14	-	-	0.007	-	-	-	-	-	-	-	-	-	-
15	0.007	-	0.007	-	-	-	-	-	-	-	0.009	0.009	-
16	-	-	0.014R	-	-	-	0.018R	-	-	-	-	0.018R	-
MEAN	.0070	.0100	.0079	.0070	.0070	.0100	-	.0080	-	.0080	.0090	.0081	.1670
STD DEV	-	-	.0011	-	.0000	-	-	.0000	-	-	-	.0011	-
REL STD	-	-	13.9	-	-1.0	-	-	-1.0	-	-	-	13.1	-
DES VAL	-	-	.008	-	-	-	-	-	-	-	-	.007	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 38 PP 78 SAMPLE 3

LAB	38011 SR TOT ICP DA	38012 SR TOT DCP DA	38111 SR DIS ICP DA	38301 SR EXT AAS DA	38999 STRNTIUM COMMON	42009 MO TOT 5X ICP	42011 MO TOT 5X ICP	42012 MO TOT 5X DCP	42111 MO DIS ICP DA	42311 MO EXT ICP DA	42999 MOLYBNUM COMMON	48002 CD TOT AAS SE	48004
1	-	-	-	-	-	0.007	-	-	-	-	0.007	-	-
3	-	-	-	-	0.167	0.006	-	-	-	-	0.006	0.005	-
6	0.06 R	-	-	-	0.06 R	-	0.009	-	-	-	0.009	-	-
9	-	-	0.18	-	0.18	-	-	-	0.01 L	-	0.01 L	-	0.005
10	-	-	-	0.18	0.18	-	-	-	0.007	-	0.007	-	-
15	0.178	-	-	-	0.178	-	-	-	-	0.01 L	0.01 L	-	-
16	-	0.266R	-	-	0.266R	-	-	0.010	-	-	0.010*	-	-
MEAN	.1780	-	.1800	.1800	.1763	.0065	.0090	.0100	.0070	-	.0078	.0050	.0050
STD DEV	-	-	-	-	.0062	.0007	-	-	-	-	.0016	-	-
REL STD	-	-	-	-	3.5	10.9	-	-	-	-	21.1	-	-
DES VAL	-	-	-	-	.168	-	-	-	-	-	.007	-	-

LAB	48009 CD TOT 5X ICP	48011 CD TOT 5X ICP	48012 CD TOT 5X DCP	48103 CD DIS AAS GF	48111 CD DIS ICP DA	48302 CD EXT AAS SE	48309 CD EXT AAS GF	48999 CADMIUM COMMON	56009 BA TOT 5X ICP	56011 BA TOT 5X ICP	56012 BA TOT 5X DCP	56111 BA DIS ICP DA	56311 BA EXT ICP DA
1	0.005	-	-	-	-	-	-	0.005	0.026	-	-	-	-
2	-	-	-	-	-	0.005	-	0.005	-	-	-	-	-
3	0.005	-	-	-	-	-	-	0.005	0.020	-	-	-	-
6	-	0.006	-	-	-	-	-	0.006	-	0.025	-	-	-
8	-	-	-	-	-	-	0.005	0.005	-	-	-	-	-
9	-	-	-	-	-	-	-	0.005	-	-	-	0.024	-
10	-	-	-	-	0.005	-	-	0.005	-	-	-	0.01	-
11	-	-	-	-	-	0.005	-	0.005	-	-	-	-	-
14	-	-	-	0.005	-	-	-	0.005	-	-	-	-	-
15	-	-	-	-	-	-	0.003	0.003	-	-	-	-	0.024
16	-	-	0.008R	-	-	-	-	0.008R	-	-	0.032	-	-
MEAN	.0050	.0060	-	.0050	.0050	.0050	.0040	.0049	.0230	.0250	.0320	.0170	.0240
STD DEV	.0000	-	-	-	-	.0000	.0014	.0007	.0042	-	-	.0099	-
REL STD	-1.0	-	-	-	-	-1.0	35.4	15.1	18.4	-	-	58.2	-
DES VAL	-	-	-	-	-	-	-	.005	-	-	-	-	-

LAB	56999 BARIUM COMMON	82002 PB TOT AAS SE	82004 PB TOT AAS GF	82009 PB TOT 5X ICP	82011 PB TOT 5X ICP	82012 PB TOT 5X DCP	82104 PB DIS AAS GF	82302 PB EXT AAS SE	82309 PB EXT AAS GF	82999 LEAD COMMON
1	0.026	-	-	0.006	-	-	-	-	-	0.006
2	-	-	-	-	-	-	-	0.005	-	0.005
3	0.020	0.005	-	0.005	-	-	-	-	-	0.005
6	0.025	-	-	-	0.008	-	-	-	-	0.008*
8	-	-	-	-	-	-	-	-	0.006	0.006
9	0.024	-	0.005	-	-	-	-	-	-	0.005
10	0.01 *	-	-	-	-	-	-	-	0.007	0.007
11	-	-	-	-	-	-	-	0.005	-	0.005
14	-	-	-	-	-	-	0.004	-	-	0.004
15	0.024	-	-	-	-	-	-	-	0.002	0.002*
16	0.032	-	-	-	-	0.009	-	-	-	0.009*
MEAN	.0230	.0050	.0050	.0055	.0080	.0090	.0040	.0050	.0050	.0056
STD DEV	.0068	-	-	.0007	-	-	-	.0000	.0026	.0019
REL STD	29.4	-	-	12.9	-	-	-	-1.0	52.9	33.9
DES VAL	.023	-	-	-	-	-	-	-	-	.005

LAB	00110 IONIC BALANC %	00120 SUM OF CATIONS	00125 SUM OF ANIONS	02011 COLOUR APPARE	02021 COLOUR VIS COM	02023 COLOUR SPECT	02024 COL TRU SPECT	02040 COLOUR COMMON	02041 CONDUCT SPEC 25	02060 CONDUCT COMMON	02073 TURB HACH	02074 TURB NPLMTRI	02077 TURB HACH FZ
1	1.60	1.56	1.51	-	-	-	54.	54. *	178.	178.	0.2	-	-
2	-1.7	1.613	1.668	35.	-	-	-	35.	176.	176.	0.2	-	-
3	0.17	1.620	1.615	30.	-	-	-	30. *	176.2	176.2	0.25	-	-
4	-	-	-	-	45.	-	-	45.	177.	177.	-	-	-
5	0.70	1.60	1.58	40.	-	-	-	40.	171.	171.	0.65 R	-	-
6	0.34	1.68	1.66	-	-	-	-	-	168.	168.	-	0.39	-
7	1.3	1.56	1.52	53.	-	-	-	53. *	174.	174.	0.2	-	-
8	22.86	1.64	1.04	-	-	-	-	-	177.	177.	-	0.12	-
9	5.2	1.71	1.54	-	-	-	-	-	170.	170.	-	-	-
10	2.95	1.590	1.499	-	-	31.	-	31.	170.	170.	-	0.2	-
11	-	-	-	40.	-	-	-	40.	165.	165.	-	-	0.2
14	-	-	-	-	-	-	-	-	176.	176.	-	-	-
15	2.02	0.564	0.542	40.	-	-	-	40.	175.	175.	-	0.1	-
16	-	-	-	-	-	-	-	-	192. R	192. R	0.22	-	-
MEAN	3.5440	1.5137	1.4174	39.6667	45.0000	31.0000	54.0000	40.8889	173.3231	173.3231	.2140	.2025	.2000
STD DEV	7.0283	.3371	.3554	7.6594	-	-	-	8.5797	4.0813	4.0813	.0219	.1323	-
REL STD	198.3	22.3	25.1	19.3	-	-	-	21.0	2.4	2.4	10.2	65.3	-
DES VAL	-	-	-	-	-	-	-	41.793	-	170.451	-	-	-

LAB	02081 TURB RATIO	02090 TURBIDTY COMMON	05100 BORON ?	05105 BORON AA CARM	05106 BORON F AZOMETH	05107 BORON ICP DA	05111 BORON F ICP DA	05190 BORON COMMON	06009 TOC CO2 IR	06051 TIC COMB IR	06101 DOC IR /DIF	06104 DOC UV CO2 IR	06107 DOC UV CO2 PHE
1	-	0.2	-	-	-	0.004	-	0.004*	-	-	-	-	6.71
2	-	0.2	-	-	-	-	-	-	-	-	-	-	5.3
3	-	0.25	-	-	-	-	-	-	-	-	-	6.8	-
4	0.59 R	0.59 R	-	0.122	-	-	-	0.122	-	-	-	7.05	-
5	-	0.65 R	-	-	-	-	-	-	-	-	9.48	-	-
6	-	0.39	-	-	-	-	-	-	-	-	-	7.1	-
7	-	0.2	-	-	-	-	-	-	-	-	-	-	-
8	-	0.12	-	-	0.10	-	-	0.10	-	-	-	-	-
10	-	0.2	-	-	-	-	0.01 L	0.01 *	-	-	-	-	-
11	-	0.2	-	-	-	-	-	-	-	-	-	-	-
15	-	0.1	-	-	-	0.01 L	-	0.01 *	5.0	5.5	-	-	-
16	-	0.22	0.05 L	-	-	-	-	0.05 L	-	-	-	-	-
MEAN	-	.2080	-	.1220	.1000	.0040	-	.0753	5.0000	5.5000	9.4800	6.9833	6.0050
STD DEV	-	.0780	-	-	-	-	-	.0627	-	-	-	.1607	.9970
REL STD	-	37.5	-	-	-	-	-	83.3	-	-	-	2.3	16.6
DES VAL	-	.249	-	-	-	-	-	.076	-	-	-	-	-

LAB	06109 DOC UV CO2 OH	06112 DOC PER IR	06150 D O C COMMON	06151 DIC IR COMBUST	06152 DIC UV CO2 IR	06154 DIC AA CO2 PHE	06159 DIC AA CO2 OH	06490 D I C COMMON	07010 TKN AA SAL	07015 TKN DIG BERTHEL	07016 TKN BLK AMM-SAL	07021 TKN BLK DIG BER	07090 TKN COMMON
1	-	-	6.71	-	-	7.13	-	7.13	-	-	-	0.25	0.25
2	-	-	5.3 *	-	-	-	-	-	-	-	-	-	-
3	-	-	6.8	-	7.0	-	-	7.0	0.247	-	-	-	0.247
4	-	-	7.05	-	7.32	-	-	7.32	-	-	-	-	-
5	-	-	9.48 *	8.09	-	-	-	8.09 *	-	-	-	-	-
6	-	-	7.1	-	-	-	-	-	-	-	0.4 R	-	0.4 R
8	-	-	-	-	-	-	-	-	-	0.20	-	-	0.20 *
10	6.2	-	6.2	-	-	-	6.8	6.8	-	-	-	-	-
15	-	-	5.0 *	-	-	-	-	5.5 *	-	-	-	-	-
16	-	0.80 R	0.80 R	-	12.5 R	-	-	12.5 R	-	-	-	-	-
MEAN	6.2000	-	6.7050	8.0900	7.1600	7.1300	6.8000	6.9733	.2470	.2000	-	.2500	.2323
STD DEV	-	-	1.3691	-	.2263	-	-	.8477	-	-	-	-	.0280
REL STD	-	-	20.4	-	3.2	-	-	12.2	-	-	-	-	12.1
DES VAL	-	-	7.325	-	-	-	-	6.856	-	-	-	-	.246

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

LAB	07109 NO3+NO2 AA HYD	07110 NO3+NO2 AA2 CD	07111 NO3+NO2 DIS SPEC	07112 NO3+NO2 UF AA CD	07390 NITRATE COMMON	07505 NH3 TOT AA BERT	07540 NH3 TOT AA SAL	07555 NH3 DIS AA PHEN	07557 NH3 DIS AA INDO	07562 NH3 DIS AA EDTA	07590 AMMONIA COMMON	07601 T N UV AA SUL	07605 T N UV HY SUL
1	-	-	0.22	-	0.22	-	-	-	-	0.004	0.004	-	-
2	-	0.25	-	-	0.25 *	-	-	-	-	-	-	0.30	-
3	-	-	-	0.212	0.212	0.005L	-	-	-	-	0.005L	0.411	-
4	-	0.235	-	-	0.235*	-	0.005L	-	-	-	0.005L	-	-
5	-	0.230	-	-	0.230	-	-	-	0.002L	-	0.002L	-	-
6	0.24	-	-	-	0.24 *	-	-	-	0.01 L	-	0.01 L	-	-
7	-	-	-	0.18	0.18 *	-	-	-	-	-	-	-	-
8	-	0.20	-	-	0.20	-	-	0.002L	-	-	0.002L	-	-
9	0.18	-	-	-	0.18 *	-	-	-	-	-	-	-	-
10	0.185	-	-	-	0.185*	-	-	0.010L	-	-	0.010L	-	0.36
11	-	0.19	-	-	0.19	-	0.28 R	-	-	-	0.28 R	-	-
13	-	0.2	-	-	0.2	-	0.1 L	-	-	-	0.1 L	-	-
14	-	-	0.21	-	0.21	0.008	-	-	-	-	0.008	-	-
15	-	0.343R	-	-	0.343R	-	-	0.005L	-	-	0.005L	-	-
MEAN	.2017	.2175	.2150	.1960	.2102	.0080	-	-	-	.0040	.0060	.3555	.3600
STD DEV	.0333	.0240	.0071	.0226	.0235	-	-	-	-	-	.0028	.0785	-
REL STD	16.5	11.0	3.3	11.5	11.2	-	-	-	-	-	47.1	22.1	-
DES VAL	-	-	-	-	.213	-	-	-	-	-	.005	-	-

LAB	07651 T N DIS UV AA	07655 T N DIS UV EDTA	07790 T N DIS COMMON	09103 F DIS COL SP	09105 F DIS SP EL	09106 F DIS EL POT	09107 F DIS AUT POT	09108 F DIS SP EL	09115 F DIS AA ALIZ	09190 FLUORIDE COMMON	10101 ALKLNTY TITR'N	10108 ALKLNTY POT TIT	10109 ALKLNTY POT TIT
1	-	-	-	-	-	-	0.32	-	-	0.32	30.7	-	-
2	-	-	0.30 *	-	-	-	-	-	-	-	31.1	-	-
3	-	-	0.411*	-	-	-	-	0.34	-	0.34	-	-	-
4	0.375	-	0.375	-	-	-	-	-	-	-	28.6	-	-
5	-	0.378	0.378	-	-	0.313	-	-	-	0.313	28.8	-	-
6	-	-	-	0.3	-	-	-	-	-	0.3	-	-	32.
7	-	-	-	-	-	-	-	-	-	-	28.2	-	-
8	-	-	-	-	0.32	-	-	-	-	0.32	-	-	30.0
9	-	-	-	-	-	-	-	-	-	-	-	30.	-
10	-	-	0.36	-	-	-	-	-	0.37	0.37 *	-	-	-
11	-	-	-	-	0.3	-	-	-	-	0.3	28.	-	-
13	-	-	-	-	-	-	-	-	-	-	30.	-	-
14	-	-	-	-	-	-	-	-	-	-	31.0	-	-
15	-	-	-	-	0.5 R	-	-	-	-	0.5 R	32.3	-	-
16	-	-	-	-	-	-	-	-	-	-	30.	-	-
MEAN	.3750	.3780	.3648	.3000	.3100	.3130	.3200	.3400	.3700	.3233	29.8700	30.0000	31.0000
STD DEV	-	-	.0407	-	.0141	-	-	-	-	.0247	1.4322	-	1.4142
REL STD	-	-	11.2	-	4.6	-	-	-	-	7.7	4.8	-	4.6
DES VAL	-	-	.342	-	-	-	-	-	-	.311	-	-	-

LAB	10111 ALKLNTY TIT PRO	10112 ALKLNTY TIT CON	10190 ALKLINTY COMMON	10301 PH	10390 PH COMMON	10602 HARDNSS CALC'D	10603 HARDNSS TITR'N	10645 HARDNSS ?	10690 HARDNESS COMMON	11001 NA TOT AAS	11005 NA TOT ICP	11007 NA DIS DCP	11102 NA F AAS
1	-	-	30.7	7.19	7.19	54.6	-	-	54.6	-	-	-	-
2	-	-	31.1	7.0	7.0	55.2	-	-	55.2	-	-	-	-
3	28.7	-	28.7	8.15	8.15 *	56.7	-	-	56.7	-	-	-	-
4	-	-	28.6	7.72	7.72	-	-	-	-	-	-	-	-
5	-	-	28.8	7.72	7.72	-	-	-	-	-	-	-	-
6	-	-	32.	7.3	7.3	-	59.	-	59.	-	-	-	10.
7	-	-	28.2	7.7	7.7	-	58.3	-	58.3	-	-	-	-
8	-	-	30.0	7.55	7.55	58.7	-	-	58.7	-	-	-	-
9	-	-	30.	7.3	7.3	-	-	60.	60.	-	10.5	-	-
10	-	28.	28.	7.66	7.66	-	-	-	-	-	8.90	-	-
11	-	-	28.	7.0	7.0	55.	-	-	55.	-	-	-	9.4
13	-	-	30.	6.9	6.9	61.0	-	-	61.0	-	-	-	-
14	-	-	31.0	7.55	7.55	55.3	-	-	55.3	9.74	-	-	-
15	-	-	32.3	7.9	7.9	58.6	-	-	58.6	-	-	-	-
16	-	-	30.	7.25	7.25	54.	-	-	54.	-	-	8.09	-
MEAN	28.7000	28.0000	29.8267	7.4593	7.4593	56.5667	58.6500	60.0000	57.2000	9.7400	9.7000	8.0900	9.7000
STD DEV	-	-	1.4109	.3609	.3609	2.3648	.4950	-	2.3479	-	1.1314	-	.4243
REL STD	-	-	4.7	4.8	4.8	4.2	.8	-	4.1	-	11.7	-	4.4
DES VAL	-	-	29.565	-	7.307	-	-	-	56.875	-	-	-	-

LAB	11103 NA DIS FL PH	11105 NA DIS AAS DA	11107 NA UF FL PH	11111 NA DIS ICP	11311 NA EXT ICP	11990 SODIUM COMMON	12005 MG TOT ICP	12012 MG TOT DCP	12101 MG DIS CALC'D	12102 MG DIS AAS DA	12106 MG UF AAS DA	12107 MG DIS AAS AUT	12111 MG DIS ICP
1	8.	-	-	-	-	8. *	-	-	-	3.2	-	-	-
2	9.9	-	-	-	-	9.9	-	-	-	-	-	3.4	-
3	-	-	9.52	-	-	9.52	-	-	-	-	3.4	-	-
5	9.3	-	-	-	-	9.3	-	-	-	3.40	-	-	-
6	-	-	-	-	-	10.	-	-	3.8	-	-	-	-
7	-	8.9	-	-	-	8.9	-	-	-	3.2	-	-	-
8	-	-	-	-	9.29	9.29	-	-	-	-	-	-	-
9	-	-	-	-	-	10.5	3.6	-	-	-	-	-	-
10	-	-	-	-	-	8.90	3.43	-	-	-	-	-	-
11	-	-	-	-	-	9.4	-	-	-	3.4	-	-	-
13	-	-	-	9.90	-	9.90	-	-	-	-	-	-	3.58
14	-	-	-	-	-	9.74	-	-	-	3.19	-	-	-
15	-	-	-	9.7	-	9.7	-	-	-	-	-	-	3.4
16	-	-	-	-	-	8.09 *	-	3.53	-	-	-	-	-
MEAN	9.0667	8.9000	9.5200	9.8000	9.2900	9.3671	3.5150	3.5300	3.8000	3.2780	3.4000	3.4000	3.4900
STD DEV	.9713	-	-	.1414	-	.7056	.1202	-	-	.1114	-	-	.1273
REL STD	10.7	-	-	1.4	-	7.5	3.4	-	-	3.4	-	-	3.6
DES VAL	-	-	-	-	-	9.545	-	-	-	-	-	-	-

LAB	12311 MG EXT ICP	12990 MGNESIUM COMMON	14105 SILICA MOLY AA	14106 SILICA MOLY	14107 SILICA MOLY AA	14111 SILICA ICP DA	14112 SILICA DCP DA	14190 SILICA COMMON	15313 T P ACL AA SNCL	15401 T P UV AA ASC	15406 T P UF AA ASC	15409 T P BLK AA ASC	15413 T P ACL AA SNCL
1	-	3.2	-	-	3.4	-	-	3.4	-	-	-	-	-
2	-	3.4	-	-	-	-	-	-	-	-	-	-	0.002
3	-	3.4	-	3.43	-	-	-	3.43	-	-	-	-	0.007
4	-	-	-	-	-	-	-	-	-	-	0.008	-	-
5	-	3.40	3.5	-	-	-	-	3.5	-	-	-	-	-
6	-	3.8	-	-	-	-	-	-	-	-	-	0.03 R	-
7	-	3.2	-	-	-	-	-	-	-	-	-	-	-
8	3.7	3.7	3.0	-	-	-	-	3.0	-	-	-	-	0.007
9	-	3.6	-	-	-	3.55	-	3.55	-	-	-	-	-
10	-	3.43	3.2	-	-	-	-	3.2	-	0.010L	-	-	-
11	-	3.4	3.4	-	-	-	-	3.4	0.005L	-	-	-	-
13	-	3.58	-	-	-	-	-	-	-	-	0.008	-	-
14	-	3.19	-	-	-	-	-	-	-	-	-	-	-
15	-	3.4	-	-	-	1.5 R	-	1.5 R	-	-	0.005	-	-
16	-	3.53	-	-	-	-	3.35	3.35	-	-	-	-	-
MEAN	3.7000	3.4450	3.2750	3.4300	3.4000	3.5500	3.3500	3.3538	-	-	.0070	-	.0053
STD DEV	-	.1831	.2217	-	-	-	-	.1768	-	-	.0017	-	.0029
REL STD	-	5.3	6.8	-	-	-	-	5.3	-	-	24.7	-	54.1
DES VAL	-	3.480	-	-	-	-	-	3.360	-	-	-	-	-

LAB	15421 T P BLK DIG ASC	15490 TOT P COMMON	16304 SO4 DIS AUTO BA	16306 SO4 DIS AA MTB	16307 SO4 UF AA MTB	16309 SO4 DIS I C	16310 SO4 DIS AA CALM	16311 SO4 DIS IC	16990 SULFATE COMMON	17203 CL DIS AA FE	17204 CL DIS AG TIT	17206 CL DIS AA HG	17208 CL DIS AA HG
1	0.007	0.007	-	13.	-	-	-	-	13.	-	-	22.8	-
2	-	0.002*	14.2	-	-	13.2	-	-	14.2	-	-	-	-
3	-	0.007	-	-	13.7	-	-	-	13.7	-	-	-	23.1
4	-	0.008	-	-	-	-	-	-	-	-	-	-	-
5	-	-	-	14.0	-	-	-	-	14.0	-	-	24.0	-
6	-	0.03 R	14.	-	-	-	-	-	14.	-	26.	-	-
7	-	-	-	14.9	-	-	-	-	14.9	22.5	-	-	-
8	-	0.007	-	15.	-	-	-	-	15.	-	-	23.	-
9	-	-	-	-	-	13.4	-	-	13.4	-	-	-	-
10	-	0.010L	-	-	-	-	12.	-	12. *	-	-	-	-
11	-	0.005L	-	14.	-	-	-	-	14.	-	-	23.	-
13	-	0.008	-	14.4	-	-	-	-	14.4	-	-	25.	-
14	-	-	-	-	-	14.4	-	-	14.4	-	-	-	-
15	-	0.005	-	-	-	-	-	-	-	-	-	23.1	-
16	-	-	-	-	-	-	-	16.	16. *	-	-	-	-
MEAN	.0070	.0063	14.1000	14.2167	13.7000	13.6667	12.0000	16.0000	14.0769	22.5000	26.0000	23.4833	23.1000
STD DEV	-	.0021	.1414	.7333	-	.6429	-	-	.9808	-	-	.8542	-
REL STD	-	34.0	1.0	5.2	-	4.7	-	-	7.0	-	-	3.6	-
DES VAL	-	.007	-	-	-	-	-	-	13.566	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 38 PP 78 SAMPLE 4

LAB	17209 CL DIS I C	17210 CL DIS TIT CON	17211 CL DIS IC	17990 CHLORIDE COMMON	19001 K TOT AAS	19005 K TOT ICP	19008 K TOT DCP	19102 K DIS AAS	19103 K DIS FLM PH	19105 K DIS AAS DA	19106 K DIS AAS LI	19107 K DIS FLM PH	19111 K DIS ICP
1	-	-	-	22.8	-	-	-	-	2.8	-	-	-	-
2	26.	-	-	26.	-	-	-	-	3.1	-	-	-	-
3	-	-	-	23.1	-	-	-	-	-	-	-	2.84	-
5	-	-	-	24.0	-	-	-	-	2.8	-	-	-	-
6	-	-	-	26.	-	-	-	2.6	-	-	-	-	-
7	-	-	-	22.5	-	-	-	3.18	-	-	-	-	-
8	-	-	-	23.	-	-	-	-	-	-	-	-	-
9	23.	-	-	23.	-	3.2	-	-	-	-	-	-	-
10	-	24.	-	24.	-	2.84	-	-	-	-	-	-	-
11	-	-	-	23.	-	-	-	-	-	-	3.1	-	-
13	-	-	-	25.	-	-	-	-	-	-	-	-	2.95
14	26.0	-	-	26.0	2.91	-	-	-	-	-	-	-	-
15	-	-	-	23.1	-	-	-	-	-	3.1	-	-	-
16	-	-	22.	22.	-	-	2.76	-	-	-	-	-	-
MEAN	25.0000	24.0000	22.0000	23.8214	2.9100	3.0200	2.7600	2.8900	2.9000	3.1000	3.1000	2.8400	2.9500
STD DEV	1.7321	-	-	1.3830	-	.2546	-	.4101	.1732	-	-	-	-
REL STD	6.9	-	-	5.8	-	8.4	-	14.2	6.0	-	-	-	-
DES VAL	-	-	-	23.558	-	-	-	-	-	-	-	-	-

LAB	19301 K EXT HNO3 AA	19990 PTASSIUM COMMON	20005 CA TOT ICP	20007 CA TOT DCP	20050 CA DIS AAS NO	20100 CA DIS CALC'D	20103 CA DIS AAS	20107	20108 CA DIS AAS UF	20110 CA DIS AAS AUT	20111 CA DIS ICP	20311 CA EXT ICP	20990 CALCIUM COMMON
1	-	2.8	-	-	-	-	-	16.6	-	-	-	-	16.6
2	-	3.1	-	-	-	-	-	-	-	16.5	-	-	16.5
3	-	2.84	-	-	-	-	-	-	17.1	-	-	-	17.1
5	-	2.8	-	-	-	-	16.9	-	-	-	-	-	16.9
6	-	2.6	-	-	-	17.	-	-	-	-	-	-	17.
7	-	3.18	-	-	-	-	16.6	-	-	-	-	-	16.6
8	2.85	2.85	-	-	-	-	-	-	-	-	-	17.4	17.4
9	-	3.2	17.5	-	-	-	-	-	-	-	-	-	17.5
10	-	2.84	17.0	-	-	-	-	-	-	-	-	-	17.0
11	-	3.1	-	-	-	-	16.	-	-	-	-	-	16.
13	-	2.95	-	-	-	-	-	-	-	-	17.7	-	17.7
14	-	2.91	-	-	16.9	-	-	-	-	-	-	-	16.9
15	-	3.1	-	-	-	-	-	-	-	-	17.6	-	17.6
16	-	2.76	-	16.0	-	-	-	-	-	-	-	-	16.0
MEAN	2.8500	2.9307	17.2500	16.0000	16.9000	17.0000	16.5000	16.6000	17.1000	16.5000	17.6500	17.4000	16.9143
STD DEV	-	.1791	.3536	-	-	-	.4583	-	-	-	.0707	-	.5376
REL STD	-	6.1	2.0	-	-	-	2.8	-	-	-	.4	-	3.2
DES VAL	-	2.909	-	-	-	-	-	-	-	-	-	-	16.966

DATES RECEIVED

1 89/02/03	2 89/03/03	3 89/03/03	3 89/03/30	4 89/03/02
5 89/05/01	6 89/01/25	6 89/03/28	7 89/04/17	8 89/03/01
9 89/02/27	10 89/02/21	11 89/02/27	13 89/02/21	14 89/04/13
15 89/03/28	16 89/03/29			

NOTE: ALL CONCENTRATION UNITS ARE EXPRESSED IN MG/L OF EACH ELEMENT, THE EXCEPTIONS BEING: COLOUR IN RELATIVE UNITS, CONDUCTIVITY IN USIE/CM, TURBIDITY IN JTU OR NTU, NITROGEN ANALYSES IN "N", ALKALINITY & HARDNESS IN CACO3, SILICA IN SIO2, AND SULFATE IN SO4.

Research & Applications Branch
National Water Research Institute
867 Lakeshore Road, P.O. Box 5050
Burlington, Ontario
L7N 3E6

July 6 Juillet, 1989.

To: Participants & Managers in:
A: Participants et Directeurs dans:

Federal-Provicial Quality Assurance Program
Programme d'Assurance-Qualité Fédéral-Provincial (PAQFP)

Final Report/Rapport Dernier: FPQA Studies/Etudes 39-40

Vous trouverez en annexe le résumé dernier de l'étude F/P susmentionées.

Si vous avez de commentaire sur ce résumé, ou des corrections valides à notre base de données, veuillez me les transmettre.

I have enclosed the final report for the above mentioned studies.

If you have any comments on this report, or any legitimate corrections to the data base, please do not hesitate to communicate them.

Harry A

H. Alkema
Quality Assurance Project

Attachment: Distribution List
En annexe: Liste de diffusion

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Mr. C. Langlois
Can-Que WQ Agreement

Mr. G. Longpré
Laboratoire de Québec

Mr. N. Bermingham
St. Lawrence Centre Lab, P Q

Dr. L.M. Churchland
Pacific Region, WQB

RESEARCH & APPLICATIONS BRANCH

FINAL REPORT

REPORT NO. RAB 89-13 (Eng)

FEDERAL PROVINCIAL QUALITY ASSURANCE PROGRAM

STUDIES 39 AND 40

for March and April 1989

TRACE METALS, MAJOR IONS, NUTRIENTS AND PHYSICAL PARAMETERS IN SURFACE WATERS

by

H. Alkema

Quality Assurance Section
National Water Research Institute
Burlington, Ontario

July 1989

(Ce rapport est aussi disponible en français)

Introduction

As part of an on-going study, the Quality Assurance Section, NWRI in Burlington, Ontario, has been sending reference water samples bi-monthly to chemical laboratories participating in the FP program. This report summarizes the most recent FP interlaboratory quality assurance studies: FP 39 and 40, for the months March and April, 1989. These two studies dealt with trace metals, major ions, nutrients and physical parameters. The levels were medium to high levels for trace metals, and medium levels for major ions.

Study Design

Four water samples were submitted to each laboratory for chemical analyses. Two samples were submitted for trace metals analysis, while the remaining two were submitted for major ions, nutrients and some physical measurements. The following is a breakdown of the four samples:

FP 39 – Sample 1 – 125 ml, high level* for trace metals (3% HNO_3)
Sample 2 – up to 1 L, major ions etc., stored at 4°C

FP 40 – Sample 3 – 1 L, low level* for trace metals (0.2% HNO_3)
Sample 4 – up to 1 L, major ions, etc., stored at 4°C

* for definitions see Appendix 1

Treatment of Data

Each laboratory was asked to perform only those analyses which were routine to their particular laboratory, using the general methodology guidelines listed above. Results for these analyses were reported as required by the standard report sheets provided with the QA samples. Submitted results were tabulated for each parameter, first for each method reported, and then for

all methods combined. These data, and the resulting statistics are presented in the Data Summary. (attached)

Preliminary data summaries (RAB # 89–09), including problematic results, were sent May 1, and June 6. Each laboratory was given three weeks to notify us of any errors in data transcription, compilation, or flags.

Performance Indicators

In the Federal Provincial QA program, two types of reference samples are used for the accuracy assessment. These are Reference Waters (RMs) and Certified Reference waters (CRMs) which have Design Values for the stable parameters. Also, regional samples are used occasionally as natural representative samples. The means for these regional samples, and the Design Values for the reference waters are used to test each reported result for accuracy.

Percentage deviations from the reference values are used as an indication by the laboratory head to determine the extent of the discrepancies between the laboratory result and the reference value. However, please keep in mind that at low levels, high % deviations are often seen, and may be misleading if interpreted too strictly.

A result which deviates more than the greater of 10% or 1 standard deviation from the reference value is marked with an asterisk in the data table and its value tabulated in the flagged data table (Table 1). Results reported with an "L" (less than) or flagged with an "R" (rejectable) are not used in the statistical calculations. Performance indicators are fully explained in Appendix II.

Comments on Laboratory Performance

Results accompanied with a 'less than' are difficult to appraise. If a design value or mean is significantly lower than the detection limit given by a particular laboratory, then that detection limit is too high. Such a result is assigned an 'HDL' and is tabulated for each laboratory in Table 1.

If, on the other hand, the detection limit reported is far lower than the mean or design value, then the use of 'less than' is clearly inadequate and the result is flagged low. The magnitude of the deviation from the mean in such a case is taken from the detection limit given.

Attached are two tables listing flagged data by laboratory (Table 1), and listing parameters for which there was a high standard deviation (Table 2). Formerly called a high coefficient of variation, the standard deviation is generated with standardized criteria that are included with the automated flagging routine. These automated criteria have been in use since March 1988 (Study FP 27), and should provide a more accurate and consistent listing of the difficult to analyze parameters or levels. A listing of the criteria used to indicate high deviation of analysis is available on request. Your comments would be appreciated.

Provincial laboratories average number of deviations per sample was 1.9.
Federal laboratories average number of deviations per sample was 1.7.

APPENDIX I

Definitions of Types of Metals Analysis

1. HIGH LEVEL ANALYSIS

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

2. LOW LEVEL ANALYSIS

Analysis is 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, or DCP.
3. Digestion of aqueous phase and ICAP or DCP analysis.
4. Graphite tube (flameless) AAS.

Updated March 1989.

APPENDIX II

Performance Indicators

1. **Flagged Results**

As a first indication that analysis results are appreciably deviant from the expected value, each submitted result is tested with the 10% or 1 Standard Deviation Rule. When a result is found to deviate more than 10%, or more than 1 standard deviation when this is greater than 10%, the result is flagged with an asterisk in the data summary and tabled for that laboratory in the Flagged Data Table. Typically at low levels the 10% criteria is too small and the 1 standard deviation criteria effectively indicates deviant analytical results. As performance indicator, the flagged results indicate to laboratory heads that in-house QC procedures and the methodology concerned need to be ivestigated. Results may still be comparable.

2. **Grubbs' Rejectable Results**

For every parameter, each laboratory result is statistically tested to see if it is outlying. Outlying results are caused by non random causes such as a faulty calibration or incorrect transcription. These outlying results, calculated by the Grubbs' procedure,* and indicated in the data tables with an 'R', are noncomparable with the other data for that parameter.

3. **A High Standard Deviation for a Parameter**

Occasionally data for a difficult to analyse parameter yields a very high relative standard deviation (RSD). When a high RSD is not due to outlying results, there are noncomparable results within the data set. In such a case, the RSD for that parameter is indicated in Table 2, entitiled: High Standard Deviations.

4. **High Detection Limits (HDL's)**

Each laboratory determines its own detection limits according to its own requirements. When major differences in detection limits occur, an HDL is indicated for the particular laboratory in the Flagged Data Table. An HDL indicates that low level analysis may not be comparable with the analyses of other laboratories.

* reference : Frank E. Grubbs, Technometrics, 1969, p. 1.

TABLE 1: FED-PROV LABORATORIES FLAGGED DATA - STUDIES FP 39-40

LAB 2	FLAGS :	NONE							
LAB 3	FLAGS :	D O C	43%		D O C	30%			
LAB 4	FLAGS :	BORON	126%		BORON	90%		TOT P	255% R
LAB 5	FLAGS :	D O C	157%	R	D O C	130%	R		
LAB 7	FLAGS :	NITRATE	-11%						
LAB 9	FLAGS :	COBALT	-20%		NITRATE	-11%		PTASSIUM	-16%
LAB 10	FLAGS :	SILICA	-14%		ALUMINUM	40%		NITRATE	-13%
		TOT P	-24%						
	HDL :	AMMONIA			TOT P			AMMONIA	
LAB 11	FLAGS :	IRON	-89%	R	FLUORIDE	-13%		CHROMIUM	-22%
		NITRATE	-87%	R	TOT P	22%		PTASSIUM	19%
LAB 13	FLAGS :	CADMIUM	22%	R	NITRATE	-14%			
LAB 14	FLAGS :	ZINC	11%	R	NITRATE	18%		MGNESIUM	-14%
		SULFATE	34%		CHLORIDE	28%		ALUMINUM	38%
		VANADIUM	-52%		IRON	-29%		COPPER	-23%
		LEAD	-46%	R	NITRATE	16%		HARDNESS	-13% R
		MGNESIUM	-12%						
LAB 15	FLAGS :	D I C	-23%		TKN	57%		FLUORIDE	24%
		SILICA	-57%	R	PTASSIUM	12%		ALUMINUM	280% R
		NICKEL	-29%	L	D O C	-52%		FLUORIDE	43%
		SILICA	-56%	R					
	HDL :	NICKEL			LEAD				
LAB 16	FLAGS :	MANGNESE	15%		COPPER	18%		STRNTIUM	34% R
		BARIUM	13%		CONDUCT	23%	R	CHLORIDE	43% R
		ALUMINUM	222%	R	VANADIUM	67%	R	CHROMIUM	44%
		MANGNESE	195%	R	IRON	58%	R	COBALT	28%
		NICKEL	32%	R	COPPER	119%	R	ZINC	32%
		STRNTIUM	109%	R	MOLYBNUM	22%		CADMIUM	14%
		BARIUM	82%	R	LEAD	54%	R	CONDUCT	27% R
		SODIUM	-23%	R	SILICA	310%	R	CHLORIDE	40% R

NOTE: A VERY HIGH FREQUENCY OF FLAGGED RESULTS (OR A HIGH %) IS INDICATIVE OF POOR PERFORMANCE. ON THE OTHER HAND, LABS WITH FEW IF ANY FLAGS ARE JUDGED TO HAVE VERY GOOD PERFORMANCE.

ALSO, AN "R" FLAG INDICATES A NON COMPARABLE RESULT, THAT IS, ONE PRODUCED WITH NON RANDOM FACTORS. AN "L" FLAG INDICATES A 'LESS THAN' RESULT LOWER THAN THE COMPARATOR.

TABLE 2: HIGH STANDARD DEVIATION

PARAMETER		LEVEL
BORON	AT	.042 PPM
D O C	AT	1.256 PPM
VANADIUM	AT	.021 PPM
BORON	AT	.046 PPM
D O C	AT	2.074 PPM
FLUORIDE	AT	.140 PPM

DATA SUMMARY

FEDERAL-PROVINCIAL & PRAIRIE PROVINCES QUALITY ASSURANCE PROGRAMS

STUDY NO. FP 39 PP 79 DATE: 01/03/89 DUE DATE: 30/04/89 PAGE 1

SAMPLE 1 SPIKED SAMPLE. TRACE METALS D/A. (IN 3.0% HNO3)

LAB	13009 AL TOT 5X ICP	13030	13111 AL DIS ICP DA	13302 AL EXT AAS DA	13311 AL EXT ICP DA	13321 AL EXT ICP DA	13322 AL EXT DCP DA	13999 ALUMINUM COMMON	23009 V TOT 5X ICP	23011 V TOT 5X ICP	23012 V TOT 5X DCP	23111 V DIS ICP DA	23311 V EXT ICP DA
1	-	2.19	-	-	-	-	-	2.19 *	2.26	-	-	-	-
2	-	-	-	2.6	-	-	-	2.6	-	-	-	-	-
3	-	-	-	2.85	-	2.81	-	2.85	-	-	-	-	-
6	2.8	-	-	-	-	-	-	2.8	-	2.5	-	-	-
8	-	-	-	2.8	-	-	-	2.8	-	-	-	-	-
9	-	-	2.7	-	-	-	-	2.7	-	-	-	2.35	-
10	-	-	2.44	-	-	-	-	2.44	-	-	-	2.20	-
15	-	-	-	-	2.59	-	-	2.59	-	-	-	-	2.46
16	-	-	-	-	-	-	2.71	2.71	-	-	2.24	-	-
MEAN	2.8000	2.1900	2.5700	2.7500	2.5900	2.8100	2.7100	2.6311	2.2600	2.5000	2.2400	2.2750	2.4600
STD DEV	-	-	.1838	.1323	-	-	-	.2091	-	-	-	.1061	-
REL STD	-	-	7.2	4.8	-	-	-	7.9	-	-	-	4.7	-
DES VAL	-	-	-	-	-	-	-	2.690	-	-	-	-	-

LAB	23321 V EXT ICP DA	23999 VANADIUM COMMON	24009 CR TOT 5X ICP	24011 CR TOT 5X ICP	24012 CR TOT 5X DCP	24111 CR DIS ICP DA	24302 CR EXT AAS DA	24311 CR EXT ICP DA	24321 CR EXT ICP DA	24999 CHROMIUM COMMON	25003 MN TOT 5X ICP	25011 MN TOT 5X ICP	25012 MN TOT 5X DCP
1	-	2.26	0.300	-	-	-	-	-	-	0.300	0.263	-	-
3	2.32	2.32	-	-	-	-	-	-	0.297	0.297	-	-	-
6	-	2.5	-	0.33	-	-	-	-	-	0.33	-	0.26	-
8	-	-	-	-	-	-	0.28	-	-	0.28	-	-	-
9	-	2.35	-	-	-	0.30	-	-	-	0.30	-	-	-
10	-	2.20	-	-	-	0.285	-	-	-	0.285	-	-	-
11	-	-	-	-	-	-	0.300	-	-	0.300	-	-	-
13	-	-	-	-	-	-	-	0.29	-	0.29	-	-	-
15	-	2.46	-	-	-	-	-	0.297	-	0.297	-	-	-
16	-	2.24	-	-	0.318	-	-	-	-	0.318	-	-	0.302
MEAN	2.3200	2.3329	.3000	.3300	.3180	.2925	.2900	.2935	.2970	.2997	.2630	.2600	.3020
STD DEV	-	.1127	-	-	-	.0106	.0141	.0049	-	.0148	-	-	-
REL STD	-	4.8	-	-	-	3.6	4.9	1.7	-	4.9	-	-	-
DES VAL	-	2.322	-	-	-	-	-	-	-	.300	-	-	-

LAB	25104 MN DIS AAS DA	25111 MN DIS ICP DA	25304 MN EXT AAS DA	25311 MN EXT ICP DA	25321 MN EXT ICP DA	25999 MANGNESE COMMON	26009 FE TOT 5X ICP	26011 FE TOT 5X ICP	26012 FE TOT 5X DCP	26104 FE DIS AAS DA	26111 FE DIS ICP DA	26304 FE EXT AAS DA	26311 FE EXT ICP DA
1	-	-	-	-	-	0.263	1.080	-	-	-	-	-	-
2	-	-	0.28	-	-	0.28	-	-	-	-	-	1.1	-
3	-	-	0.262	-	0.253	0.262	-	-	-	-	-	1.07	-
6	-	-	-	-	-	0.26	-	1.2	-	-	-	-	-
8	-	-	-	0.27	-	0.27	-	-	-	-	-	-	1.22
9	-	0.26	-	-	-	0.26	-	-	-	-	1.05	-	-
10	-	0.247	-	-	-	0.247	-	-	-	-	1.038	-	-
11	-	-	-	-	-	-	-	-	-	-	-	0.115R	-
13	-	-	-	0.27	-	0.27	-	-	-	-	-	-	1.10
14	0.263	-	-	-	-	0.263	-	-	-	1.085	-	-	-
15	-	-	-	0.277	-	0.277	-	-	-	-	-	-	1.1
16	-	-	-	-	-	0.302*	-	-	1.10	-	-	-	-
MEAN	.2630	.2535	.2710	.2723	.2530	.2685	1.0800	1.2000	1.1000	1.0850	1.0440	1.0850	1.1400
STD DEV	-	.0092	.0127	.0040	-	.0143	-	-	-	-	.0085	.0212	.0693
REL STD	-	3.6	4.7	1.5	-	5.3	-	-	-	-	.8	2.0	6.1
DES VAL	-	-	-	-	-	.262	-	-	-	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 39 PP 79 SAMPLE 1

LAB	26321 FE EXT ICP DA	26999 IRON COMMON	27009 CO TOT 5X ICP	27011 CO TOT 5X ICP	27012 CO TOT 5X DCP	27111 CO DIS ICP DA	27301 CO EXT AAS DA	27311 CO EXT ICP DA	27321 CO EXT ICP DA	27999 COBALT COMMON	28009 NI TOT 5X ICP	28011 NI TOT 5X ICP	28012 NI TOT 5X DCP
1	-	1.080	1.060	-	-	-	-	-	-	1.060	1.220	-	-
2	-	1.1	-	-	-	-	-	-	-	-	-	-	-
3	1.10	1.07	-	-	-	-	-	-	1.05	1.05	-	-	-
6	-	1.2	-	1.1	-	-	-	-	-	1.1	-	1.3	-
8	-	1.22 *	-	-	-	-	1.09	-	-	1.09	-	-	-
9	-	1.05	-	-	-	1.05	-	-	-	1.05	-	-	-
10	-	1.038	-	-	-	1.025	-	-	-	1.025	-	-	-
11	-	0.115R	-	-	-	-	1.11	-	-	1.11	-	-	-
13	-	1.10	-	-	-	-	-	-	-	-	-	-	-
14	-	1.085	-	-	-	-	-	-	-	-	-	-	-
15	-	1.1	-	-	-	-	-	1.08	-	1.08	-	-	-
16	-	1.10	-	-	1.07	-	-	-	-	1.07	-	-	1.28
MEAN	1.1000	1.1039	1.0600	1.1000	1.0700	1.0375	1.1000	1.0800	1.0500	1.0706	1.2200	1.3000	1.2800
STD DEV	-	.0567	-	-	-	.0177	.0141	-	-	.0272	-	-	-
REL STD	-	5.1	-	-	-	1.7	1.3	-	-	2.5	-	-	-
DES VAL	-	1.087	-	-	-	-	-	-	-	1.067	-	-	-

LAB	28111 NI DIS ICP DA	28301 NI EXT AAS DA	28311 NI EXT ICP DA	28321 NI EXT ICP DA	28999 NICKEL COMMON	29009 CU TOT 5X ICP	29011 CU TOT 5X ICP	29012 CU TOT 5X DCP	29106 CU DIS AAS DA	29111 CU DIS ICP DA	29306 CU EXT AAS DA	29311 CU EXT ICP DA	29321 CU EXT ICP DA
1	-	-	-	-	1.220	0.285	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	0.3	-	-
3	-	-	-	1.22	1.22	-	-	-	-	-	-	-	0.279
6	-	-	-	-	1.3	-	0.30	-	-	-	-	-	-
8	-	-	1.35	-	1.35	-	-	-	-	-	-	0.32	-
9	1.2	-	-	-	1.2	-	-	-	-	0.29	-	-	-
10	1.184	-	-	-	1.184	-	-	-	-	0.274	-	-	-
11	-	1.20	-	-	1.20	-	-	-	-	-	0.310	-	-
13	-	-	1.23	-	1.23	-	-	-	-	-	-	0.29	-
14	-	-	-	-	-	-	-	-	0.299	-	-	-	-
15	-	-	1.26	-	1.26	-	-	-	-	-	-	0.309	-
16	-	-	-	-	1.28	-	-	0.338	-	-	-	-	-
MEAN	1.1920	1.2000	1.2800	1.2200	1.2444	.2850	.3000	.3380	.2990	.2820	.3050	.3063	.2790
STD DEV	.0113	-	.0624	-	.0524	-	-	-	-	.0113	.0071	.0152	-
REL STD	.9	-	4.9	-	4.2	-	-	-	-	4.0	2.3	5.0	-
DES VAL	-	-	-	-	1.233	-	-	-	-	-	-	-	-

LAB	29999 COPPER COMMON	30009 ZN TOT 5X ICP	30011 ZN TOT 5X ICP	30012 ZN TOT 5X DCP	30104 ZN DIS AAS DA	30111 ZN DIS ICP DA	30304 ZN EXT AAS DA	30311 ZN EXT ICP DA	30321 ZN EXT ICP DA	30999 ZINC COMMON	38012 SR TOT DCP DA	38111 SR DIS ICP DA	38301 SR EXT AAS DA
1	0.285	0.332	-	-	-	-	-	-	-	0.332	-	-	-
2	0.3	-	-	-	-	-	0.31	-	-	0.31	-	-	-
3	0.279	-	-	-	-	-	-	-	0.311	0.311	-	-	-
6	0.30	-	0.33	-	-	-	-	-	-	0.33	-	-	-
8	0.32 *	-	-	-	-	-	-	0.32	-	0.32	-	-	-
9	0.29	-	-	-	-	0.31	-	-	-	0.31	-	0.49	-
10	0.274	-	-	-	-	0.308	-	-	-	0.308	-	-	0.49
11	0.310	-	-	-	-	-	0.320	-	-	0.320	-	-	-
13	0.29	-	-	-	-	-	-	0.32	-	0.32	-	-	-
14	0.299	-	-	-	0.349R	-	-	-	-	0.349R	-	-	-
15	0.309	-	-	-	-	-	-	0.315	-	0.315	-	-	-
16	0.338*	-	-	0.326	-	-	-	-	-	0.326	0.655R	-	-
MEAN	.2995	.3320	.3300	.3260	-	.3090	.3150	.3183	.3110	.3184	-	.4900	.4900
STD DEV	.0180	-	-	-	-	.0014	.0071	.0029	-	.0084	-	-	-
REL STD	6.0	-	-	-	-	.5	2.2	.9	-	2.6	-	-	-
DES VAL	.287	-	-	-	-	-	-	-	-	.314	-	-	-

LAB	38311 SR EXT ICP DA	38321 SR EXT ICP DA	38999 STRNTIUM COMMON	42009 MO TOT 5X ICP	42011 MO TOT 5X ICP	42012 MO TOT 5X DCP	42111 MO DIS ICP DA	42121 MO EXT ICP DA	42311 MO EXT ICP DA	42999 MOLYBNUM COMMON	48009 CD TOT 5X ICP	48011 CD TOT 5X ICP	48012 CD TOT 5X DCP
1	-	-	-	4.53	-	-	-	-	-	4.53	0.234	-	-
3	-	0.488	0.488	-	-	-	-	4.50	-	4.50	-	-	-
6	-	-	-	-	4.8	-	-	-	-	4.8	-	0.25	-
9	-	-	0.49	-	-	-	4.6	-	-	4.6	-	-	-
10	-	-	0.49	-	-	-	4.391	-	-	4.391	-	-	-
15	0.494	-	0.494	-	-	-	-	-	4.48	4.48	-	-	-
16	-	-	0.655R	-	-	4.83	-	-	-	4.83	-	-	0.239
MEAN	.4940	.4880	.4905	4.5300	4.8000	4.8300	4.4955	4.5000	4.4800	4.5901	.2340	.2500	.2390
STD DEV	-	-	.0025	-	-	-	.1478	-	-	.1659	-	-	-
REL STD	-	-	.5	-	-	-	3.3	-	-	3.6	-	-	-
DES VAL	-	-	.489	-	-	-	-	-	-	4.627	-	-	-

LAB	48111 CD DIS ICP DA	48301 CD EXT AAS DA	48302 CD EXT AAS SE	48311 CD EXT ICP DA	48321 CD EXT ICP DA	48999 CADMIUM COMMON	56009 BA TOT 5X ICP	56011 BA TOT 5X ICP	56012 BA TOT 5X DCP	56111 BA DIS ICP DA	56301 BA EXT AAS DA	56311 BA EXT ICP DA	56321 BA EXT ICP DA
1	-	-	-	-	-	0.234	2.48	-	-	-	-	-	-
2	-	-	0.23	-	-	0.23	-	-	-	-	-	-	-
3	-	-	-	-	0.233	0.233	-	-	-	-	2.61	-	2.51
6	-	-	-	-	-	0.25	-	2.6	-	-	-	-	-
8	-	0.26	-	-	-	0.26	-	-	-	-	-	-	-
9	0.25	-	-	-	-	0.25	-	-	-	2.55	-	-	-
10	0.217	-	-	-	-	0.217	-	-	-	2.35	-	-	-
11	-	0.245	-	-	-	0.275	-	-	-	-	-	-	-
13	-	-	-	0.29 R	-	0.29 R	-	-	-	-	-	-	-
15	-	-	-	0.245	-	0.245	-	-	-	-	-	2.59	-
16	-	-	-	-	-	0.239	-	-	2.85	-	-	-	-
MEAN	.2335	.2525	.2300	.2450	.2330	.2403	2.4800	2.6000	2.8500	2.4500	2.6100	2.5900	2.5100
STD DEV	.0233	.0106	-	-	-	.0123	-	-	-	.1414	-	-	-
REL STD	10.0	4.2	-	-	-	5.1	-	-	-	5.8	-	-	-
DES VAL	-	-	-	-	-	.37	-	-	-	-	-	-	-

LAB	56999 BARIUM COMMON	82009 PB TOT 5X ICP	82011 PB TOT 5X ICP	82012 PB TOT 5X DCP	82101 PB DIS AAS DA	82111 PB DIS ICP DA	82301 PB EXT AAS DA	82302 PB EXT AAS SE	82311 PB EXT ICP DA	82321 PB EXT ICP DA	82999 LEAD COMMON
1	2.48	1.36	-	-	-	-	-	0.853R	-	-	1.36
2	-	-	-	-	-	-	-	1.3	-	-	1.3
3	2.61	-	-	-	-	-	-	-	-	1.28	1.28
6	2.6	-	1.4	-	-	-	-	-	-	-	1.4
8	-	-	-	-	-	-	-	-	1.50	-	1.50 *
9	2.55	-	-	-	-	1.33	-	-	-	-	1.33
10	2.35	-	-	-	-	1.243	-	-	-	-	1.243
11	-	-	-	-	-	-	1.32	-	-	-	1.32
13	-	-	-	-	-	-	-	-	1.34	-	1.34
14	-	-	-	-	1.33	-	-	-	-	-	1.33
15	2.59	-	-	-	-	-	-	-	1.29	-	1.29
16	2.85 *	-	-	1.45	-	-	-	-	-	-	1.45
MEAN	2.5757	1.3600	1.4000	1.4500	1.3300	1.2865	1.3200	1.3000	1.3767	1.2800	1.3453
STD DEV	.1516	-	-	-	-	.0615	-	-	.1097	-	.0733
REL STD	5.9	-	-	-	-	4.8	-	-	8.0	-	5.4
DES VAL	2.522	-	-	-	-	-	-	-	-	-	1.327

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 39 PP 79 SAMPLE 2

LAB	00110 IONIC BALANC %	00120 SUM OF CATIONS	00125 SUM OF ANIONS	02011 COLOUR APPARE	02021 COLOUR VIS COM	02023 COLOUR SPECT	02024 COL TRU SPECT	02040 COLOUR COMMON	02041 CONDUCT SPEC 25	02060 CONDUCT COMMON	02073 TURB HACH	02074 TURB NPLMTRI	02077 TURB HACH FZ
1	0.66	2.85	2.82	-	-	-	1.	1.	297.	297.	0.07	-	-
2	-1.0	2.807	2.864	5. L	-	-	-	5. L	296.	296.	0.1	-	-
3	-0.8	2.843	2.890	5. L	-	-	-	5. L	311.	311.	0.13	-	-
4	-	-	-	-	5. L	-	-	5. L	292.	292.	-	-	-
5	-0.77	2.85	2.89	5. L	-	-	-	5. L	292.	292.	0.07	-	-
6	1.18	3.07	2.97	-	-	-	-	-	272.	272.	-	0.15	-
7	-0.5	2.82	2.79	2.	-	-	-	2.	293.	293.	0.1	-	-
8	4.22	3.14	2.88	5. L	-	-	-	5. L	290.	290.	-	0.09	-
9	1.57	2.92	2.83	-	-	-	-	-	286.	286.	-	-	-
10	-0.55	2.783	2.814	-	-	1.	-	1.	284.	284.	-	0.2	-
11	-	-	-	5.	-	-	-	5.	280.	280.	-	-	0.1
14	-	-	-	-	-	-	-	-	294.	294.	-	-	-
15	-	-	-	5. L	-	-	-	5. L	270.	270.	-	0.1 L	-
16	-	-	-	-	-	-	-	-	360. R	360. R	0.1	-	-
MEAN	.6263	2.8981	2.8609	3.5000	-	1.0000	1.0000	2.2500	289.0000	289.0000	.0950	.1467	.1000
STD DEV	1.7217	.1244	.0546	2.1213	-	-	-	1.8930	10.8858	10.8858	.0226	.0551	-
REL STD	274.9	4.3	1.9	60.6	-	-	-	84.1	3.8	3.8	23.8	37.6	-
DES VAL	-	-	-	-	-	-	-	2.546	-	291.761	-	-	-

LAB	02081 TURB RATIO	02090 TURBIDTY COMMON	05100 BORON ?	05105 BORON AA CARM	05106 BORON F AZOMETH	05107 BORON ICP DA	05111 BORON F ICP DA	05190 BORON COMMON	06009 TOC CO2 IR	06051 TIC COMB IR	06101 DOC IR /DIF	06104 DOC UV CO2 IR	06107 DOC UV CO2 PHE
1	-	0.07	-	-	-	-	-	-	-	-	-	-	1.35
2	-	0.1	-	-	-	-	-	-	-	-	-	-	1.0
3	-	0.13	-	-	-	-	-	-	-	-	-	1.8	-
4	0.20	0.20	-	0.095	-	-	-	0.095*	-	-	-	1.50	-
5	-	0.07	-	-	-	-	-	-	-	-	3.23 R	-	-
6	-	0.15	-	-	-	-	-	-	-	-	-	1.0	-
7	-	0.1	-	-	-	-	-	-	-	-	-	-	-
8	-	0.09	-	-	0.05 L	-	-	0.05 L	-	-	-	-	-
10	-	0.2	-	-	-	-	0.03	0.03	-	-	-	-	-
11	-	0.1	-	-	-	-	-	-	-	-	-	-	-
15	-	0.1 L	-	-	-	0.01 L	-	0.01 L	1.	14.	-	-	-
16	-	0.1	0.05 L	-	-	-	-	0.05 L	-	-	-	-	-
MEAN	.2000	.1191	-	.0950	-	-	.0300	.0625	1.0000	14.0000	-	1.4333	1.1750
STD DEV	-	.0461	-	-	-	-	-	.0460	-	-	-	.4041	.2475
REL STD	-	38.7	-	-	-	-	-	73.5	-	-	-	28.2	21.1
DES VAL	-	.206	-	-	-	-	-	.042	-	-	-	-	-

LAB	06109 DOC UV CO2 OH	06112 DOC PER IR	06150 D O C COMMON	06152 DIC UV CO2 IR	06154 DIC AA CO2 PHE	06159 DIC AA CO2 OH	06490 D I C COMMON	07000	07010 TKN AA SAL	07015 TKN DIG BERTHEL	07016 TKN BLK AMM-SAL	07021 TKN BLK DIG BER	07090 TKN COMMON
1	-	-	1.35	-	18.4	-	18.4	-	-	-	-	0.12	0.12
2	-	-	1.0	-	-	-	-	-	-	-	-	-	-
3	-	-	1.8 *	18.7	-	-	18.7	-	0.062	-	-	-	0.062
4	-	-	1.50	-	-	-	-	-	-	-	-	-	-
5	-	-	3.23 R	-	-	-	-	-	-	-	-	-	-
6	-	-	1.0	-	-	-	-	-	-	-	0.3 R	-	0.3 R
8	-	-	-	-	-	-	-	-	-	0.20 L	-	-	0.20 L
10	1.0	-	1.0	-	-	18.0	18.0	-	-	-	-	-	-
15	-	-	1.	-	-	-	14. *	0.20	-	-	-	-	0.20 *
16	-	1.4	1.4	17.8	-	-	17.8	-	-	-	-	-	-
MEAN	1.0000	1.4000	1.2563	18.2500	18.4000	18.0000	17.3800	.2000	.0620	-	-	.1200	.1273
STD DEV	-	-	.3041	.6364	-	-	1.9215	-	-	-	-	-	.0693
REL STD	-	-	24.2	3.5	-	-	11.1	-	-	-	-	-	54.4
DES VAL	-	-	1.430	-	-	-	18.164	-	-	-	-	-	.126

LAB	07109 NO3+NO2 AA HYD	07110 NO3+NO2 AA2 CD	07111 NO3+NO2 DIS SPEC	07112 NO3+NO2 UF AA CD	07390 NITRATE COMMON	07505 NH3 TOT AA BERT	07540 NH3 TOT AA SAL	07555 NH3 DIS AA PHEN	07557 NH3 DIS AA INDO	07562 NH3 DIS AA EDTA	07590 AMMONIA COMMON	07600 T N PER AUTO	07601 T N UV AA SUL
1	-	-	0.335	-	0.335	-	-	-	-	0.007	0.007	-	-
2	-	0.37	-	-	0.37	-	-	-	-	-	-	-	0.38
3	-	-	-	0.349	0.349	0.005L	-	-	-	-	0.005L	-	0.434
4	-	0.359	-	-	0.359	-	0.005L	-	-	-	0.005L	-	-
5	-	0.335	-	-	0.335	-	-	-	0.009	-	0.009	-	-
6	0.41 R	-	-	-	0.41 R	-	-	-	0.01	-	0.01	-	-
7	-	-	-	0.33	0.33	-	-	-	-	-	-	-	-
8	-	0.39	-	-	0.39 *	-	-	0.002	-	-	0.002*	-	-
9	0.35	-	-	-	0.35	-	-	-	-	-	-	-	-
10	0.325	-	-	-	0.325	-	-	0.010L	-	-	0.010L	-	-
11	-	0.34	-	-	0.34	-	0.007L	-	-	-	0.007L	-	-
13	-	0.3	-	-	0.3 *	-	-	-	-	-	-	-	-
14	-	-	0.41	-	0.41 *	-	-	-	-	-	-	-	-
15	-	0.343	-	-	0.343	-	-	0.012	-	-	0.012	0.54	-
MEAN	.3375	.3481	.3725	.3395	.3489	-	-	.0070	.0095	.0070	.0080	.5400	.4070
STD DEV	.0177	.0287	.0530	.0134	.0286	-	-	.0071	.0007	-	.0038	-	.0382
REL STD	5.2	8.2	14.2	4.0	8.2	-	-	101.0	7.4	-	47.6	-	9.4
DES VAL	-	-	-	-	.333	-	-	-	-	-	.013	-	-

LAB	07605 T N UV HY SUL	07651 T N DIS UV AA	07655 T N DIS UV EDTA	07690 TOT N COMMON	07790 T N DIS COMMON	09103 F DIS COL SP	09105 F DIS SP EL	09106 F DIS EL POT	09107 F DIS AUT POT	09108 F DIS SP EL	09115 F DIS AA ALIZ	09190 FLUORIDE COMMON	10101 ALKLNTY TITR'N
1	-	-	-	-	-	-	-	-	0.58	-	-	0.58	76.6
2	-	-	-	-	0.38	-	-	0.52	-	-	-	0.52	73.9
3	-	-	-	-	0.434	-	-	-	-	0.56	-	0.56	75.0
4	-	0.457	-	-	0.457	-	-	-	-	-	-	-	74.9
5	-	-	0.400	-	0.400	-	-	0.561	-	-	-	0.561	76.9
6	-	-	-	-	-	0.6	-	-	-	-	-	0.6	-
7	-	-	-	-	-	-	-	-	-	-	-	-	73.3
8	-	-	-	-	-	-	0.60	-	-	-	-	0.60	-
10	0.43	-	-	-	0.43	-	-	-	-	-	0.61	0.61	-
11	-	-	-	-	-	-	0.49	-	-	-	-	0.49 *	75.
13	-	-	-	-	-	-	-	-	-	-	-	-	74.
14	-	-	-	-	-	-	-	-	-	-	-	-	76.3
15	-	-	-	0.54	-	-	0.7	-	-	-	-	0.7 *	78.3
16	-	-	-	-	-	-	-	-	-	-	-	-	78.
MEAN	.4300	.4570	.4000	.5400	.4202	.6000	.5967	.5405	.5800	.5600	.6100	.5801	75.6545
STD DEV	-	-	-	-	.0303	-	.1050	.0290	-	-	-	.0598	1.6777
REL STD	-	-	-	-	7.2	-	17.6	5.4	-	-	-	10.3	2.2
DES VAL	-	-	-	.518	.417	-	-	-	-	-	-	.563	-

LAB	10108 ALKLNTY POT TIT	10109 ALKLNTY POT TIT	10111 ALKLNTY TIT PRO	10112 ALKLNTY TIT CON	10190 ALKLINTY COMMON	10301 PH	10390 PH COMMON	10602 HARDNSS CALC'D	10603 HARDNSS TITR'N	10606 HARDNSS CALC'D	10690 HARDNESS COMMON	11001 NA TOT AAS	11005 NA TOT ICP
1	-	-	-	-	76.6	7.89	7.89	106.3	-	-	106.3	-	-
2	-	-	-	-	73.9	7.8	7.8	103.8	-	-	103.8	-	-
3	-	-	72.5	-	72.5	7.85	7.85	-	-	106.	106.	-	-
4	-	-	-	-	74.9	8.04	8.04	-	-	-	-	-	-
5	-	-	-	-	76.9	8.00	8.00	-	-	-	-	-	-
6	-	83.	-	-	83.	8.0	8.0	-	114.	-	114.	-	-
7	-	-	-	-	73.3	8.1	8.1	105.7	108.6	-	108.6	-	-
8	-	73.	-	-	73.	8.00	8.00	116.	-	-	116.	-	-
9	75.	-	-	-	75.	7.96	7.96	108.	-	-	108.	-	15.5
10	-	-	-	75.	75.	7.90	7.90	-	-	-	-	-	13.81
11	-	-	-	-	75.	7.75	7.75	104.	-	-	104.	-	-
13	-	-	-	-	74.	7.5	7.5	113.	-	-	113.	-	-
14	-	-	-	-	76.3	8.00	8.00	96.6	-	-	96.6	15.3	-
15	-	-	-	-	78.3	8.4	8.4	104.	-	-	104.	-	-
16	-	-	-	-	78.	7.99	7.99	107.5	-	-	107.5	-	-
MEAN	75.0000	78.0000	72.5000	75.0000	75.7133	7.9453	7.9453	106.4900	111.3000	106.0000	107.3167	15.3000	14.6550
STD DEV	-	7.0711	-	-	2.6656	.1938	.1938	5.3149	3.8184	-	5.2786	-	1.1950
REL STD	-	9.1	-	-	3.5	2.4	2.4	5.0	3.4	-	4.9	-	8.2
DES VAL	-	-	-	-	75.668	-	7.882	-	-	-	107.029	-	-

LAB	11007 NA DIS DCP	11102 NA F AAS	11103 NA DIS FL PH	11105 NA DIS AAS DA	11107 NA UF FL PH	11111 NA DIS ICP	11311 NA EXT ICP	11990 SODIUM COMMON	12005 MG TOT ICP	12012 MG TOT DCP	12101 MG DIS CALC'D	12102 MG DIS AAS DA	12105
1	-	-	15.	-	-	-	-	15.	-	-	-	-	6.4
2	-	-	15.1	-	-	-	-	15.1	-	-	-	-	-
3	-	-	-	-	15.0	-	-	15.0	-	-	-	-	-
5	-	-	14.8	-	-	-	-	14.8	-	-	-	6.39	-
6	-	16.	-	-	-	-	-	16.	-	-	6.	-	-
7	-	-	-	14.5	-	-	-	14.5	-	-	-	6.5	-
8	-	-	-	-	-	-	17.0	17.0 *	-	-	-	-	-
9	-	-	-	-	-	-	-	15.5	6.9	-	-	-	-
10	-	-	-	-	-	-	-	13.81	6.38	-	-	-	-
11	-	16.	-	-	-	-	-	16.	-	-	-	6.4	-
13	-	-	-	-	-	15.5	-	15.5	-	-	-	-	-
14	-	-	-	-	-	-	-	15.3	-	-	-	5.66	-
15	-	-	-	-	-	14.5	-	14.5	-	-	-	-	-
16	15.2	-	-	-	-	-	-	15.2	-	6.45	-	-	-
MEAN	15.2000	16.0000	14.9667	14.5000	15.0000	15.0000	17.0000	15.2293	6.6400	6.4500	6.0000	6.2375	6.4000
STD DEV	-	.0000	.1528	-	-	.7071	-	.7776	.3677	-	-	.3882	-
REL STD	-	-1.0	1.0	-	-	4.7	-	5.1	5.5	-	-	6.2	-
DES VAL	-	-	-	-	-	-	-	14.817	-	-	-	-	-

LAB	12106 MG UF AAS DA	12107 MG DIS AAS AUT	12111 MG DIS ICP	12311 MG EXT ICP	12990 MGNESIUM COMMON	14102 SILICA ANSA AA	14105 SILICA MOLY AA	14106 SILICA MOLY	14107 SILICA MOLY AA	14111 SILICA ICP DA	14112 SILICA DCP DA	14190 SILICA COMMON	15313 T P ACL AA SNCL
1	-	-	-	-	6.4	-	-	-	2.2	-	-	2.2	-
2	-	6.4	-	-	6.4	2.15	-	-	-	-	-	2.15	-
3	6.4	-	-	-	6.4	-	-	2.16	-	-	-	2.16	-
5	-	-	-	-	6.39	-	2.1	-	-	-	-	2.1	-
6	-	-	-	-	6.	-	-	-	-	-	-	-	-
7	-	-	-	-	6.5	-	-	-	-	-	-	-	-
8	-	-	-	7.40	7.40 *	-	2.0	-	-	-	-	2.0	-
9	-	-	-	-	6.9	-	-	-	-	2.14	-	2.14	-
10	-	-	-	-	6.38	-	1.84	-	-	-	-	1.84 *	-
11	-	-	-	-	6.4	2.2	-	-	-	-	-	2.2	0.007
13	-	-	6.80	-	6.80	-	-	-	-	-	-	-	-
14	-	-	-	-	5.66 *	-	-	-	-	-	-	-	-
15	-	-	6.2	-	6.2	-	-	-	-	0.92 R	-	0.92 R	-
16	-	-	-	-	6.45	-	-	-	-	-	2.00	2.00	-
MEAN	6.4000	6.4000	6.5000	7.4000	6.4486	2.1750	1.9800	2.1600	2.2000	2.1400	2.0000	2.0878	.0070
STD DEV	-	-	.4243	-	.4055	.0354	.1311	-	-	-	-	.1194	-
REL STD	-	-	6.5	-	6.3	1.6	6.6	-	-	-	-	5.7	-
DES VAL	-	-	-	-	6.563	-	-	-	-	-	-	2.151	-

LAB	15401 T P UV AA ASC	15406 T P UF AA ASC	15413 T P ACL AA SNCL	15421 T P BLK DIG ASC	15490 TOT P COMMON	16151	16304 SO4 DIS AUTO BA	16306 SO4 DIS AA MTB	16307 SO4 UF AA MTB	16309 SO4 DIS I C	16310 SO4 DIS AA CALM	16311 SO4 DIS IC	16990 SULFATE COMMON
1	-	-	-	0.004	0.004	-	-	28.	-	-	-	-	28.
2	-	-	-	-	-	-	32.0	-	-	29.7	-	-	29.7
3	-	-	0.005	-	0.005	-	-	-	29.4	-	-	-	29.4
4	-	0.003L	-	-	0.003L	-	-	-	-	-	-	-	-
5	-	-	-	-	-	19.9	-	30.6	-	-	-	-	30.6
6	-	-	-	-	-	-	32.	-	-	-	-	-	32.
7	-	-	-	-	-	-	-	30.9	-	-	-	-	30.9
8	-	-	0.007	-	0.007	-	-	40.	-	-	-	-	40. *
9	-	-	-	-	-	-	-	-	-	30.	-	-	30.
10	0.010L	-	-	-	0.010L	-	-	-	-	-	28.	-	28.
11	-	-	-	-	0.007	-	-	28.	-	-	-	-	28.
13	-	-	-	-	-	-	-	32.8	-	-	-	-	32.8
14	-	-	-	-	-	-	-	-	-	39.8	-	-	39.8 *
15	-	0.006	-	-	0.006	-	-	26.	-	-	-	-	26.
16	-	-	-	-	-	-	-	-	-	-	-	26.	26.
MEAN	-	.0060	.0060	.0040	.0058	19.9000	32.0000	30.9000	29.4000	33.1667	28.0000	26.0000	30.8000
STD DEV	-	-	.0014	-	.0013	-	.0000	4.6069	-	5.7466	-	-	4.3371
REL STD	-	-	23.6	-	22.5	-	-1.0	14.9	-	17.3	-	-	14.1
DES VAL	-	-	-	-	.007	-	-	-	-	-	-	-	29.688

LAB	17203 CL DIS AA FE	17204 CL DIS AG TIT	17206 CL DIS AA HG	17208 CL DIS AA HG	17209 CL DIS I C	17210 CL DIS TIT CON	17211 CL DIS IC	17990 CHLORIDE COMMON	19001 K TOT AAS	19005 K TOT ICP	19008 K TOT DCP	19102 K DIS AAS	19103 K DIS FLM PH
1	-	-	22.9	-	-	-	-	22.9	-	-	-	-	3.02
2	-	-	-	-	23.6	-	-	23.6	-	-	-	-	3.0
3	-	-	-	24.1	-	-	-	24.1	-	-	-	-	-
5	-	-	23.5	-	-	-	-	23.5	-	-	-	-	3.1
6	-	16. R	-	-	-	-	-	16. R	-	-	-	3.8 R	-
7	23.4	-	-	-	-	-	-	23.4	-	-	-	2.92	-
8	-	-	20.	-	-	-	-	20. *	-	-	-	-	-
9	-	-	-	-	24.	-	-	24.	-	3.2	-	-	-
10	-	-	-	-	-	24.	-	24.	-	3.17	-	-	-
11	-	-	24.	-	-	-	-	24.	-	-	-	-	-
13	-	-	25.0	-	-	-	-	25.0	-	-	-	-	-
14	-	-	-	-	30.4	-	-	30.4 *	3.22	-	-	-	-
15	-	-	23.	-	-	-	-	23.	-	-	-	-	-
16	-	-	-	-	-	-	34. R	34. R	-	-	2.85	-	-
MEAN	23.4000	-	23.0667	24.1000	26.0000	24.0000	-	23.9917	3.2200	3.1850	2.8500	2.9200	3.0400
STD DEV	-	-	1.6872	-	3.8158	-	-	2.3539	-	.0212	-	-	.0529
REL STD	-	-	7.3	-	14.7	-	-	9.8	-	.7	-	-	1.7
DES VAL	-	-	-	-	-	-	-	23.716	-	-	-	-	-

LAB	19105 K DIS AAS DA	19106 K DIS AAS LI	19107 K DIS FLM PH	19111 K DIS ICP	19301 K EXT HNO3 AA	19990 PTASSIUM COMMON	20005 CA TOT ICP	20007 CA TOT DCP	20050 CA DIS AAS NO	20100 CA DIS CALC'D	20103 CA DIS AAS	20107	20108 CA DIS AAS UF
1	-	-	-	-	-	3.02	-	-	-	-	-	32.	-
2	-	-	-	-	-	3.0	-	-	-	-	-	-	-
3	-	-	3.19	-	-	3.19	-	-	-	-	-	-	31.7
5	-	-	-	-	-	3.1	-	-	-	-	31.0	-	-
6	-	-	-	-	-	3.8 R	-	-	-	36. R	-	-	-
7	-	-	-	-	-	2.92	-	-	-	-	31.6	-	-
8	-	-	-	-	2.70	2.70 *	-	-	-	-	-	-	-
9	-	-	-	-	-	3.2	32.	-	-	-	-	-	-
10	-	-	-	-	-	3.17	31.6	-	-	-	-	-	-
11	-	2.9	-	-	-	2.9	-	-	-	-	31.	-	-
13	-	-	-	2.99	-	2.99	-	-	-	-	-	-	-
14	-	-	-	-	-	3.22	-	-	29.2		-	-	-
15	3.56	-	-	-	-	3.56 *	-	-	-		-	-	-
16	-	-	-	-	-	2.85	-	30.5	-		-	-	-
MEAN	3.5600	2.9000	3.1900	2.9900	2.7000	3.0631	31.8000	30.5000	29.2000	-	31.5333	32.0000	31.7000
STD DEV	-	-	-	-	-	.2150	.2828	-	-	-	.5033	-	-
REL STD	-	-	-	-	-	7.0	.9	-	-	-	1.6	-	-
DES VAL	-	-	-	-	-	3.170	-	-	-	-	-	-	-

LAB	20110 CA DIS AAS AUT	20111 CA DIS ICP	20311 CA EXT ICP	20990 CALCIUM COMMON
1	-	-	-	32.
2	31.	-	-	31.
3	-	-	-	31.7
5	-	-	-	32.0
6	-	-	-	36. R
7	-	-	-	31.6
8	-	-	34.5	34.5
9	-	-	-	31.
10	-	-	-	31.6
11	-	-	-	31.
13	-	32.7	-	32.7
14	-	-	-	29.2
15	-	31.3	-	31.3
16	-	-	-	30.5
MEAN	31.0000	32.0000	34.5000	31.6231
STD DEV	-	.9899	-	1.2208
REL STD	-	3.1	-	3.9
DES VAL	-	-	-	31.664

DATA SUMMARY

FEDERAL-PROVINCIAL & PRAIRIE PROVINCES QUALITY ASSURANCE PROGRAMS

STUDY NO. FP 40 PP 80 DATE: 01/04/89 DUE DATE: 30/04/89

SAMPLE 3 SPIKED SAMPLE. TRACE METALS S/E. (IN 0.2% HNO3)

LAB	13009 AL TOT 5X ICP	13030	13105 AL DIS AAS GF	13111 AL DIS ICP DA	13302 AL EXT AAS DA	13305 AL EXT AAS SE	13311 AL EXT ICP DA	13322 AL EXT DCP DA	13999 ALUMINUM COMMON	23002 V TOT AAS SE	23009 V TOT 5X ICP	23011 V TOT 5X ICP	23012 V TOT 5X DCP
1	-	0.063	-	-	-	-	-	-	0.063*	-	0.022	-	-
2	-	-	-	-	-	0.047	-	-	0.047	-	-	-	-
3	0.059	-	-	-	-	0.052	-	-	0.052	0.020	0.020	-	-
6	0.055	-	-	-	-	-	-	-	0.055	-	-	0.03	-
8	-	-	-	-	0.2 L	-	-	-	0.2 L	-	-	-	-
9	-	-	-	0.05	-	-	-	-	0.05	-	-	-	-
10	-	-	-	0.07	-	-	-	-	0.07 *	-	-	-	-
14	-	-	0.069	-	-	-	-	-	0.069*	-	-	-	-
15	-	-	-	-	-	-	0.19 R	-	0.19 R	-	-	-	-
16	-	-	-	-	-	-	-	0.161R	0.161R	-	-	-	0.035R
MEAN	.0570	.0630	.0690	.0600	-	.0495	-	-	.0580	.0200	.0210	.0300	-
STD DEV	.0028	-	-	.0141	-	.0035	-	-	.0093	-	.0014	-	-
REL STD	5.0	-	-	23.6	-	7.1	-	-	16.1	-	6.7	-	-
DES VAL	-	-	-	-	-	-	-	-	.050	-	-	-	-

LAB	23105	23111 V DIS ICP DA	23311 V EXT ICP DA	23999 VANADIUM COMMON	24003 CR TOT AAS SE	24004 CR TOT AAS GF	24009 CR TOT 5X ICP	24011 CR TOT 5X ICP	24012 CR TOT 5X DCP	24111 CR DIS ICP DA	24303 CR EXT AAS SE	24311 CR EXT ICP DA	24999 CHROMIUM COMMON
1	-	-	-	0.022	-	-	0.027	-	-	-	-	-	0.027
3	-	-	-	0.020	0.027	-	0.026	-	-	-	-	-	0.027
6	-	-	-	0.03 *	-	-	-	0.025	-	-	-	-	0.025
8	-	-	-	-	-	0.036	-	-	-	-	-	-	0.036*
9	-	0.022	-	0.022	-	0.026	-	-	-	-	-	-	0.026
10	-	0.022	-	0.022	-	-	-	-	-	0.028	-	-	0.028
11	-	-	-	-	-	-	-	-	-	-	0.021	-	0.021*
14	0.010	-	-	0.010*	-	-	-	-	-	-	-	-	-
15	-	-	0.02	0.02	-	-	-	-	-	-	-	0.027	0.027
16	-	-	-	0.035R	-	-	-	-	0.039	-	-	-	0.039*
MEAN	.0100	.0220	.0200	.0209	.0270	.0310	.0265	.0250	.0390	.0280	.0210	.0270	.0284
STD DEV	-	.0000	-	.0059	-	.0071	.0007	-	-	-	-	-	.0056
REL STD	-	-1.0	-	28.2	-	22.8	2.7	-	-	-	-	-	19.6
DES VAL	-	-	-	.021	-	-	-	-	-	-	-	-	.027

LAB	25003 MN TOT 5X ICP	25004 MN TOT AAS DA	25010 MN TOT 5X ICP	25011 MN TOT 5X ICP	25012 MN TOT 5X DCP	25107 MN DIS AAS GF	25111 MN DIS ICP DA	25304 MN EXT AAS DA	25311 MN EXT ICP DA	25999 MANGNESE COMMON	26005 FE TOT AAS SE	26009 FE TOT 5X ICP	26011 FE TOT 5X ICP
1	0.021	-	-	-	-	-	-	-	-	0.021	-	0.420R	-
2	-	-	-	-	-	-	-	0.02	-	0.02	-	-	-
3	-	0.021	0.021	-	-	-	-	-	-	0.021	0.050	0.050	-
6	-	-	-	0.025	-	-	-	-	-	0.025	-	-	0.075R
8	-	-	-	-	-	-	-	-	0.02	0.02	-	-	-
9	-	-	-	-	-	-	0.023	-	-	0.023	-	-	-
10	-	-	-	-	-	-	0.022	-	-	0.022	-	-	-
14	-	-	-	-	-	0.020	-	-	-	0.020	-	-	-
15	-	-	-	-	-	-	-	-	0.024	0.024	-	-	-
16	-	-	-	-	0.065R	-	-	-	-	0.065R	-	-	-
MEAN	.0210	.0210	.0210	.0250	-	.0200	.0225	.0200	.0220	.0218	.0500	.0500	-
STD DEV	-	-	-	-	-	-	.0007	-	.0028	.0019	-	-	-
REL STD	-	-	-	-	-	-	3.1	-	12.9	8.5	-	-	-
DES VAL	-	-	-	-	-	-	-	-	-	.022	-	-	-

LAB	26012 FE TOT 5X DCP	26107 FE DIS AAS GF	26111 FE DIS ICP DA	26305 FE EXT AAS SE	26311 FE EXT ICP DA	26999 IRON COMMON	27003 CO TOT AAS GF	27009 CO TOT 5X ICP	27011 CO TOT 5X ICP	27012 CO TOT 5X DCP	27111 CO DIS ICP DA	27302 CO EXT AAS SE	27311 CO EXT ICP DA
1	-	-	-	-	-	0.420R	-	0.025	-	-	-	-	-
2	-	-	-	0.05	-	0.05	-	-	-	-	-	-	-
3	-	-	-	-	-	0.050	-	0.024	-	-	-	-	-
6	-	-	-	-	-	0.075R	-	-	0.022	-	-	-	-
8	-	-	-	-	0.06	0.06 *	0.026	-	-	-	-	-	-
9	-	-	0.050	-	-	0.050	-	-	-	-	0.02	-	-
10	-	-	0.050	-	-	0.050	-	-	-	-	0.027	-	-
11	-	-	-	0.045	-	0.045	-	-	-	-	-	0.025	-
14	-	0.034	-	-	-	0.034*	-	-	-	-	-	-	-
15	-	-	-	-	0.045	0.045	-	-	-	-	-	-	0.025
16	0.076R	-	-	-	-	0.076R	-	-	-	0.032	-	-	-
MEAN	-	.0340	.0500	.0475	.0525	.0480	.0260	.0245	.0220	.0320	.0235	.0250	.0250
STD DEV	-	-	.0000	.0035	.0106	.0073	-	.0007	-	-	.0049	-	-
REL STD	-	-	-1.0	7.4	20.2	15.2	-	2.9	-	-	21.1	-	-
DES VAL	-	-	-	-	-	.048	-	-	-	-	-	-	-

LAB	27999 COBALT COMMON	28002 NI TOT AAS SE	28009 NI TOT 5X ICP	28011 NI TOT 5X ICP	28012 NI TOT 5X DCP	28111 NI DIS ICP DA	28302 NI EXT AAS SE	28309 NI EXT AAS GF	28311 NI EXT ICP DA	28999 NICKEL COMMON	29005 CU TOT AAS SE	29009 CU TOT 5X ICP	29011 CU TOT 5X ICP
1	0.025	-	0.028	-	-	-	-	-	-	0.028	-	0.054	-
3	0.024	0.027	0.026	-	-	-	-	-	-	0.027	0.053	0.052	-
6	0.022	-	-	0.03	-	-	-	-	-	0.03	-	-	0.055
8	0.026	-	-	-	-	-	-	0.028	-	0.028	-	-	-
9	0.02 *	-	-	-	-	0.025	-	-	-	0.025	-	-	-
10	0.027	-	-	-	-	0.027	-	-	-	0.027	-	-	-
11	0.025	-	-	-	-	-	0.025	-	-	0.025	-	-	-
15	0.025	-	-	-	-	-	-	-	0.02 L	0.02 *	-	-	-
16	0.032*	-	-	-	0.037R	-	-	-	-	0.037R	-	-	-
MEAN	.0251	.0270	.0270	.0300	-	.0260	.0250	.0280	-	.0271	.0530	.0530	.0550
STD DEV	.0033	-	.0014	-	-	.0014	-	-	-	.0018	-	.0014	-
REL STD	13.3	-	5.2	-	-	5.4	-	-	-	6.5	-	2.7	-
DES VAL	.025	-	-	-	-	-	-	-	-	.028	-	-	-

LAB	29012 CU TOT 5X DCP	29107 CU DIS AAS GF	29111 CU DIS ICP DA	29305 CU EXT AAS SE	29311 CU EXT ICP DA	29999 COPPER COMMON	30005 ZN TOT AAS SE	30009 ZN TOT 5X ICP	30011 ZN TOT 5X ICP	30012 ZN TOT 5X DCP	30107 ZN DIS AAS GF	30111 ZN DIS ICP DA	30304 ZN EXT AAS DA
1	-	-	-	-	-	0.054	-	0.034	-	-	-	-	-
2	-	-	-	0.053	-	0.053	-	-	-	-	-	-	0.035
3	-	-	-	-	-	0.053	0.035	0.032	-	-	-	-	-
6	-	-	-	-	-	0.055	-	-	0.025	-	-	-	-
8	-	-	-	-	0.07	0.07 *	-	-	-	-	-	-	-
9	-	-	0.053	-	-	0.053	-	-	-	-	-	0.035	-
10	-	-	0.055	-	-	0.055	-	-	-	-	-	0.034	-
11	-	-	-	0.052	-	0.052	-	-	-	-	-	-	-
14	-	0.041	-	-	-	0.041*	-	-	-	-	0.033	-	-
15	-	-	-	-	0.06	0.06	-	-	-	-	-	-	-
16	0.116R	-	-	-	-	0.116R	-	-	-	0.045	-	-	-
MEAN	-	.0410	.0540	.0525	.0650	.0546	.0350	.0330	.0250	.0450	.0330	.0345	.0350
STD DEV	-	-	.0014	.0007	.0071	.0072	-	.0014	-	-	-	.0007	-
REL STD	-	-	2.6	1.3	10.9	13.2	-	4.3	-	-	-	2.0	-
DES VAL	-	-	-	-	-	.053	-	-	-	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 40 PP 80 SAMPLE 3

LAB	30305 ZN EXT AAS SE	30311 ZN EXT ICP DA	30999 ZINC COMMON	38009 SR TOT ICP DA	38012 SR TOT DCP DA	38111 SR DIS ICP DA	38301 SR EXT AAS DA	38311 SR EXT ICP DA	38999 STRNTIUM COMMON	42009 MO TOT 5X ICP	42011 MO TOT 5X ICP	42012 MO TOT 5X DCP	42111 MO DIS ICP DA
1	-	-	0.034	-	-	-	-	-	-	0.016	-	-	-
2	-	-	0.035	-	-	-	-	-	-	-	-	-	-
3	-	-	0.035	0.171	-	-	-	-	0.171	0.017	-	-	-
6	-	-	0.025*	-	-	-	-	-	-	-	0.03 R	-	-
8	-	0.04	0.04 *	-	-	-	-	-	-	-	-	-	-
9	-	-	0.035	-	-	0.18	-	-	0.18	-	-	-	0.02
10	-	-	0.034	-	-	-	0.18	-	0.18	-	-	-	0.018
11	0.030	-	0.030	-	-	-	-	-	-	-	-	-	-
14	-	-	0.033	-	-	-	-	-	-	-	-	-	-
15	-	0.036	0.036	-	-	-	-	0.18	0.18	-	-	-	-
16	-	-	0.045*	-	0.359R	-	-	-	0.359R	-	-	0.022	-
MEAN	.0300	.0380	.0347	.1710	-	.1800	.1800	.1800	.1778	.0165	-	.0220	.0190
STD DEV	-	.0028	.0051	-	-	-	-	-	.0045	.0007	-	-	.0014
REL STD	-	7.4	14.6	-	-	-	-	-	2.5	4.3	-	-	7.4
DES VAL	-	-	.034	-	-	-	-	-	.172	-	-	-	-

LAB	42311 MO EXT ICP DA	42999 MOLYBNUM COMMON	48002 CD TOT AAS SE	48004	48009 CD TOT 5X ICP	48011 CD TOT 5X ICP	48012 CD TOT 5X DCP	48103 CD DIS AAS GF	48111 CD DIS ICP DA	48302 CD EXT AAS SE	48309 CD EXT AAS GF	48311 CD EXT ICP DA	48999 CADMIUM COMMON
1	-	0.016	-	-	0.021	-	-	-	-	-	-	-	0.021
2	-	-	-	-	-	-	-	-	-	0.021	-	-	0.021
3	-	0.017	0.021	-	0.020	-	-	-	-	-	-	-	0.021
6	-	0.03 R	-	-	-	0.020	-	-	-	-	-	-	0.020
8	-	-	-	-	-	-	-	-	-	-	0.022	-	0.022
9	-	0.02	-	0.023	-	-	-	-	-	-	-	-	0.023
10	-	0.018	-	-	-	-	-	-	0.020	-	-	-	0.020
11	-	-	-	-	-	-	-	-	-	0.020	-	-	0.020
14	-	-	-	-	-	-	-	0.020	-	-	-	-	0.020
15	0.02	0.02	-	-	-	-	-	-	-	-	-	0.022	0.022
16	-	0.022*	-	-	-	-	0.024	-	-	-	-	-	0.024*
MEAN	.0200	.0188	.0210	.0230	.0205	.0200	.0240	.0200	.0200	.0205	.0220	.0220	.0213
STD DEV	-	.0022	-	-	.0007	-	-	-	-	.0007	-	-	.0013
REL STD	-	11.8	-	-	3.4	-	-	-	-	3.4	-	-	6.3
DES VAL	-	.018	-	-	-	-	-	-	-	-	-	-	.021

LAB	56009 BA TOT 5X ICP	56011 BA TOT 5X ICP	56012 BA TOT 5X DCP	56111 BA DIS ICP DA	56311 BA EXT ICP DA	56999 BARIUM COMMON	82002 PB TOT AAS SE	82004 PB TOT AAS GF	82009 PB TOT 5X ICP	82011 PB TOT 5X ICP	82012 PB TOT 5X DCP	82104 PB DIS AAS GF	82302 PB EXT AAS SE
1	0.022	-	-	-	-	0.022	-	-	-	-	-	-	0.027
2	-	-	-	-	-	-	-	-	-	-	-	-	0.026
3	0.022	-	-	-	-	0.022	0.025	-	0.025	-	-	-	-
6	-	0.029	-	-	-	0.029	-	-	-	0.027	-	-	-
9	-	-	-	0.025	-	0.025	-	0.026	-	-	-	-	-
10	-	-	-	0.02	-	0.02	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	0.025
14	-	-	-	-	-	-	-	-	-	-	-	0.014R	-
15	-	-	-	-	0.024	0.024	-	-	-	-	-	-	-
16	-	-	0.040R	-	-	0.040R	-	-	-	-	0.040R	-	-
MEAN	.0220	.0290	-	.0225	.0240	.0237	.0250	.0260	.0250	.0270	-	-	.0260
STD DEV	.0000	-	-	.0035	-	.0031	-	-	-	-	-	-	.0010
REL STD	-1.0	-	-	15.7	-	13.3	-	-	-	-	-	-	3.8
DES VAL	-	-	-	-	-	.022	-	-	-	-	-	-	-

LAB	82309 PB EXT AAS GF	82311 PB EXT ICP DA	82999 LEAD COMMON
1	-	-	0.027
2	-	-	0.026
3	-	-	0.025
6	-	-	0.027
8	0.029	-	0.029
9	-	-	0.026
10	0.026	-	0.026
11	-	-	0.025
14	-	-	0.014R
15	-	0.05 L	0.05 L
16	-	-	0.040R
MEAN	.0275	-	.0264
STD DEV	.0021	-	.0013
REL STD	7.7	-	4.9
DES VAL	-	-	.026

LAB	00110 IONIC BALANC %	00120 SUM OF CATIONS	00125 SUM OF ANIONS	02011 COLOUR APPARE	02021 COLOUR VIS COM	02023 COLOUR SPECT	02024 COL TRU SPECT	02040 COLOUR COMMON	02041 CONDUCT SPEC 25	02060 CONDUCT COMMON	02073 TURB HACH	02074 TURB NPLMTRI	02077 TURB HACH FZ
1	0.93	3.13	3.07	-	-	-	1.	1.	315.	315.	0.12	-	-
2	-0.84	3.092	3.144	5. L	-	-	-	5. L	315.	315.	0.2	-	-
3	-0.2	3.108	3.121	5. L	-	-	-	5. L	331.	331.	0.13	-	-
4	-	-	-	-	5.	-	-	5.	312.	312.	-	-	-
5	-1.02	3.10	3.16	5. L	-	-	-	5. L	307.	307.	0.11	-	-
6	0.22	2.24	3.26	-	-	-	-	-	294.	294.	-	0.21	-
7	-0.6	3.08	3.04	2.	-	-	-	2.	311.	311.	0.1	-	-
8	-0.19	3.35	3.36	5. L	-	-	-	5. L	308.	308.	-	0.06	-
9	1.92	3.18	3.06	-	-	-	-	-	304.	304.	-	-	-
10	-0.66	3.103	3.144	-	-	2.	-	2.	303.	303.	-	0.1	-
11	-	-	-	5. L	-	-	-	5. L	300.	300.	-	-	0.1
14	-	-	-	-	-	-	-	-	311.	311.	-	-	-
15	-	-	-	5. L	-	-	-	5. L	285.	285.	-	0.1 L	-
16	-	-	-	-	-	-	-	-	390. R	390. R	0.1	-	-
MEAN	-.0489	3.0426	3.1510	2.0000	5.0000	2.0000	1.0000	2.5000	307.3846	307.3846	.1267	.1233	.1000
STD DEV	.9484	.3123	.1023	-	-	-	-	1.7321	11.1321	11.1321	.0378	.0777	-
REL STD	-1.0	10.3	3.2	-	-	-	-	69.3	3.6	3.6	29.8	63.0	-
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

LAB	02081 TURB RATIO	02090 TURBIDTY COMMON	05100 BORON ?	05105 BORON AA CARM	05106 BORON F AZOMETH	05107 BORON ICP DA	05111 BORON F ICP DA	05190 BORON COMMON	06009 TOC CO2 IR	06051 TIC COMB IR	06101 DOC IR /DIF	06104 DOC UV CO2 IR	06107 DOC UV CO2 PHE
1	-	0.12	-	-	-	-	-	-	-	-	-	-	2.3
2	-	0.2	-	-	-	-	-	-	-	-	-	-	2.0
3	-	0.13	-	-	-	-	-	-	-	-	-	2.7	-
4	0.12	0.12	-	0.087	-	-	-	0.087*	-	-	-	2.39	-
5	-	0.11	-	-	-	-	-	-	-	-	4.77 R	-	-
6	-	0.21	-	-	-	-	-	-	-	-	-	1.8	-
7	-	0.1	-	-	-	-	-	-	-	-	-	-	-
8	-	0.06	-	-	0.05 L	-	-	0.05 L	-	-	-	-	-
10	-	0.1	-	-	-	-	0.03	0.03	-	-	-	-	-
11	-	0.1	-	-	-	-	-	-	-	-	-	-	-
15	-	0.1 L	-	-	-	0.02	-	0.02	1.	24.	-	-	-
16	-	0.1	0.05 L	-	-	-	-	0.05 L	-	-	-	-	-
MEAN	.1200	.1227	-	.0870	-	.0200	.0300	.0457	1.0000	24.0000	-	2.2967	2.1500
STD DEV	-	.0445	-	-	-	-	-	.0361	-	-	-	.4572	.2121
REL STD	-	36.3	-	-	-	-	-	79.1	-	-	-	19.9	9.9
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

LAB	06109 DOC UV CO2 OH	06112 DOC PER IR	06150 D O C COMMON	06151 DIC IR COMBUST	06152 DIC UV CO2 IR	06154 DIC AA CO2 PHE	06159 DIC AA CO2 OH	06490 D I C COMMON	07000	07010 TKN AA SAL	07015 TKN DIG BERTHEL	07016 TKN BLK AMM-SAL	07021 TKN BLK DIG BER
1	-	-	2.3	-	-	23.1	-	23.1	-	-	-	-	0.018
2	-	-	2.0	-	-	-	-	-	-	-	-	-	-
3	-	-	2.7 *	-	23.3	-	-	23.3	-	0.121	-	-	-
4	-	-	2.39	-	-	-	-	-	-	-	-	-	-
5	-	-	4.77 R	23.6	-	-	-	23.6	-	-	-	-	-
6	-	-	1.8	-	-	-	-	-	-	-	-	0.3	-
8	-	-	-	-	-	-	-	-	-	-	0.20	-	-
10	1.8	-	1.8	-	-	-	22.	22.	-	-	-	-	-
15	-	-	1. *	-	-	-	-	24.	0.27	-	-	-	-
16	-	2.6	2.6	-	21.1	-	-	21.1	-	-	-	-	-
MEAN	1.8000	2.6000	2.0738	23.6000	22.2000	23.1000	22.0000	22.8500	.2700	.1210	.2000	.3000	.0180
STD DEV	-	-	.5514	-	1.5556	-	-	1.0895	-	-	-	-	-
REL STD	-	-	26.6	-	7.0	-	-	4.8	-	-	-	-	-
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

LAB	07090 TKN COMMON	07109 NO3+NO2 AA HYD	07110 NO3+NO2 AA2 CD	07111 NO3+NO2 DIS SPEC	07112 NO3+NO2 UF AA CD	07390 NITRATE COMMON	07505 NH3 TOT AA BERT	07540 NH3 TOT AA SAL	07555 NH3 DIS AA PHEN	07557 NH3 DIS AA INDO	07562 NH3 DIS AA EDTA	07590 AMMONIA COMMON	07600 T N PER AUTO
1	0.018*	-	-	0.315	-	0.315	-	-	-	-	0.005	0.005	-
2	-	-	0.34	-	-	0.34	-	-	-	-	-	-	-
3	0.121	-	-	-	0.304	0.304	0.005L	-	-	-	-	0.005L	-
4	-	-	0.317	-	-	0.317	-	0.005L	-	-	-	0.005L	-
5	-	-	0.335	-	-	0.335	-	-	-	0.003	-	0.003	-
6	0.3 *	0.37	-	-	-	0.37 *	-	-	-	0.01	-	0.01 *	-
7	-	-	-	-	0.28	0.28 *	-	-	-	-	-	-	-
8	0.20	-	0.31	-	-	0.31	-	-	0.002	-	-	0.002	-
9	-	0.28	-	-	-	0.28 *	-	-	-	-	-	-	-
10	-	0.275	-	-	-	0.275*	-	-	0.010L	-	-	0.010L	-
11	-	-	0.04 R	-	-	0.04 R	-	0.007L	-	-	-	0.007L	-
13	-	-	0.3	-	-	0.3	-	-	-	-	-	-	-
14	-	-	-	0.365	-	0.365*	-	-	-	-	-	-	-
15	0.27	-	0.302	-	-	0.302	-	-	0.006	-	-	0.006	0.57
MEAN	.1818	.3083	.3173	.3400	.2920	.3148	-	-	.0040	.0065	.0050	.0052	.5700
STD DEV	.1147	.0535	.0168	.0354	.0170	.0305	-	-	.0028	.0049	-	.0031	-
REL STD	63.1	17.3	5.3	10.4	5.8	9.7	-	-	70.7	76.1	-	59.9	-
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

LAB	07601 T N UV AA SUL	07605 T N UV HY SUL	07651 T N DIS UV AA	07655 T N DIS UV EDTA	07690 TOT N COMMON	07790 T N DIS COMMON	09103 F DIS COL SP	09105 F DIS SP EL	09106 F DIS EL POT	09107 F DIS AUT POT	09108 F DIS SP EL	09115 F DIS AA ALIZ	09190 FLUORIDE COMMON
1	-	-	-	-	-	-	-	-	-	0.12	-	-	0.12
2	0.40	-	-	-	-	0.40	-	-	0.12	-	-	-	0.12
3	0.448	-	-	-	-	0.448	-	-	-	-	0.14	-	0.14
4	-	-	0.470	-	-	0.470	-	-	-	-	-	-	-
5	-	-	-	0.450	-	0.450	-	-	0.133	-	-	-	0.133
6	-	-	-	-	-	-	0.1	-	-	-	-	-	0.1 *
8	-	-	-	-	-	-	-	0.17	-	-	-	-	0.17
10	-	0.44	-	-	-	0.44	-	-	-	-	-	0.16	0.16
11	-	-	-	-	-	-	-	0.12	-	-	-	-	0.12
15	-	-	-	-	0.57	-	-	0.2	-	-	-	-	0.2 *
MEAN	.4240	.4400	.4700	.4500	.5700	.4416	.1000	.1633	.1265	.1200	.1400	.1600	.1403
STD DEV	.0339	-	-	-	-	.0257	-	.0404	.0092	-	-	-	.0311
REL STD	8.0	-	-	-	-	5.8	-	24.7	7.3	-	-	-	22.2
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

LAB	10101 ALKLNTY TITR'N	10108 ALKLNTY POT TIT	10109 ALKLNTY POT TIT	10111 ALKLNTY TIT PRO	10112 ALKLNTY TIT CON	10190 ALKLINTY COMMON	10301 PH	10390 PH COMMON	10602 HARDNSS CALC'D	10603 HARDNSS TITR'N	10606 HARDNSS CALC'D	10690 HARDNESS COMMON	11001 NA TOT AAS
1	94.1	-	-	-	-	94.1	7.94	7.94	128.6	-	-	128.6	-
2	91.9	-	-	-	-	91.9	8.2	8.2	126.1	-	-	126.1	-
3	93.3	-	-	90.8	-	90.8	7.90	7.90	-	-	127.	127.	-
4	92.7	-	-	-	-	92.7	8.04	8.04	-	-	-	-	-
5	94.9	-	-	-	-	94.9	8.02	8.02	-	-	-	-	-
6	-	-	99.	-	-	99.	8.1	8.1	-	132.	-	132.	-
7	89.5	-	-	-	-	89.5	8.1	8.1	127.1	128.6	-	128.6	-
8	-	-	92.	-	-	92.	8.10	8.10	135.	-	-	135.	-
9	-	93.	-	-	-	93.	8.02	8.02	126.	-	-	126.	-
10	-	-	-	-	95.	95.	8.10	8.10	-	-	-	-	-
11	94.	-	-	-	-	94.	8.27	8.27	124.	-	-	124.	-
13	87.	-	-	-	-	87.	7.4	7.4	135.	-	-	135.	-
14	93.5	-	-	-	-	93.5	8.04	8.04	112. R	-	-	112. R	12.6
15	93.4	-	-	-	-	93.4	8.2	8.2	125.	-	-	125.	-
16	96.	-	-	-	-	96.	7.92	7.92	128.0	-	-	128.0	-
MEAN	92.7545	93.0000	95.5000	90.8000	95.0000	93.1200	8.0233	8.0233	128.3111	130.3000	127.0000	128.6636	12.6000
STD DEV	2.5339	-	4.9497	-	-	2.8082	.2016	.2016	4.0452	2.4042	-	3.7879	-
REL STD	2.7	-	5.2	-	-	3.0	2.5	2.5	3.2	1.8	-	2.9	-
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 40 PP 80 SAMPLE 4

LAB	11005 NA TOT ICP	11007 NA DIS DCP	11102 NA F AAS	11103 NA DIS FL PH	11105 NA DIS AAS DA	11107 NA UF FL PH	11111 NA DIS ICP	11311 NA EXT ICP	11990 SODIUM COMMON	12005 MG TOT ICP	12012 MG TOT DCP	12101 MG DIS CALC'D	12102 MG DIS AAS DA
1	-	-	-	12.	-	-	-	-	12.	-	-	-	-
2	-	-	-	12.3	-	-	-	-	12.3	-	-	-	-
3	-	-	-	-	-	12.4	-	-	12.4	-	-	-	-
5	-	-	-	12.3	-	-	-	-	12.3	-	-	-	-
6	-	-	13.	-	-	-	-	-	13.	-	-	6.3 R	-
7	-	-	-	-	11.7	-	-	-	11.7	-	-	-	8.3
8	-	-	-	-	-	-	-	14.1	14.1 *	-	-	-	-
9	14.	-	-	-	-	-	-	-	14.	8.4	-	-	-
10	11.57	-	-	-	-	-	-	-	11.57	8.27	-	-	-
11	-	-	13.	-	-	-	-	-	13.	-	-	-	8.2
13	-	-	-	-	-	-	13.2	-	13.2	-	-	-	-
14	-	-	-	-	-	-	-	-	12.6	-	-	-	7.24
15	-	-	-	-	-	-	12.0	-	12.0	-	-	-	-
16	-	9.71 R	-	-	-	-	-	-	9.71 R	-	8.08	-	-
MEAN	12.7850	-	13.0000	12.2000	11.7000	12.4000	12.6000	14.1000	12.6285	8.3350	8.0800	-	7.9133
STD DEV	1.7183	-	.0000	.1732	-	-	.8485	-	.8005	.0919	-	-	.5853
REL STD	13.4	-	-1.0	1.4	-	-	6.7	-	6.3	1.1	-	-	7.4
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

LAB	12103	12105	12106 MG UF AAS DA	12107 MG DIS AAS AUT	12111 MG DIS ICP	12311 MG EXT ICP	12990 MGNESIUM COMMON	14102 SILICA ANSA AA	14105 SILICA MOLY AA	14106 SILICA MOLY	14107 SILICA MOLY AA	14111 SILICA ICP DA	14112 SILICA DCP DA
1	-	8.2	-	-	-	-	8.2	-	-	-	0.5	-	-
2	-	-	-	8.2	-	-	8.2	0.55	-	-	-	-	-
3	-	-	8.2	-	-	-	8.2	-	-	0.53	-	-	-
5	8.23	-	-	-	-	-	8.23	-	0.5	-	-	-	-
6	-	-	-	-	-	-	6.3 R	-	-	-	-	-	-
7	-	-	-	-	-	-	8.3	-	-	-	-	-	-
8	-	-	-	-	-	9.20	9.20 *	-	0.4 R	-	-	-	-
9	-	-	-	-	-	-	8.4	-	-	-	-	0.54	-
10	-	-	-	-	-	-	8.27	-	0.52	-	-	-	-
11	-	-	-	-	-	-	8.2	0.50	-	-	-	-	-
13	-	-	-	-	8.66	-	8.66	-	-	-	-	-	-
14	-	-	-	-	-	-	7.24 *	-	-	-	-	-	-
15	-	-	-	-	7.9	-	7.9	-	-	-	-	0.23 R	-
16	-	-	-	-	-	-	8.08	-	-	-	-	-	2.13 R
MEAN	8.2300	8.2000	8.2000	8.2000	8.2800	9.2000	8.2369	.5250	.5100	.5300	.5000	.5400	-
STD DEV	-	-	-	-	.5374	-	.4355	.0354	.0141	-	-	-	-
REL STD	-	-	-	-	6.5	-	5.3	6.7	2.8	-	-	-	-
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

LAB	14190 SILICA COMMON	15313 T P ACL AA SNCL	15401 T P UV AA ASC	15406 T P UF AA ASC	15409 T P BLK AA ASC	15412	15413 T P ACL AA SNCL	15490 TOT P COMMON	16304 SO4 DIS AUTO BA	16306 SO4 DIS AA MTB	16307 SO4 UF AA MTB	16309 SO4 DIS I C	16310 SO4 DIS AA CALM
1	0.5	-	-	-	-	0.052	-	0.052	-	26.	-	-	-
2	0.55	-	-	-	-	-	-	-	29.5	-	-	27.3	-
3	0.53	-	-	-	-	-	0.050	0.050	-	-	27.8	-	-
4	-	-	-	0.186R	-	-	-	0.186R	-	-	-	-	-
5	0.5	-	-	-	-	-	-	-	-	28.2	-	-	-
6	-	-	-	-	0.06	-	-	0.06	29.	-	-	-	-
7	-	-	-	-	-	-	-	-	-	29.1	-	-	-
8	0.4 R	-	-	-	-	-	0.053	0.053	-	45. R	-	-	-
9	0.54	-	-	-	-	-	-	-	-	-	-	27.	-
10	0.52	-	0.040	-	-	-	-	0.040*	-	-	-	-	26.
11	0.50	0.064	-	-	-	-	-	0.064*	-	28.	-	-	-
13	-	-	-	-	-	-	-	-	-	29.6	-	-	-
14	-	-	-	-	-	-	-	-	-	28.5	-	-	-
15	0.23 R	-	-	0.048	-	-	-	0.048	-	25.	-	-	-
16	2.13 R	-	-	-	-	-	-	-	-	-	-	-	-
MEAN	.5200	.0640	.0400	.0480	.0600	.0520	.0515	.0524	29.2500	27.7714	27.8000	27.1500	26.0000
STD DEV	.0208	-	-	-	-	-	.0021	.0079	.3536	1.6680	-	.2121	-
REL STD	4.0	-	-	-	-	-	4.1	15.0	1.2	6.0	-	.8	-
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

LAB	16311 SO4 DIS IC	16990 SULFATE COMMON	17203 CL DIS AA FE	17204 CL DIS AG TIT	17206 CL DIS AA HG	17208 CL DIS AA HG	17209 CL DIS I C	17210 CL DIS TIT CON	17211 CL DIS IC	17990 CHLORIDE COMMON	19001 K TOT AAS	19005 K TOT ICP	19008 K TOT DCP
1	-	26.	-	-	21.9	-	-	-	-	21.9	-	-	-
2	-	27.3	-	-	-	-	23.5	-	-	23.5	-	-	-
3	-	27.8	-	-	-	22.6	-	-	-	22.6	-	-	-
5	-	28.2	-	-	23.0	-	-	-	-	23.0	-	-	-
6	-	29.	-	24.	-	-	-	-	-	24.	-	-	-
7	-	29.1	22.3	-	-	-	-	-	-	22.3	-	-	-
8	-	45. R	-	-	20. R	-	-	-	-	20. R	-	-	-
9	-	27.	-	-	-	-	22.	-	-	22.	-	1.2	-
10	-	26.	-	-	-	-	-	24.	-	24.	-	1.51	-
11	-	28.	-	-	23.	-	-	-	-	23.	-	-	-
13	-	29.6	-	-	23.0	-	-	-	-	23.0	-	-	-
14	-	28.5	-	-	-	-	23.2	-	-	23.2	1.47	-	-
15	-	25.	-	-	22.	-	-	-	-	22.	-	-	-
16	30.	30.	-	-	-	-	-	-	32. R	32. R	-	-	1.27
MEAN	30.0000	27.8077	22.3000	24.0000	22.5800	22.6000	22.9000	24.0000	-	22.8750	1.4700	1.3550	1.2700
STD DEV	-	1.5030	-	-	.5762	-	.7937	-	-	.7362	-	.2192	-
REL STD	-	5.4	-	-	2.6	-	3.5	-	-	3.2	-	16.2	-
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

LAB	19102 K DIS AAS	19103 K DIS FLM PH	19105 K DIS AAS DA	19106 K DIS AAS LI	19107 K DIS FLM PH	19111 K DIS ICP	19301 K EXT HNO3 AA	19990 PTASSIUM COMMON	20005 CA TOT ICP	20007 CA TOT DCP	20050 CA DIS AAS NO	20100 CA DIS CALC'D	20103 CA DIS AAS
1	-	1.37	-	-	-	-	-	1.37	-	-	-	-	-
2	-	1.4	-	-	-	-	-	1.4	-	-	-	-	-
3	-	-	-	-	1.47	-	-	1.47	-	-	-	-	-
5	-	1.4	-	-	-	-	-	1.4	-	-	-	-	37.1
6	1.7	-	-	-	-	-	-	1.7 *	-	-	-	42. R	-
7	1.27	-	-	-	-	-	-	1.27	-	-	-	-	37.2
8	-	-	-	-	-	-	1.20	1.20 *	-	-	-	-	-
9	-	-	-	-	-	-	-	1.2 *	37.	-	-	-	-
10	-	-	-	-	-	-	-	1.51	37.7	-	-	-	-
11	-	-	-	1.7	-	-	-	1.7 *	-	-	-	-	36.
13	-	-	-	-	-	1.50	-	1.50	-	-	-	-	-
14	-	-	-	-	-	-	-	1.47	-	-	33.1	-	-
15	-	-	1.53	-	-	-	-	1.53	-	-	-	-	-
16	-	-	-	-	-	-	-	1.27	-	34.8	-	-	-
MEAN	1.4850	1.3900	1.5300	1.7000	1.4700	1.5000	1.2000	1.4279	37.3500	34.8000	33.1000	-	36.7667
STD DEV	.3041	.0173	-	-	-	-	-	.1600	.4950	-	-	-	.6658
REL STD	20.5	1.2	-	-	-	-	-	11.2	1.3	-	-	-	1.8
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-	-

LAB	20107	20108 CA DIS AAS UF	20110 CA DIS AAS AUT	20111 CA DIS ICP	20311 CA EXT ICP	20990 CALCIUM COMMON
1	38.	-	-	-	-	38.
2	-	-	37.	-	-	37.
3	-	37.2	-	-	-	37.2
5	-	-	-	-	-	37.1
6	-	-	-	-	-	42. R
7	-	-	-	-	-	37.2
8	-	-	-	-	39.0	39.0
9	-	-	-	-	-	37.
10	-	-	-	-	-	37.7
11	-	-	-	-	-	36.
13	-	-	-	38.5	-	38.5
14	-	-	-	-	-	33.1
15	-	-	-	36.9	-	36.9
16	-	-	-	-	-	34.8
MEAN	38.0000	37.2000	37.0000	37.7000	39.0000	36.8846
STD DEV	-	-	-	1.1314	-	1.5470
REL STD	-	-	-	3.0	-	4.2
DES VAL	-	-	-	-	-	-

DATES RECEIVED	1 89/03/14	2 89/05/01	3 89/03/23	3 89/04/28	4 89/05/02
	5 89/05/01	6 89/03/21	6 89/05/02	7 89/06/05	8 89/05/19
	9 89/04/26	10 89/04/25	11 89/04/25	13 89/05/02	14 89/06/01
	15 89/04/28	16 89/03/29			

NOTE: ALL CONCENTRATION UNITS ARE EXPRESSED IN MG/L OF EACH ELEMENT, THE EXCEPTIONS BEING: COLOUR IN RELATIVE UNITS, CONDUCTIVITY IN USIE/CM, TURBIDITY IN JTU OR NTU, NITROGEN ANALYSES IN "N", ALKALINITY & HARDNESS IN CACO3, SILICA IN SIO2, AND SULFATE IN SO4.

Canada Centre for Inland Waters
National Water Research Institute
867 Lakeshore Road, P.O. Box 5050
Burlington, Ontario
L7R 4A6

September 8 Septembre, 1989.

To: Participants & Managers in:
A: Participants et Directeurs dans:

Federal-Provicial Quality Assurance Program
Programme d'Assurance-Qualité Fédéral-Provincial (PAQFP)

Final Report/Rapport Dernier: FPQA Studies/Etudes 41-42

Vous trouverez en annexe le résumé dernier de l'étude F/P susmentionées.

Si vous avez de commentaire sur ce résumé, ou des corrections valides à notre base de données, veuillez me les transmettre.

I have enclosed the final report for the above mentioned studies.

If you have any comments on this report, or any legitimate corrections to the data base, please do not hesitate to communicate them.

Harry A.

H. Alkema
Quality Assurance Project
Research & Applications Branch

Attachment: Distribution List
En annexe: Liste de diffusion

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RESEARCH & APPLICATIONS BRANCH

FINAL REPORT

REPORT NO. RAB 89–17 (Eng)

FEDERAL PROVINCIAL QUALITY ASSURANCE PROGRAM

STUDIES 41 AND 42

for May and June 1989

TRACE METALS, MAJOR IONS, NUTRIENTS AND PHYSICAL PARAMETERS IN SURFACE WATERS

by

H. Alkema

Quality Assurance Section
National Water Research Institute
Burlington, Ontario

September 1989

(Ce rapport est aussi disponible en français)

Introduction

As part of an on-going study, the Quality Assurance Section, NWRI in Burlington, Ontario, has been sending reference water samples bi-monthly to chemical laboratories participating in the FP program. This report summarizes the most recent FP interlaboratory quality assurance studies: FP 41 and 42, for the months May and June, 1989. These two studies dealt with trace metals, major ions, nutrients and physical parameters. The concentrations were mainly low.

Study Design

Four water samples were submitted to each laboratory for chemical analyses. Two samples were submitted for trace metals analysis, while the remaining two were submitted for major ions, nutrients and some physical measurements. The following is a breakdown of the four samples:

FP 41 – Sample 1 – 125 ml, high level* for trace metals (3% HNO_3)
Sample 2 – up to 1 L, major ions etc., stored at 4°C

FP 42 – Sample 3 – 1 L, low level* for trace metals (0.2% HNO_3)
Sample 4 – up to 1 L, major ions, etc., stored at 4°C

* for definitions see Appendix 1

Treatment of Data

Each laboratory was asked to perform only those analyses which were routine to their particular laboratory, using the general methodology guidelines listed above. Results for these analyses were reported as required by the standard report sheets provided with the QA samples. Submitted results were tabulated for each parameter, first for each method reported, and then for

all methods combined. These data, and the resulting statistics are presented in the Data Summary. (attached)

Preliminary data summaries (RAB # 89–12), including problematic results, were sent July 5, and August 11. Each laboratory was given three weeks to notify us of any errors in data transcription, compilation, or flags.

Performance Indicators

In the Federal Provincial QA program, two types of reference samples are used for the accuracy assessment. These are Reference Waters (RMs) and Certified Reference waters (CRMs) which have Design Values for the stable parameters. Also, regional samples are used occasionally as natural representative samples. The means for these regional samples, and the Design Values for the reference waters are used to test each reported result for accuracy.

Percentage deviations from the reference values are used as an indication by the laboratory head to determine the extent of the discrepancies between the laboratory result and the reference value. However, please keep in mind that at low levels, high % deviations are often seen, and may be misleading if interpreted too strictly.

A result which deviates more than the greater of 10% or 1 standard deviation from the reference value is marked with an asterisk in the data table and its value tabulated in the flagged data table (Table 1). Results reported with an "L" (less than) or flagged with an "R" (rejectable) are not used in the statistical calculations. Performance indicators are fully explained in Appendix II.

Comments on Laboratory Performance

Results accompanied with a 'less than' are difficult to appraise. If a design value or mean is significantly lower than the detection limit given by a particular laboratory, then that detection limit is too high. Such a result is assigned an 'HDL' and is tabulated for each laboratory in Table 1.

If, on the other hand, the detection limit reported is far lower than the mean or design value, then the use of 'less than' is clearly inadequate and the result is flagged low. The magnitude of the deviation from the mean in such a case is taken from the detection limit given.

Attached are two tables listing flagged data by laboratory (Table 1), and listing parameters for which there was a high standard deviation (Table 2). Formerly called a high coefficient of variation, the standard deviation is generated with standardized criteria that are included with the automated flagging routine. These automated criteria have been in use since March 1988 (Study FP 27), and should provide a more accurate and consistent listing of the difficult to analyze parameters or levels. A listing of the criteria used to indicate high deviation of analysis is available on request. Your comments would be appreciated.

Provincial laboratories average number of deviations per sample was 2.2.
Federal laboratories average number of deviations per sample was 2.2.

TABLE 1: FED-PROV LABORATORIES FLAGGED DATA - STUDIES FP 41-42

LAB 2	FLAGS :	D O C	-25%		NITRATE	41%		T N DIS	-48%
		CHLORIDE	-12%						
LAB 3	FLAGS :	TKN	46%		SULFATE	-14%		CHLORIDE	19%
		D O C	-20%		SULFATE	-25%			
LAB 4	FLAGS :	BORON	141%	R	D O C	518%	R	T N DIS	12%
		BORON	73%	R	D O C	-86%	R	T N DIS	35%
LAB 5	FLAGS :	D O C	167%	R	D O C	20%			
LAB 7	FLAGS :	SULFATE	-27%		SODIUM	-12%		SULFATE	18%
LAB 9	FLAGS :	ALUMINUM	-34%						
LAB 10	FLAGS :	NITRATE	-12%		CHROMIUM	23%		IRON	-29%
		COLOUR	-32%		D O C	-22%		NITRATE	-41%
	HDL :	AMMONIA			TOT P			TOT P	
LAB 11	FLAGS :	NICKEL	-83%	R	COPPER	17%		SULFATE	123% R
		CHLORIDE	82%	R	MANGNESE	-58%	R	SODIUM	-12%
		SULFATE	54%	R	CHLORIDE	-14%			
	HDL :	AMMONIA			AMMONIA				
LAB 13	FLAGS :	MGNESIUM	11%		CHLORIDE	19%		HARDNESS	36% R
	HDL :	AMMONIA			AMMONIA				
LAB 14	FLAGS :	MANGNESE	87%	R	IRON	192%	R	COPPER	87% R
		SODIUM	25%		ALUMINUM	-37%		MANGNESE	25%
		SODIUM	12%						
	HDL :	NITRATE							
LAB 15	FLAGS :	D O C	72%	R	AMMONIA	400%	R	CHLORIDE	98% R
		CHROMIUM	23%		LEAD	-80%	R	AMMONIA	152% R
		HARDNESS	18%		CHLORIDE	20%			
	HDL :	NICKEL			D I C				
LAB 16	FLAGS :	VANADIUM	-29%	R	MANGNESE	35%		COBALT	-12%
		NICKEL	17%		COPPER	1761%	R	ZINC	45% R
		STRNTIUM	39%	R	BARIUM	19%	R	CONDUCT	13% R
		D I C	-37%	R	SULFATE	53%	R	CHLORIDE	-21%
		VANADIUM	-64%	R	MANGNESE	33%		ZINC	33% R
		STRNTIUM	27%		MOLYBNUM	27%		BARIUM	23% R
		LEAD	-50%	R	CONDUCT	12%		HARDNESS	-20%
		SULFATE	-29%		CHLORIDE	-82%	L		
	HDL :	CHLORIDE							
LAB 19	FLAGS :	CHROMIUM	-32%		D O C	84%		SODIUM	-36%
		NICKEL	-31%		D O C	22%		TKN	-15%
		ALKLINTY	85%						
	HDL :	AMMONIA			TOT P			LEAD	
		D I C			AMMONIA			TOT P	

. . . . /2

LAB 20	FLAGS :	CHROMIUM	-25%	D O C	-100%	R	D I C	21%	
		TKN	-44%	SULFATE	13%		CHLORIDE	19%	
		PTASSIUM	24%	IRON	-23%		TURBIDTY	138%	
		NITRATE	41%	TOT N	11%		SULFATE	64%	R
		PTASSIUM	47%						
	HDL :	D I C							
LAB 21	FLAGS :	ALUMINUM	107%	R	VANADIUM	12%		CHROMIUM	40%	R
		ZINC	27%		MOLYBNUM	-44%	R	CADMIUM	-27%	R
		BARIUM	100%	R	FLUORIDE	100%	R	HARDNESS	12%	
		CALCIUM	14%		ALUMINUM	52%		VANADIUM	27%	
		CHROMIUM	23%		MOLYBNUM	-55%	L	CADMIUM	-80%	R
		BARIUM	102%	R	COLOUR	35%		TURBIDTY	99%	
		NITRATE	-72%		FLUORIDE	229%	R	SULFATE	-29%	
	HDL :	MOLYBNUM							

NOTE: A VERY HIGH FREQUENCY OF FLAGGED RESULTS (OR A HIGH %) IS INDICATIVE OF POOR PERFORMANCE. ON THE OTHER HAND, LABS WITH FEW IF ANY FLAGS ARE JUDGED TO HAVE VERY GOOD PERFORMANCE.

ALSO, AN "R" FLAG INDICATES A NON COMPARABLE RESULT, THAT IS, ONE PRODUCED WITH NON RANDOM FACTORS. AN "L" FLAG INDICATES A 'LESS THAN' RESULT LOWER THAN THE REFERENCE VALUE.

TABLE 2: HIGH STANDARD DEVIATION

PARAMETER		LEVEL	
BORON	AT	.032	PPM
D O C	AT	1.683	PPM
SODIUM	AT	1.277	PPM
ALUMINUM	AT	.061	PPM
COLOUR	AT	133.111	PPM
BORON	AT	.088	PPM
T N DIS	AT	.192	PPM
ALKLINTY	AT	3.235	PPM

APPENDIX I

Definitions of Types of Metals Analysis

1. HIGH LEVEL ANALYSIS

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

2. LOW LEVEL ANALYSIS

Analysis is 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, or DCP.
3. Digestion of aqueous phase and ICAP or DCP analysis.
4. Graphite tube (flameless) AAS.

Updated March 1989.

APPENDIX II

Performance Indicators

1. Flagged Results

As a first indication that analysis results are appreciably deviant from the expected value, each submitted result is tested with the 10% or 1 Standard Deviation Rule. When a result is found to deviate more than 10%, or more than 1 standard deviation when this is greater than 10%, the result is flagged with an asterisk in the data summary and tabled for that laboratory in the Flagged Data Table. Typically at low levels the 10% criteria is too small and the 1 standard deviation criteria effectively indicates deviant analytical results. As performance indicator, the flagged results indicate to laboratory heads that in-house QC procedures and the methodology concerned need to be ivestigated. Results may still be comparable.

2. Grubbs' Rejectable Results

For every parameter, each laboratory result is statistically tested to see if it is outlying. Outlying results are caused by non random causes such as a faulty calibration or incorrect transcription. These outlying results, calculated by the Grubbs' procedure,* and indicated in the data tables with an 'R', are noncomparable with the other data for that parameter.

3. A High Standard Deviation for a Parameter

Occasionally data for a difficult to analyse parameter yields a very high relative standard deviation (RSD). When a high RSD is not due to outlying results, there are noncomparable results within the data set. In such a case, the RSD for that parameter is indicated in Table 2, entitiled: High Standard Deviations.

4. High Detection Limits (HDL's)

Each laboratory determines its own detection limits according to its own requirements. When major differences in detection limits occur, an HDL is indicated for the particular laboratory in the Flagged Data Table. An HDL indicates that low level analysis may not be comparable with the analyses of other laboratories.

* reference : Frank E. Grubbs, Technometrics, 1969, p. 1.

DATA SUMMARY

FEDERAL-PROVINCIAL & PRAIRIE PROVINCES QUALITY ASSURANCE PROGRAMS

STUDY NO. FP 41 PP 81 DATE: 01/05/89 DUE DATE: 30/06/89

SAMPLE 1 SPIKED SAMPLE. TRACE METALS D/A. (IN 3.0% HNO3)

LAB	13009 AL TOT 5X ICP	13030	13102 AL DIS AAS DA	13111 AL DIS ICP DA	13302 AL EXT AAS DA	13321 AL EXT ICP DA	13322 AL EXT DCP DA	13999 ALUMINUM COMMON	23004	23009 V TOT 5X ICP	23011 V TOT 5X ICP	23012 V TOT 5X DCP	23111 V DIS ICP DA
1	-	0.508	-	-	-	-	-	0.508	-	0.476	-	-	-
2	-	-	-	-	0.5	-	-	0.5	-	-	-	-	-
3	-	-	-	-	0.496	0.529	-	0.496	-	-	-	-	-
6	0.50	-	-	-	-	-	-	0.50	-	-	0.48	-	-
8	-	-	-	-	0.8 R	-	-	0.8 R	-	-	-	-	-
9	-	-	-	0.50	-	-	-	0.50	-	-	-	-	0.50
10	-	-	-	0.45	-	-	-	0.45	-	-	-	-	0.454
15	-	-	-	0.46	-	-	-	0.46	-	-	-	-	0.51
16	-	-	-	-	-	-	0.554	0.554	-	-	-	0.350R	-
19	0.460	-	-	-	-	-	-	0.460	-	0.467	-	-	-
20	0.50	-	-	-	-	-	-	0.50	-	0.45	-	-	-
21	-	-	1.06 R	-	-	-	-	1.06 R	0.551	-	-	-	-
MEAN	.4867	.5080	-	.4700	.4980	.5290	.5540	.4928	.5510	.4643	.4800	-	.4880
STD DEV	.0231	-	-	.0265	.0028	-	-	.0301	-	.0132	-	-	.0299
REL STD	4.7	-	-	5.6	.6	-	-	6.1	-	2.8	-	-	6.1
DES VAL	-	-	-	-	-	-	-	.513	-	-	-	-	-

LAB	23321 V EXT ICP DA	23999 VANADIUM COMMON	24004 CR TOT AAS GF	24009 CR TOT 5X ICP	24011 CR TOT 5X ICP	24012 CR TOT 5X DCP	24104 CR DIS AAS DA	24111 CR DIS ICP DA	24311 CR EXT ICP DA	24321 CR EXT ICP DA	24999 CHROMIUM COMMON	25003 MN TOT 5X ICP	25010 MN TOT 5X ICP
1	-	0.476	-	0.050	-	-	-	-	-	-	0.050	0.046	-
3	0.492	0.492	-	-	-	-	-	-	-	0.051	0.051	-	-
6	-	0.48	-	-	0.045	-	-	-	-	-	0.045*	-	-
8	-	-	0.079R	-	-	-	-	-	-	-	0.079R	-	-
9	-	0.50	-	-	-	-	-	0.049	-	-	0.049	-	-
10	-	0.454	-	-	-	-	-	0.046	-	-	0.046	-	-
13	-	-	-	-	-	-	-	-	0.05	-	0.05	-	-
15	-	0.51	-	-	-	-	-	0.048	-	-	0.048	-	-
16	-	0.350R	-	-	-	0.050	-	-	-	-	0.050	-	-
19	-	0.467	-	0.036	-	-	-	-	-	-	0.036*	0.048	-
20	-	0.45	-	0.04	-	-	-	-	-	-	0.04 *	-	0.05
21	-	0.551*	-	-	-	-	0.074R	-	-	-	0.074R	-	-
MEAN	.4920	.4867	-	.0420	.0450	.0500	-	.0477	.0500	.0510	.0465	.0470	.0500
STD DEV	-	.0313	-	.0072	-	-	-	.0015	-	-	.0049	.0014	-
REL STD	-	6.4	-	17.2	-	-	-	3.2	-	-	10.6	3.0	-
DES VAL	-	.492	-	-	-	-	-	-	-	-	.053	-	-

LAB	25011 MN TOT 5X ICP	25012 MN TOT 5X DCP	25104 MN DIS AAS DA	25111 MN DIS ICP DA	25304 MN EXT AAS DA	25311 MN EXT ICP DA	25321 MN EXT ICP DA	25999 MANGNESE COMMON	26009 FE TOT 5X ICP	26011 FE TOT 5X ICP	26012 FE TOT 5X DCP	26104 FE DIS AAS DA	26111 FE DIS ICP DA
1	-	-	-	-	-	-	-	0.046	0.246	-	-	-	-
2	-	-	-	-	0.04	-	-	0.04	-	-	-	-	-
3	-	-	-	-	0.048	-	0.046	0.048	-	-	-	-	-
6	0.042	-	-	-	-	-	-	0.042	-	0.24	-	-	-
8	-	-	-	-	-	0.03	-	0.03 *	-	-	-	-	-
9	-	-	-	0.048	-	-	-	0.048	-	-	-	-	0.26
10	-	-	-	0.044	-	-	-	0.044	-	-	-	-	0.223
13	-	-	-	-	-	0.04	-	0.04	-	-	-	-	-
14	-	-	0.086R	-	-	-	-	0.086R	-	-	-	0.727R	-
15	-	-	-	0.049	-	-	-	0.049	-	-	-	-	0.252
16	-	0.062	-	-	-	-	-	0.062*	-	-	0.250	-	-
19	-	-	-	-	-	-	-	0.048	0.258	-	-	-	-
20	-	-	-	-	-	-	-	0.05	0.25	-	-	-	-
21	-	-	0.050	-	-	-	-	0.050	-	-	-	0.26	-
MEAN	.0420	.0620	.0500	.0470	.0440	.0350	.0460	.0459	.2513	.2400	.2500	.2600	.2450
STD DEV	-	-	-	.0026	.0057	.0071	-	.0074	.0061	-	-	-	.0195
REL STD	-	-	-	5.6	12.9	20.2	-	16.1	2.4	-	-	-	7.9
DES VAL	-	-	-	-	-	-	-	.046	-	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 41 PP 81 SAMPLE 1

LAB	26304 FE EXT AAS DA	26305 FE EXT AAS SE	26311 FE EXT ICP DA	26321 FE EXT ICP DA	26999 IRON COMMON	27009 CO TOT 5X ICP	27011 CO TOT 5X ICP	27012 CO TOT 5X DCP	27101 CO DIS AAS DA	27111 CO DIS ICP DA	27301 CO EXT AAS DA	27302 CO EXT AAS SE	27321 CO EXT ICP DA
1	-	-	-	-	0.246	0.221	-	-	-	-	-	-	-
2	0.27	-	-	-	0.27	-	-	-	-	-	-	-	-
3	0.253	-	-	0.252	0.253	-	-	-	-	-	-	-	0.219
6	-	-	-	-	0.24	-	0.21	-	-	-	-	-	-
8	-	-	0.24	-	0.24	-	-	-	-	-	0.23	-	-
9	-	-	-	-	0.26	-	-	-	-	0.22	-	-	-
10	-	-	-	-	0.223	-	-	-	-	0.204	-	-	-
11	-	0.241	-	-	0.241	-	-	-	-	-	-	0.240	-
13	-	-	0.22	-	0.22	-	-	-	-	-	-	-	-
14	-	-	-	-	0.727R	-	-	-	-	-	-	-	-
15	-	-	-	-	0.252	-	-	-	-	0.228	-	-	-
16	-	-	-	-	0.250	-	-	0.200	-	-	-	-	-
19	-	-	-	-	0.258	0.234	-	-	-	-	-	-	-
20	-	-	-	-	0.25	0.23	-	-	-	-	-	-	-
21	-	-	-	-	0.26	-	-	-	0.24	-	-	-	-
MEAN	.2615	.2410	.2300	.2520	.2474	.2283	.2100	.2000	.2400	.2173	.2300	.2400	.2190
STD DEV	.0120	-	.0141	-	.0139	.0067	-	-	-	.0122	-	-	-
REL STD	4.6	-	6.1	-	5.6	2.9	-	-	-	5.6	-	-	-
DES VAL	-	-	-	-	.249	-	-	-	-	-	-	-	-

LAB	27999 COBALT COMMON	28009 NI TOT 5X ICP	28011 NI TOT 5X ICP	28012 NI TOT 5X DCP	28101 NI DIS AAS DA	28111 NI DIS ICP DA	28302 NI EXT AAS SE	28309 NI EXT AAS GF	28311 NI EXT ICP DA	28321 NI EXT ICP DA	28999 NICKEL COMMON	29009 CU TOT 5X ICP	29011 CU TOT 5X ICP
1	0.221	0.261	-	-	-	-	-	-	-	-	0.261	0.045	-
3	0.219	-	-	-	-	-	-	-	-	0.256	0.256	-	-
6	0.21	-	0.24	-	-	-	-	-	-	-	0.24	-	0.042
8	0.23	-	-	-	-	-	-	0.25	-	-	0.25	-	-
9	0.22	-	-	-	-	0.26	-	-	-	-	0.26	-	-
10	0.204	-	-	-	-	0.244	-	-	-	-	0.244	-	-
11	0.240	-	-	-	-	-	0.046R	-	-	-	0.046R	-	-
13	-	-	-	-	-	-	-	-	0.24	-	0.24	-	-
15	0.228	-	-	-	-	0.26	-	-	-	-	0.26	-	-
16	0.200*	-	-	0.310	-	-	-	-	-	-	0.310*	-	-
19	0.234	0.264	-	-	-	-	-	-	-	-	0.264	0.044	-
20	0.23	0.27	-	-	-	-	-	-	-	-	0.27	0.05	-
21	0.24	-	-	-	0.275	-	-	-	-	-	0.275	-	-
MEAN	.2230	.2650	.2400	.3100	.2750	.2547	-	.2500	.2400	.2560	.2608	.0463	.0420
STD DEV	.0132	.0046	-	-	-	.0092	-	-	-	-	.0191	.0032	-
REL STD	5.9	1.7	-	-	-	3.6	-	-	-	-	7.3	6.9	-
DES VAL	.228	-	-	-	-	-	-	-	-	-	.264	-	-

LAB	29012 CU TOT 5X DCP	29106 CU DIS AAS DA	29111 CU DIS ICP DA	29305 CU EXT AAS SE	29306 CU EXT AAS DA	29311 CU EXT ICP DA	29321 CU EXT ICP DA	29999 COPPER COMMON	30009 ZN TOT 5X ICP	30011 ZN TOT 5X ICP	30012 ZN TOT 5X DCP	30104 ZN DIS AAS DA	30111 ZN DIS ICP DA
1	-	-	-	-	-	-	-	0.045	0.057	-	-	-	-
2	-	-	-	-	0.05	-	-	0.05	-	-	-	-	-
3	-	-	-	-	-	-	0.045	0.045	-	-	-	-	-
6	-	-	-	-	-	-	-	0.042	-	0.050	-	-	-
8	-	-	-	-	-	0.03 R	-	0.03 R	-	-	-	-	-
9	-	-	0.044	-	-	-	-	0.044	-	-	-	-	0.05
10	-	-	0.041	-	-	-	-	0.041	-	-	-	-	0.053
11	-	-	-	0.054	-	-	-	0.054*	-	-	-	-	-
13	-	-	-	-	-	0.04	-	0.04	-	-	-	-	-
14	-	0.086R	-	-	-	-	-	0.086R	-	-	-	0.061	-
15	-	-	0.045	-	-	-	-	0.045	-	-	-	-	0.054
16	0.856R	-	-	-	-	-	-	0.856R	-	-	0.080R	-	-
19	-	-	-	-	-	-	-	0.044	0.058	-	-	-	-
20	-	-	-	-	-	-	-	0.05	0.06	-	-	-	-
21	-	0.05	-	-	-	-	-	0.05	-	-	-	0.07	-
MEAN	-	.0500	.0433	.0540	.0500	.0400	.0450	.0458	.0583	.0500	-	.0655	.0523
STD DEV	-	-	.0021	-	-	-	-	.0043	.0015	-	-	.0064	.0021
REL STD	-	-	4.8	-	-	-	-	9.3	2.6	-	-	9.7	4.0
DES VAL	-	-	-	-	-	-	-	.046	-	-	-	-	-

LAB	30304 ZN EXT AAS DA	30305 ZN EXT AAS SE	30311 ZN EXT ICP DA	30321 ZN EXT ICP DA	30999 ZINC COMMON	38012 SR TOT DCP DA	38111 SR DIS ICP DA	38321 SR EXT ICP DA	38999 STRNTIUM COMMON	42009 MO TOT 5X ICP	42011 MO TOT 5X ICP	42012 MO TOT 5X DCP	42101 MO DIS AAS DA
1	-	-	-	-	0.057	-	-	-	-	0.875	-	-	-
2	0.06	-	-	-	0.06	-	-	-	-	-	-	-	-
3	-	-	-	0.057	0.057	-	-	0.171	0.171	-	-	-	-
6	-	-	-	-	0.050	-	-	-	-	-	0.84	-	-
8	-	-	0.04	-	0.04 *	-	-	-	-	-	-	-	-
9	-	-	-	-	0.05	-	0.17	-	0.17	-	-	-	-
10	-	-	-	-	0.053	-	-	-	-	-	-	-	-
11	-	0.052	-	-	0.052	-	-	-	-	-	-	-	-
13	-	-	0.06	-	0.06	-	-	-	-	-	-	-	-
14	-	-	-	-	0.061	-	-	-	-	-	-	-	-
15	-	-	-	-	0.054	-	0.173	-	0.173	-	-	-	-
16	-	-	-	-	0.080R	0.232R	-	-	0.232R	-	-	0.918	-
19	-	-	-	-	0.058	-	-	-	-	0.872	-	-	-
20	-	-	-	-	0.06	-	-	-	-	0.90	-	-	-
21	-	-	-	-	0.07 *	-	-	-	-	-	-	-	0.50 R
MEAN	.0600	.0520	.0500	.0570	.0559	-	.1715	.1710	.1713	.8823	.8400	.9180	-
STD DEV	-	-	.0141	-	.0070	-	.0021	-	.0015	.0154	-	-	-
REL STD	-	-	28.3	-	12.5	-	1.2	-	.9	1.7	-	-	-
DES VAL	-	-	-	-	.055	-	-	-	.167	-	-	-	-

LAB	42111 MO DIS ICP DA	42121 MO EXT ICP DA	42999 MOLYBNUM COMMON	48009 CD TOT 5X ICP	48011 CD TOT 5X ICP	48012 CD TOT 5X DCP	48101 CD DIS AAS DA	48111 CD DIS ICP DA	48301 CD EXT AAS DA	48302 CD EXT AAS SE	48311 CD EXT ICP DA	48321 CD EXT ICP DA	48999 CADMIUM COMMON
1	-	-	0.875	0.039	-	-	-	-	-	-	-	-	0.039
2	-	-	-	-	-	-	-	-	0.04	-	-	-	0.04
3	-	0.903	0.903	-	-	-	-	-	-	-	-	0.039	0.039
6	-	-	0.84	-	0.035	-	-	-	-	-	-	-	0.035
8	-	-	-	-	-	-	-	-	0.04	-	-	-	0.04
9	0.89	-	0.89	-	-	-	-	0.042	-	-	-	-	0.042
10	0.839	-	0.839	-	-	-	-	0.035	-	-	-	-	0.035
11	-	-	-	-	-	-	-	-	-	0.045	-	-	0.045
13	-	-	-	-	-	-	-	-	-	-	0.04	-	0.04
15	0.89	-	0.89	-	-	-	-	0.042	-	-	-	-	0.042
16	-	-	0.918	-	-	0.040	-	-	-	-	-	-	0.040
19	-	-	0.872	0.040	-	-	-	-	-	-	-	-	0.040
20	-	-	0.90	0.04	-	-	-	-	-	-	-	-	0.04
21	-	-	0.50 R	-	-	-	0.03 R	-	-	-	-	-	0.03 R
MEAN	.8730	.9030	.8808	.0397	.0350	.0400	-	.0397	.0400	.0450	.0400	.0390	.0398
STD DEV	.0294	-	.0272	.0006	-	-	-	.0040	.0000	-	-	-	.0027
REL STD	3.4	-	3.1	1.5	-	-	-	10.2	-1.0	-	-	-	6.7
DES VAL	-	-	.892	-	-	-	-	-	-	-	-	-	.041

LAB	56000 BA ?	56009 BA TOT 5X ICP	56011 BA TOT 5X ICP	56012 BA TOT 5X DCP	56111 BA DIS ICP DA	56301 BA EXT AAS DA	56321 BA EXT ICP DA	56999 BARIUM COMMON	82009 PB TOT 5X ICP	82011 PB TOT 5X ICP	82012 PB TOT 5X DCP	82101 PB DIS AAS DA	82111 PB DIS ICP DA
1	-	0.443	-	-	-	-	-	0.443	-	-	-	-	-
3	-	-	-	-	-	0.47	0.447	0.47	-	-	-	-	-
6	-	-	0.42	-	-	-	-	0.42	-	0.25	-	-	-
9	-	-	-	-	0.45	-	-	0.45	-	-	-	-	0.27
10	-	-	-	-	0.41	-	-	0.41	-	-	-	-	0.247
14	-	-	-	-	-	-	-	-	-	-	-	0.28	-
15	-	-	-	-	0.448	-	-	0.448	-	-	-	-	0.28
16	-	-	-	0.538R	-	-	-	0.538R	-	-	0.280	-	-
19	-	0.452	-	-	-	-	-	0.452	0.291	-	-	-	-
20	-	-	-	-	-	-	-	-	0.30	-	-	-	-
21	0.90 R	-	-	-	-	-	-	0.90 R	-	-	-	0.24	-
MEAN	-	.4475	.4200	-	.4360	.4700	.4470	.4419	.2955	.2500	.2800	.2600	.2657
STD DEV	-	.0064	-	-	.0225	-	-	.0204	.0064	-	-	.0283	.0169
REL STD	-	1.4	-	-	5.2	-	-	4.6	2.2	-	-	10.9	6.4
DES VAL	-	-	-	-	-	-	-	.451	-	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 41 PP 81 SAMPLE 1

LAB	82301 PB EXT AAS DA	82302 PB EXT AAS SE	82311 PB EXT ICP DA	82321 PB EXT ICP DA	82999 LEAD COMMON
1	-	0.304	-	-	0.304
2	0.28	-	-	-	0.28
3	-	-	-	0.275	0.275
6	-	-	-	-	0.25
8	0.28	-	-	-	0.28
9	-	-	-	-	0.27
10	-	-	-	-	0.247
13	-	-	0.25	-	0.25
14	-	-	-	-	0.28
15	-	-	-	-	0.28
16	-	-	-	-	0.280
19	-	-	-	-	0.291
20	-	-	-	-	0.30
21	-	-	-	-	0.24
MEAN	.2800	.3040	.2500	.2750	.2734
STD DEV	.0000	-	-	-	.0198
REL STD	-1.0	-	-	-	7.2
DES VAL	-	-	-	-	.276

LAB	00110 IONIC BALANC %	00120 SUM OF CATIONS	00125 SUM OF ANIONS	02011 COLOUR APPARE	02021 COLOUR VIS COM	02023 COLOUR SPECT	02024 COL TRU SPECT	02040 COLOUR COMMON	02041 CONDUCT SPEC 25	02060 CONDUCT COMMON	02073 TURB HACH	02074 TURB NPLMTRI	02077 TURB HACH FZ
1	7.6	0.91	1.06	-	-	-	3.	3.	95.	95.	0.1	-	-
2	0.79	0.930	0.915	5. L	-	-	-	5. L	94.	94.	0.3	-	-
3	-1.2	0.957	0.981	5.	-	-	-	5.	95.6	95.6	0.20	-	-
4	-	-	-	-	7.5	-	-	7.5	94.5	94.5	-	-	-
5	-	-	-	5.	-	-	-	5.	94.6	94.6	0.09	-	-
6	3.7	0.96	0.89	-	-	-	-	-	93.	93.	-	0.11	-
7	-0.6	0.90	0.91	5.	-	-	-	5.	92.7	92.7	0.08	-	-
8	-1.51	1.02	1.05	5. L	-	-	-	5. L	101.	101.	-	0.06	-
9	3.13	0.99	0.93	-	-	-	-	-	95.	95.	-	-	-
10	0.48	0.945	0.936	-	-	2.	-	2.	93.	93.	-	0.2	-
11	-	-	-	5.	-	-	-	5.	92.	92.	-	-	0.1
14	-	-	-	-	-	-	-	-	95.6	95.6	-	-	-
15	-	-	-	5.	-	-	-	5.	98.	98.	-	0.1 L	-
16	-	-	-	-	-	-	-	-	107. R	107. R	0.1	-	-
19	-	-	-	-	-	-	-	-	93.6	93.6	-	-	-
20	-	0.966	-	-	-	-	-	-	90.	90.	-	0.2	-
21	2.62	0.998	0.947	-	-	-	10. L	10. L	88.3	88.3	-	0.20	-
MEAN	1.6678	.9576	.9577	5.0000	7.5000	2.0000	3.0000	4.6875	94.1188	94.1188	.1450	.1540	.1000
STD DEV	2.9157	.0382	.0608	.0000	-	-	-	1.6243	2.9308	2.9308	.0876	.0654	-
REL STD	174.8	4.0	6.3	-1.0	-	-	-	34.7	3.1	3.1	60.4	42.5	-
DES VAL	-	-	-	-	-	-	-	3.982	-	94.275	-	-	-

LAB	02081 TURB RATIO	02090 TURBIDTY COMMON	05105 BORON AA CARM	05106 BORON F AZOMETH	05107 BORON ICP DA	05111 BORON F ICP DA	05190 BORON COMMON	06006	06009 TOC CO2 IR	06051 TIC COMB IR	06101 DOC IR /DIF	06104 DOC UV CO2 IR	06107 DOC UV CO2 PHE
1	-	0.1	-	-	0.006	-	0.006	-	-	-	-	-	1.3
2	-	0.3	-	-	-	-	-	-	-	-	-	-	1.4
3	-	0.20	-	-	-	-	-	-	-	-	-	1.4	-
4	0.11	0.11	0.077R	-	-	-	0.077R	-	-	-	-	10.4 R	-
5	-	0.09	-	-	-	-	-	-	-	-	4.50 R	-	-
6	-	0.11	-	-	-	-	-	-	-	-	-	-	-
7	-	0.08	-	-	-	-	-	-	-	-	-	-	-
8	-	0.06	-	0.05 L	-	-	0.05 L	-	-	-	-	-	-
10	-	0.2	-	-	-	0.01 L	0.01 L	-	-	-	-	-	-
11	-	0.1	-	-	-	-	-	-	-	-	-	-	-
15	-	0.1 L	-	-	0.01 L	-	0.01 L	-	-	-	-	2.9 R	-
16	-	0.1	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	0.002	-	0.002	-	3.1	10.3	-	-	-
20	-	0.2	-	-	-	-	-	0. R	-	12.	-	-	-
21	-	0.20	-	-	-	-	-	-	-	-	-	-	-
MEAN	.1100	.1423	-	-	.0040	-	.0040	-	3.1000	11.1500	-	1.4000	1.3500
STD DEV	-	.0701	-	-	.0028	-	.0028	-	-	1.2021	-	-	.0707
REL STD	-	49.3	-	-	70.7	-	70.7	-	-	10.8	-	-	5.2
DES VAL	-	.185	-	-	-	-	.032	-	-	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 41 PP 81 SAMPLE 2

LAB	06109 DOC UV CO2 OH	06112 DOC PER IR	06150 D O C COMMON	06151 DIC IR COMBUST	06152 DIC UV CO2 IR	06154 DIC AA CO2 PHE	06159 DIC AA CO2 OH	06490 D I C COMMON	07005 TKN INDO BL	07010 TKN AA SAL	07015 TKN DIG BERTHEL	07016 TKN BLK AMM-SAL	07021 TKN BLK DIG BER
1	-	-	1.3	-	-	9.1	-	9.1	-	-	-	-	0.01 L
2	-	-	1.4	-	-	-	-	-	-	-	-	-	-
3	-	-	1.4	-	10.1	-	-	10.[illegible]	-	0.131	-	-	-
4	-	-	10.4 R	-	10.5	-	-	10.5	-	-	-	-	-
5	-	-	4.50 R	9.90	-	-	-	9.90	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	0.5 R	-
8	-	-	-	-	-	-	-	-	-	-	0.20 L	-	-
10	1.2	-	1.2	-	-	-	10.0	10.0	-	-	-	-	-
15	-	-	2.9 R	-	9.6	-	-	9.6	-	-	-	-	-
16	-	1.7	1.7	-	6.3 R	-	-	6.3 R	-	-	-	-	-
19	-	-	3.1 *	-	-	-	-	10.3	-	-	-	-	0.10
20	-	-	0. R	-	-	-	-	12. *	-	-	-	0.05	-
21	-	-	-	-	-	-	-	-	0.078	-	-	-	-
MEAN	1.2000	1.7000	1.6833	9.9000	10.0667	9.1000	10.0000	10.1875	.0780	.1310	-	.0500	.1000
STD DEV	-	-	.7139	-	.4509	-	-	.8493	-	-	-	-	-
REL STD	-	-	42.4	-	4.5	-	-	8.3	-	-	-	-	-
DES VAL	-	-	1.276	-	-	-	-	9.950	-	-	-	-	-

LAB	07090 TKN COMMON	07109 NO3+NO2 AA HYD	07110 NO3+NO2 AA2 CD	07111 NO3+NO2 DIS SPEC	07112 NO3+NO2 UF AA CD	07390 NITRATE COMMON	07505 NH3 TOT AA BERT	07540 NH3 TOT AA SAL	07555 NH3 DIS AA PHEN	07556 NH3 DIS INDO	07557 NH3 DIS AA INDO	07562 NH3 DIS AA EDTA	07590 AMMONIA COMMON
1	0.01 *	-	-	0.280	-	0.280	-	-	-	-	-	0.002	0.002
2	-	-	0.29	-	-	0.29	-	-	-	-	-	-	-
3	0.131*	-	-	-	0.292	0.292	0.005L	-	-	-	-	-	0.005L
4	-	-	0.292	-	-	0.292	-	0.005L	-	-	-	-	0.005L
5	-	-	0.300	-	-	0.300	-	-	-	-	0.003	-	0.003
6	0.5 R	0.27	-	-	-	0.27	-	-	-	-	0.01 L	-	0.01 L
7	-	-	-	-	0.31	0.31	-	-	-	-	-	-	-
8	0.20 L	-	0.29	-	-	0.29	-	-	0.004	-	-	-	0.004
9	-	0.29	-	-	-	0.29	-	-	-	-	-	-	-
10	-	0.255	-	-	-	0.255*	-	-	0.010L	-	-	-	0.010L
11	-	-	-	-	-	-	-	0.03 L	-	-	-	-	0.03 L
13	-	-	0.3	-	-	0.3	-	0.1 L	-	-	-	-	0.1 L
14	-	-	-	0.305	-	0.305	-	-	-	-	-	-	-
15	-	-	0.286	-	-	0.286	-	-	0.015R	-	-	-	0.015R
19	0.10	-	0.30	-	-	0.30	-	-	0.02 L	-	-	-	0.02 L
20	0.05 *	-	0.305	-	-	0.305	0.005L	-	-	-	-	-	0.005L
21	0.078	-	-	0.260	-	0.260	-	-	-	0.005L	-	-	0.005L
MEAN	.0898	.2717	.2954	.2817	.3010	.2891	-	-	.0040	-	.0030	.0020	.0030
STD DEV	.0343	.0176	.0067	.0225	.0127	.0159	-	-	-	-	-	-	.0010
REL STD	38.2	6.5	2.3	8.0	4.2	5.5	-	-	-	-	-	-	33.3
DES VAL	.084	-	-	-	-	.299	-	-	-	-	-	-	.003

LAB	07600 T N PER AUTO	07601 T N UV AA SUL	07602 T N CALC'D	07605 T N UV HY SUL	07651 T N DIS UV AA	07655 T N DIS UV EDTA	07690 TOT N COMMON	07790 T N DIS COMMON	09103 F DIS COL SP	09105 F DIS SP EL	09106 F DIS EL POT	09107 F DIS AUT POT	09108 F DIS SP EL
1	-	-	-	-	-	-	-	-	-	-	-	0.04	-
2	-	0.30	-	-	-	-	-	0.30	-	-	0.05 L	-	-
3	-	0.324	-	-	-	-	-	0.324	-	-	-	-	0.03
4	-	-	-	-	0.361	-	-	0.361*	-	-	-	-	-
5	-	-	-	-	-	0.320	-	0.320	-	-	0.05 L	-	-
6	-	-	-	-	-	-	-	-	0.1 L	-	-	-	-
8	-	-	-	-	-	-	-	-	-	0.05 L	-	-	-
10	-	-	-	0.31	-	-	-	0.31	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	0.05 L	-	-	-
15	-	-	-	-	-	-	-	-	-	0.06	-	-	-
19	-	-	0.40	-	-	-	0.40	-	-	-	-	-	-
20	0.355	-	-	-	-	-	0.355	-	-	0.10 L	-	-	-
21	-	-	0.338	-	-	-	0.338	-	-	-	0.104R	-	-
MEAN	.3550	.3120	.3690	.3100	.3610	.3200	.3643	.3230	-	.0600	-	.0400	.0300
STD DEV	-	.0170	.0438	-	-	-	.0320	.0232	-	-	-	-	-
REL STD	-	5.4	11.9	-	-	-	8.8	7.2	-	-	-	-	-
DES VAL	-	-	-	-	-	-	.370	.329	-	-	-	-	-

LAB	09115 F DIS AA ALIZ	09116 F DIS IC	09190 FLUORIDE COMMON	10101 ALKLNTY TITR'N	10108 ALKLNTY POT TIT	10109 ALKLNTY POT TIT	10111 ALKLNTY TIT PRO	10112 ALKLNTY TIT CON	10190 ALKLINTY COMMON	10301 PH	10390 PH COMMON	10601 HARDNSS CALC'D	10602 HARDNSS CALC'D
1	-	-	0.04	42.	-	-	-	-	42.	7.61	7.61	-	41.
2	-	-	0.05 L	39.5	-	-	-	-	39.5	7.8	7.8	-	43.1
3	-	-	0.03	-	-	-	40.6	-	40.6	7.87	7.87	-	-
4	-	-	-	40.6	-	-	-	-	40.6	7.83	7.83	-	-
5	-	-	0.05 L	41.4	-	-	-	-	41.4	8.00	8.00	-	-
6	-	-	0.1 L	-	-	44.	-	-	44.	8.0	8.0	-	-
7	-	-	-	40.0	-	-	-	-	40.0	7.9	7.9	-	-
8	-	-	0.05 L	-	-	46.6	-	-	46.6 *	8.11	8.11	-	47.8
9	-	-	-	-	41.	-	-	-	41.	7.68	7.68	-	46.
10	0.05	-	0.05	-	-	-	-	41.	41.	7.65	7.65	-	-
11	-	-	0.05 L	41.	-	-	-	-	41.	7.3	7.3	-	43.5
13	-	-	-	37.	-	-	-	-	37.	7.1	7.1	-	49.5
14	-	-	-	42.3	-	-	-	-	42.3	7.78	7.78	40.35	-
15	-	-	0.06	41.4	-	-	-	-	41.4	7.9	7.9	-	45.1
16	-	0.1 L	0.1 L	41.0	-	-	-	-	41.0	7.63	7.63	-	43.0
19	-	-	-	-	-	42.	-	-	42.	7.9	7.9	-	46.7
20	-	-	0.10 L	43.0	-	-	-	-	43.0	7.5	7.5	-	45.2
21	-	-	0.104R	41.5	-	-	-	-	41.5	7.49	7.49	-	50.2
MEAN	.0500	-	.0450	40.8917	41.0000	44.2000	40.6000	41.0000	41.4389	7.7250	7.7250	40.3500	45.5545
STD DEV	-	-	.0129	1.5530	-	2.3065	-	-	1.9512	.2588	.2588	-	2.8556
REL STD	-	-	28.7	3.8	-	5.2	-	-	4.7	3.4	3.4	-	6.3
DES VAL	-	-	.052	-	-	-	-	-	41.263	-	7.663	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 41 PP 81 SAMPLE 2

LAB	10603 HARDNSS TITR'N	10606 HARDNSS CALC'D	10690 HARDNESS COMMON	11005 NA TOT ICP	11102 NA F AAS	11103 NA DIS FL PH	11104 NA DIS FLAME	11105 NA DIS AAS DA	11107 NA UF FL PH	11111 NA DIS ICP	11311 NA EXT ICP	11990 SODIUM COMMON	12002 MG TOT AAS DA
1	-	-	41.	-	-	2.	-	-	-	-	-	2. *	-
2	-	-	43.1	-	-	1.3	-	-	-	-	-	1.3	-
3	-	44.4	44.4	-	-	-	-	-	1.30	-	-	1.30	-
5	-	-	-	-	-	1.3	-	-	-	-	-	1.3	-
6	44.	-	44.	-	1.	-	-	-	-	-	-	1. *	-
7	46.3	-	46.3	-	-	-	-	1.08	-	-	-	1.08	-
8	-	-	47.8	-	-	-	-	-	-	-	1.43	1.43	-
9	-	-	46.	1.3	-	-	-	-	-	-	-	1.3	-
10	-	-	-	1.25	-	-	-	-	-	-	-	1.25	-
11	-	-	43.5	-	1.1	-	-	-	-	-	-	1.1	-
13	-	-	49.5	-	-	-	-	-	-	1.14	-	1.14	-
14	-	-	40.35	-	1.60	-	-	-	-	-	-	1.60 *	-
15	-	-	45.1	-	-	-	-	-	-	1.2	-	1.2	-
16	-	-	43.0	-	-	-	-	-	-	-	-	-	-
19	-	-	46.7	0.818	-	-	-	-	-	-	-	0.818*	-
20	-	-	45.2	-	-	-	1.4	-	-	-	-	1.4	2.54
21	-	-	50.2 *	-	1.14	-	-	-	-	-	-	1.14	-
MEAN	45.1500	44.4000	45.0767	1.1227	1.2100	1.5333	1.4000	1.0800	1.3000	1.1700	1.4300	1.2724	2.5400
STD DEV	1.6263	-	2.7969	.2650	.2666	.4041	-	-	-	.0424	-	.2670	-
REL STD	3.6	-	6.2	23.6	22.0	26.4	-	-	-	3.6	-	21.0	-
DES VAL	-	-	44.692	-	-	-	-	-	-	-	-	1.277	-

LAB	12005 MG TOT ICP	12101 MG DIS CALC'D	12102 MG DIS AAS DA	12105 MG DIS AAS DA	12106 MG UF AAS DA	12107 MG DIS AAS AUT	12111 MG DIS ICP	12311 MG EXT ICP	12990 MGNESIUM COMMON	14000 SILICA ?	14090 SILICA ?	14102 SILICA ANSA AA	14103 SILICA MOL SUL
1	-	-	-	2.0	-	-	-	-	2.0 *	-	-	-	-
2	-	-	-	-	-	2.7	-	-	2.7	-	-	2.55	-
3	-	-	-	-	2.65	-	-	-	2.65	-	-	-	-
5	-	-	2.78	-	-	-	-	-	2.78	-	-	-	-
6	-	2.9	-	-	-	-	-	-	2.9	-	-	-	-
7	-	-	2.47	-	-	-	-	-	2.47	-	-	-	-
8	-	-	-	-	-	-	-	3.10	3.10 *	-	-	-	-
9	3.0	-	-	-	-	-	-	-	3.0	-	-	-	-
10	2.72	-	-	-	-	-	-	-	2.72	-	-	-	-
11	-	-	2.7	-	-	-	-	-	2.7	-	-	-	-
13	-	-	-	-	-	-	3.02	-	3.02 *	-	-	-	-
14	-	-	2.64	-	-	-	-	-	2.64	-	-	-	-
15	-	-	-	-	-	-	2.7	-	2.7	-	-	-	-
19	2.90	-	-	-	-	-	-	-	2.90	-	-	-	2.42
20	-	-	-	-	-	-	-	-	2.54	-	-	-	-
21	-	-	-	-	2.6	-	-	-	2.6	2.50	2.50	-	-
MEAN	2.8733	2.9000	2.6475	2.0000	2.6250	2.7000	2.8600	3.1000	2.7138	2.5000	2.5000	2.5500	2.4200
STD DEV	.1419	-	.1315	-	.0354	-	.2263	-	.2609	-	-	-	-
REL STD	4.9	-	5.0	-	1.3	-	7.9	-	9.6	-	-	-	-
DES VAL	-	-	-	-	-	-	-	-	2.757	-	-	-	-

LAB	14105 SILICA MOL ASC	14107 SILICA MOLY AA	14111 SILICA ICP DA	14190 SILICA COMMON	15301 T P ACL AA ASC	15313 T P ACL AA SNCL	15401 T P UV AA ASC	15403 T P UF AA SNCL	15406 T P UF AA ASC	15407 T P ASC AC	15409 T P BLK AA ASC	15413 T P ACL AA SNCL	15421 T P BLK DIG ASC
1	-	2.5	-	2.5	-	-	-	-	-	-	-	-	0.001
2	-	-	-	2.55	-	-	-	-	-	-	-	0.001L	-
3	-	2.37	-	2.37	-	-	-	-	-	-	-	0.002	-
4	-	-	-	-	-	-	-	-	0.003	-	-	-	-
5	2.4	-	-	2.4	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	0.03 R	-	-
7	-	-	-	-	-	-	-	0.001L	-	-	-	-	-
8	2.3	-	-	2.3	-	-	-	-	-	-	-	0.004	-
9	-	-	2.4	2.4	-	-	-	-	-	-	-	-	-
10	2.20	-	-	2.20	-	-	0.010L	-	-	-	-	-	-
11	-	-	-	-	-	0.005L	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-	0.005	-	-	-	-
15	-	-	2.31	2.31	-	-	-	-	0.002L	-	-	-	-
19	-	-	-	2.42	-	-	-	-	0.02 L	-	-	-	-
20	2.4	-	-	2.4	0.003	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-	-	0.003	-	-	-
MEAN	2.3250	2.4350	2.3550	2.3850	.0030	-	-	-	.0040	.0030	-	.0030	.0010
STD DEV	.0957	.0919	.0636	.0998	-	-	-	-	.0014	-	-	.0014	-
REL STD	4.1	3.8	2.7	4.2	-	-	-	-	35.4	-	-	47.1	-
DES VAL	-	-	-	2.378	-	-	-	-	-	-	-	-	-

LAB	15490 TOT P COMMON	16206	16303 SO4 DIS TIT THO	16304 SO4 DIS AUTO BA	16306 SO4 DIS AA MTB	16307 SO4 UF AA MTB	16309 SO4 DIS I C	16310 SO4 DIS AA CALM	16311 SO4 DIS IC	16990 SULFATE COMMON	17203 CL DIS AA FE	17204 CL DIS AG TIT	17206 CL DIS AA HG
1	0.001	-	-	-	8. R	-	-	-	-	8. R	-	-	1.1
2	0.001L	-	-	3.3	-	-	3.0	-	-	3.3	-	-	-
3	0.002	-	-	-	-	2.8	-	-	-	2.8 *	-	-	-
4	0.003	-	-	-	-	-	-	-	-	-	-	-	-
5	-	3.3	-	-	-	-	-	-	-	3.3	-	-	1.3
6	0.03 R	-	-	10. L	-	-	-	-	-	10. L	-	2. L	-
7	0.001L	-	-	-	2.4	-	-	-	-	2.4 *	1.30	-	-
8	0.004	-	-	-	3.15	-	-	-	-	3.15	-	-	1.30
9	-	-	-	-	-	-	3.0	-	-	3.0	-	-	-
10	0.010L	-	-	-	-	-	-	3.0	-	3.0	-	-	-
11	0.005L	-	-	-	7.3 R	-	-	-	-	7.3 R	-	-	2.3 R
13	0.005	-	-	-	3.01	-	-	-	-	3.01	-	-	1.5
14	-	-	-	-	-	-	3.19	-	-	3.19	-	-	-
15	0.002L	-	-	-	-	-	-	-	-	-	-	-	2.5 R
16	-	-	-	-	-	-	-	-	5. R	5. R	-	-	-
19	0.02 L	-	-	-	-	-	-	-	-	-	-	-	1.18
20	0.003	-	-	-	3.7	-	-	-	-	3.7 *	1.5	-	-
21	0.003	-	3.3	-	-	-	-	-	-	3.3	1.4	-	-
MEAN	.0030	3.3000	3.3000	3.3000	3.0650	2.8000	3.0633	3.0000	-	3.1045	1.4000	-	1.2760
STD DEV	.0013	-	-	-	.5341	-	.1097	-	-	.3314	.1000	-	.1513
REL STD	43.0	-	-	-	17.4	-	3.6	-	-	10.7	7.1	-	11.9
DES VAL	.005	-	-	-	-	-	-	-	-	3.269	-	-	-

LAB	17208 CL DIS AA HG	17209 CL DIS I C	17210 CL DIS TIT CON	17211 CL DIS IC	17990 CHLORIDE COMMON	19001 K TOT AAS	19005 K TOT ICP	19102 K DIS AAS	19103 K DIS FLM PH	19104 K DIS FLAME	19105 K DIS AAS DA	19106 K DIS AAS LI	19107 K DIS FLM PH
1	-	-	-	-	1.1	-	-	-	0.4	-	-	-	-
2	-	1.2	-	-	1.2	-	-	-	0.48	-	-	-	-
3	1.5	-	-	-	1.5 *	-	-	-	-	-	-	-	0.52
5	-	-	-	-	1.3	-	-	-	0.5	-	-	-	-
6	-	-	-	-	2. L	-	-	0.8 R	-	-	-	-	-
7	-	-	-	-	1.30	-	-	0.40	-	-	-	-	-
8	-	-	-	-	1.30	-	-	-	-	-	-	-	-
9	-	1.1	-	-	1.1	-	0.5	-	-	-	-	-	-
10	-	-	1.3	-	1.3	-	0.51	-	-	-	-	-	-
11	-	-	-	-	2.3 R	-	-	-	-	-	-	0.5	-
13	-	-	-	-	1.5 *	-	-	-	-	-	-	-	-
14	-	1.37	-	-	1.37	0.497	-	-	-	-	-	-	-
15	-	-	-	-	2.5 R	-	-	-	-	-	0.51	-	-
16	-	-	-	1.	1. *	-	-	-	-	-	-	-	-
19	-	-	-	-	1.18	-	0.456	-	-	-	-	-	-
20	-	-	-	-	1.5 *	-	-	-	0.6	-	-	-	-
21	-	-	-	-	1.4	-	-	-	-	0.42	-	-	-
MEAN	1.5000	1.2233	1.3000	1.0000	1.2893	.4970	.4887	.4000	.4950	.4200	.5100	.5000	.5200
STD DEV	-	.1365	-	-	.1588	-	.0287	-	.0823	-	-	-	-
REL STD	-	11.2	-	-	12.3	-	5.9	-	16.6	-	-	-	-
DES VAL	-	-	-	-	1.265	-	-	-	-	-	-	-	-

LAB	19111 K DIS ICP	19301 K EXT HNO3 AA	19990 PTASSIUM COMMON	20003 CA TOT AAS LA	20005 CA TOT ICP	20050 CA DIS AAS NO	20103 CA DIS AAS	20107 CA DIS AAS	20108 CA DIS AAS UF	20110 CA DIS AAS AUT	20111 CA DIS ICP	20311 CA EXT ICP	20990 CALCIUM COMMON
1	-	-	0.4	-	-	-	-	13.0	-	-	-	-	13.0
2	-	-	0.48	-	-	-	-	-	-	12.8	-	-	12.8
3	-	-	0.52	-	-	-	-	-	13.4	-	-	-	13.4
5	-	-	0.5	-	-	-	13.3	-	-	-	-	-	13.3
6	-	-	0.8 R	-	-	-	-	-	12.8	-	-	-	12.8
7	-	-	0.40	-	-	-	12.75	-	-	-	-	-	12.75
8	-	0.46	0.46	-	-	-	-	-	-	-	-	13.9	13.9
9	-	-	0.5	-	13.5	-	-	-	-	-	-	-	13.5
10	-	-	0.51	-	13.1	-	-	-	-	-	-	-	13.1
11	-	-	0.5	-	-	-	13.	-	-	-	-	-	13.
13	0.45	-	0.45	-	-	-	-	-	-	-	13.8	-	13.8
14	-	-	0.497	-	-	11.8	-	-	-	-	-	-	11.8
15	-	-	0.51	-	-	-	-	-	-	-	13.5	-	13.5
19	-	-	0.456	-	13.9	-	-	-	-	-	-	-	13.9
20	-	-	0.6 *	13.94	-	-	-	-	-	-	-	-	13.94
21	-	-	0.42	-	-	-	-	-	14.5	-	-	-	14.5 *
MEAN	.4500	.4600	.4802	13.9400	13.5000	11.8000	13.0167	13.0000	13.5667	12.8000	13.6500	13.9000	13.3119
STD DEV	-	-	.0518	-	.4000	-	.2754	-	.8622	-	.2121	-	.6419
REL STD	-	-	10.8	-	3.0	-	2.1	-	6.4	-	1.6	-	4.8
DES VAL	-	-	.484	-	-	-	-	-	-	-	-	-	12.718

DATA SUMMARY

FEDERAL-PROVINCIAL & PRAIRIE PROVINCES QUALITY ASSURANCE PROGRAMS

STUDY NO. FP 42 PP 82 DATE: 01/06/89 DUE DATE: 30/06/89

SAMPLE 3 SPIKED SAMPLE. TRACE METALS S/E. (IN 0.2% HNO3)

LAB	13004 AL TOT AAS GF	13009 AL TOT 5X ICP	13030	13105 AL DIS AAS GF	13111 AL DIS ICP DA	13302 AL EXT AAS DA	13305 AL EXT AAS SE	13322 AL EXT DCP DA	13999 ALUMINUM COMMON	19107 K DIS FLM PH	19990 PTASSIUM COMMON	23000	23002 V TOT AAS SE
1	-	-	0.051	-	-	-	-	-	0.051	-	-	-	-
2	-	-	-	-	-	-	0.051	-	0.051	-	-	-	-
3	-	0.067	-	-	-	-	-	-	0.067	-	-	-	0.011
6	-	0.065	-	-	-	-	-	-	0.065	-	-	-	-
8	-	-	-	-	-	0.2 L	-	-	0.2 L	-	-	-	-
9	-	-	-	-	0.04	-	-	-	0.04 *	-	-	-	-
10	-	-	-	-	0.07	-	-	-	0.07	-	-	-	-
14	-	-	-	0.038	-	-	-	-	0.038*	0.012	0.012	-	-
15	0.057	-	-	-	-	-	-	-	0.057	-	-	-	-
16	-	-	-	-	-	-	-	0.077	0.077	-	-	-	-
19	-	0.044	-	-	-	-	-	-	0.044	-	-	-	-
20	0.074	-	-	-	-	-	-	-	0.074	-	-	-	-
21	-	-	-	0.092	-	-	-	-	0.092*	-	-	0.014	-
MEAN	.0655	.0587	.0510	.0650	.0550	-	.0510	.0770	.0605	.0120	.0120	.0140	.0110
STD DEV	.0120	.0127	-	.0382	.0212	-	-	-	.0165	-	-	-	-
REL STD	18.4	21.7	-	58.7	38.6	-	-	-	27.3	-	-	-	-
DES VAL	-	-	-	-	-	-	-	-	.061	-	-	-	-

LAB	23009 V TOT 5X ICP	23011 V TOT 5X ICP	23012 V TOT 5X DCP	23105	23111 V DIS ICP DA	23999 VANADIUM COMMON	24003 CR TOT AAS SE	24004 CR TOT AAS GF	24009 CR TOT 5X ICP	24011 CR TOT 5X ICP	24012 CR TOT 5X DCP	24056 CR DIS AAS GF	24111 CR DIS ICP DA
1	0.011	-	-	-	-	0.011	-	-	0.014	-	-	-	-
3	0.010	-	-	-	-	0.011	0.015	-	0.014	-	-	-	-
6	-	0.01 L	-	-	-	0.01 L	-	-	-	0.012	-	-	-
8	-	-	-	-	-	-	-	0.022R	-	-	-	-	-
9	-	-	-	-	0.01	0.01	-	0.013	-	-	-	-	-
10	-	-	-	-	0.012	0.012	-	-	-	-	-	-	0.016
14	-	-	-	0.010	-	0.010	-	-	-	-	-	-	-
15	-	-	-	-	0.01	0.01	-	-	-	-	-	-	0.016
16	-	-	0.004R	-	-	0.004R	-	-	-	-	0.014	-	-
19	0.011	-	-	-	-	0.011	-	-	0.011	-	-	-	-
20	-	-	-	-	-	-	-	0.0145	-	-	-	-	-
21	-	-	-	-	-	0.014*	-	-	-	-	-	0.016	-
MEAN	.0107	-	-	.0100	.0107	.0111	.0150	.0138	.0130	.0120	.0140	.0160	.0160
STD DEV	.0006	-	-	-	.0012	.0014	-	.0011	.0017	-	-	-	.0000
REL STD	5.4	-	-	-	10.8	12.2	-	7.7	13.3	-	-	-	-1.0
DES VAL	-	-	-	-	-	.011	-	-	-	-	-	-	-

LAB	24303 CR EXT AAS SE	24999 CHROMIUM COMMON	25003 MN TOT 5X ICP	25004 MN TOT AAS DA	25010 MN TOT 5X ICP	25011 MN TOT 5X ICP	25012 MN TOT 5X DCP	25107 MN DIS AAS GF	25111 MN DIS ICP DA	25304 MN EXT AAS DA	25311 MN EXT ICP DA	25999 MANGNESE COMMON	26005 FE TOT AAS SE
1	-	0.014	0.012	-	-	-	-	-	-	-	-	0.012	-
2	-	-	-	-	-	-	-	-	-	0.01	-	0.01	-
3	-	0.015	-	0.011	0.011	-	-	-	-	-	-	0.011	0.028
6	-	0.012	-	-	-	0.010	-	-	-	-	-	0.010	-
8	-	0.022R	-	-	-	-	-	-	-	-	0.02 L	0.02 L	-
9	-	0.013	-	-	-	-	-	-	0.012	-	-	0.012	-
10	-	0.016*	-	-	-	-	-	-	0.011	-	-	0.011	-
11	0.013	0.013	-	0.005R	-	-	-	-	-	-	-	0.005R	-
14	-	-	-	-	-	-	-	0.015	-	-	-	0.015*	-
15	-	0.016*	-	-	-	-	-	-	0.013	-	-	0.013	-
16	-	0.014	-	-	-	-	0.016	-	-	-	-	0.016*	-
19	-	0.011	0.012	-	-	-	-	-	-	-	-	0.012	-
20	-	.0145	-	-	-	-	-	0.012	-	-	-	0.012	-
21	-	0.016*	-	-	-	-	-	0.014	-	-	-	0.014	-
MEAN	.0130	.0140	.0120	.0110	.0110	.0100	.0160	.0137	.0120	.0100	-	.0123	.0280
STD DEV	-	.0017	.0000	-	-	-	-	.0015	.0010	-	-	.0019	-
REL STD	-	12.0	-1.0	-	-	-	-	11.2	8.3	-	-	15.2	-
DES VAL	-	.013	-	-	-	-	-	-	-	-	-	.012	-

LAB	26009 FE TOT 5X ICP	26011 FE TOT 5X ICP	26012 FE TOT 5X DCP	26107 FE DIS AAS GF	26111 FE DIS ICP DA	26305 FE EXT AAS SE	26311 FE EXT ICP DA	26999 IRON COMMON	27002 CO TOT AAS SE	27003 CO TOT AAS GF	27009 CO TOT 5X ICP	27011 CO TOT 5X ICP	27012 CO TOT 5X DCP
1	0.030	-	-	-	-	-	-	0.030	-	-	0.011	-	-
2	-	-	-	-	-	0.03	-	0.03	-	-	-	-	-
3	0.030	-	-	-	-	-	-	0.028	0.011	-	0.010	-	-
6	-	0.031	-	-	-	-	-	0.031	-	-	-	0.010	-
8	-	-	-	-	-	-	0.03	0.03	-	0.011	-	-	-
9	-	-	-	-	0.03	-	-	0.03	-	-	-	-	-
10	-	-	-	-	0.020	-	-	0.020*	-	-	-	-	-
11	-	-	-	-	-	0.028	-	0.028	-	-	-	-	-
15	-	-	-	-	0.028	-	-	0.028	-	-	-	-	-
16	-	-	0.030	-	-	-	-	0.030	-	-	-	-	0.010
19	0.026	-	-	-	-	-	-	0.026	-	-	0.009	-	-
20	-	-	-	.0215	-	-	-	.0215*	-	0.010	-	-	-
21	-	-	-	0.026	-	-	-	0.026	-	-	-	-	-
MEAN	.0287	.0310	.0300	.0238	.0260	.0290	.0300	.0276	.0110	.0105	.0100	.0100	.0100
STD DEV	.0023	-	-	.0032	.0053	.0014	-	.0034	-	.0007	.0010	-	-
REL STD	8.1	-	-	13.4	20.4	4.9	-	12.4	-	6.7	10.0	-	-
DES VAL	-	-	-	-	-	-	-	.028	-	-	-	-	-

LAB	27107 CO DIS AAS GF	27111 CO DIS ICP DA	27302 CO EXT AAS SE	27999 COBALT COMMON	28002 NI TOT AAS SE	28007 NI TOT AAS GF	28009 NI TOT 5X ICP	28011 NI TOT 5X ICP	28012 NI TOT 5X DCP	28107 NI DIS AAS GF	28111 NI DIS ICP DA	28302 NI EXT AAS SE	28309 NI EXT AAS GF
1	-	-	-	0.011	-	-	0.014	-	-	-	-	-	-
3	-	-	-	0.011	0.012	-	0.012	-	-	-	-	-	-
6	-	-	-	0.010	-	-	-	0.011	-	-	-	-	-
8	-	-	-	0.011	-	-	-	-	-	-	-	-	0.014
9	-	0.01	-	0.01	-	-	-	-	-	-	0.01	-	-
10	-	0.009	-	0.009	-	-	-	-	-	-	0.013	-	-
11	-	-	0.012	0.012	-	-	-	-	-	-	-	0.012	-
15	-	0.012	-	0.012	-	-	-	-	-	-	0.02 L	-	-
16	-	-	-	0.010	-	-	-	-	0.012	-	-	-	-
19	-	-	-	0.009	-	-	0.009	-	-	-	-	-	-
20	-	-	-	0.010	-	0.016	-	-	-	-	-	-	-
21	0.010	-	-	0.010	-	-	-	-	-	0.013	-	-	-
MEAN	.0100	.0103	.0120	.0104	.0120	.0160	.0117	.0110	.0120	.0130	.0115	.0120	.0140
STD DEV	-	.0015	-	.0010	-	-	.0025	-	-	-	.0021	-	-
REL STD	-	14.8	-	9.6	-	-	21.6	-	-	-	18.4	-	-
DES VAL	-	-	-	.011	-	-	-	-	-	-	-	-	-

LAB	28999 NICKEL COMMON	29003 CU TOT AAS GF	29005 CU TOT AAS SE	29009 CU TOT 5X ICP	29011 CU TOT 5X ICP	29012 CU TOT 5X DCP	29107 CU DIS AAS GF	29111 CU DIS ICP DA	29305 CU EXT AAS SE	29311 CU EXT ICP DA	29999 COPPER COMMON	30003 ZN TOT AAS GF	30005 ZN TOT AAS SE
1	0.014	-	-	0.015	-	-	-	-	-	-	0.015	-	-
2	-	-	-	-	-	-	-	-	0.014	-	0.014	-	-
3	0.012	-	0.013	0.013	-	-	-	-	-	-	0.013	-	0.015
6	0.011	-	-	-	0.012	-	-	-	-	-	0.012	-	-
8	0.014	-	-	-	-	-	-	-	-	0.01 L	0.01 *	-	-
9	0.01	-	-	-	-	-	-	0.012	-	-	0.012	-	-
10	0.013	-	-	-	-	-	-	0.014	-	-	0.014	-	-
11	0.012	-	-	-	-	-	-	-	0.014	-	0.014	-	-
15	0.02 L	-	-	-	-	-	-	0.015	-	-	0.015	-	-
16	0.012	-	-	-	-	0.013	-	-	-	-	0.013	-	-
19	0.009*	-	-	0.013	-	-	-	-	-	-	0.013	-	-
20	0.016	.0122	-	-	-	-	-	-	-	-	.0122	0.016	-
21	0.013	-	-	-	-	-	0.015	-	-	-	0.015	-	-
MEAN	.0124	.0122	.0130	.0137	.0120	.0130	.0150	.0137	.0140	-	.0135	.0160	.0150
STD DEV	.0020	-	-	.0012	-	-	-	.0015	.0000	-	.0011	-	-
REL STD	15.9	-	-	8.4	-	-	-	11.2	-1.0	-	8.5	-	-
DES VAL	.013	-	-	-	-	-	-	-	-	-	.013	-	-

LAB	30009 ZN TOT 5X ICP	30011 ZN TOT 5X ICP	30012 ZN TOT 5X DCP	30107 ZN DIS AAS GF	30111 ZN DIS ICP DA	30304 ZN EXT AAS DA	30305 ZN EXT AAS SE	30311 ZN EXT ICP DA	30999 ZINC COMMON	38009 SR TOT ICP DA	38012 SR TOT DCP DA	38111 SR DIS ICP DA	38999 STRNTIUM COMMON
1	0.079R	-	-	-	-	-	-	-	0.079R	-	-	-	-
2	-	-	-	-	-	0.017	-	-	0.017	-	-	-	-
3	0.015	-	-	-	-	-	-	-	0.015	0.351	-	-	0.351
6	-	0.012	-	-	-	-	-	-	0.012	-	-	-	-
8	-	-	-	-	-	-	-	0.01 L	0.01 *	-	-	-	-
9	-	-	-	-	0.015	-	-	-	0.015	-	-	0.38	0.38
10	-	-	-	-	0.017	-	-	-	0.017	-	-	-	-
11	-	-	-	-	-	-	0.016	-	0.016	-	-	-	-
14	-	-	-	0.018	-	-	-	-	0.018	-	-	-	-
15	-	-	-	-	0.016	-	-	-	0.016	-	-	0.37	0.37
16	-	-	0.020R	-	-	-	-	-	0.020R	-	0.458	-	0.458*
19	0.017	-	-	-	-	-	-	-	0.017	-	-	-	-
20	-	-	-	-	-	-	-	-	0.016	-	-	-	-
21	-	-	-	0.012	-	-	-	-	0.012	-	-	-	-
MEAN	.0160	.0120	-	.0150	.0160	.0170	.0160	-	.0155	.3510	.4580	.3750	.3898
STD DEV	.0014	-	-	.0042	.0010	-	-	-	.0020	-	-	.0071	.0471
REL STD	8.8	-	-	28.3	6.3	-	-	-	12.7	-	-	1.9	12.1
DES VAL	-	-	-	-	-	-	-	-	.015	-	-	-	.361

LAB	42000	42009 MO TOT 5X ICP	42011 MO TOT 5X ICP	42012 MO TOT 5X DCP	42111 MO DIS ICP DA	42999 MOLYBNUM COMMON	48002 CD TOT AAS SE	48003 CD TOT AAS GF	48004	48009 CD TOT 5X ICP	48011 CD TOT 5X ICP	48012 CD TOT 5X DCP	48103 CD DIS AAS GF
1	-	0.013	-	-	-	0.013	-	-	-	0.011	-	-	-
3	-	0.012	-	-	-	0.012	0.010	-	-	0.010	-	-	-
6	-	-	0.01	-	-	0.01	-	-	-	-	0.010	-	-
9	-	-	-	-	0.01	0.01	-	-	0.011	-	-	-	-
10	-	-	-	-	0.009	0.009	-	-	-	-	-	-	-
15	-	-	-	-	0.01	0.01	-	-	-	-	-	-	-
16	-	-	-	0.014	-	0.014*	-	-	-	-	-	0.010	-
19	-	0.012	-	-	-	0.012	-	-	-	0.011	-	-	-
20	-	-	-	-	-	-	-	0.011	-	-	-	-	-
21	0.005L	-	-	-	-	0.005*	-	-	-	-	-	-	0.002R
MEAN	-	.0123	.0100	.0140	.0097	.0113	.0100	.0110	.0110	.0107	.0100	.0100	-
STD DEV	-	.0006	-	-	.0006	.0018	-	-	-	.0006	-	-	-
REL STD	-	4.7	-	-	6.0	15.6	-	-	-	5.4	-	-	-
DES VAL	-	-	-	-	-	.011	-	-	-	-	-	-	-

LAB	48107	48111 CD DIS ICP DA	48302 CD EXT AAS SE	48309 CD EXT AAS GF	48999 CADMIUM COMMON	56000 BA ?	56009 BA TOT 5X ICP	56011 BA TOT 5X ICP	56012 BA TOT 5X DCP	56111 BA DIS ICP DA	56999 BARIUM COMMON	82002 PB TOT AAS SE	82004 PB TOT AAS GF
1	-	-	-	-	0.011	-	0.053	-	-	-	0.053	-	-
2	-	-	0.011	-	0.011	-	-	-	-	-	-	-	-
3	-	-	-	-	0.010	-	0.052	-	-	-	0.052	0.010	-
6	-	-	-	-	0.010	-	-	0.056	-	-	0.056	-	-
8	-	-	-	0.010	0.010	-	-	-	-	-	-	-	-
9	-	-	-	-	0.011	-	-	-	-	0.05	0.05	-	0.010
10	-	0.011	-	-	0.011	-	-	-	-	0.05	0.05	-	-
11	-	-	0.009	-	0.009	-	-	-	-	-	-	-	-
14	0.011	-	-	-	0.011	-	-	-	-	-	-	-	-
15	-	0.011	-	-	0.011	-	-	-	-	0.055	0.055	-	0.002R
16	-	-	-	-	0.010	-	-	-	0.064R	-	0.064R	-	-
19	-	-	-	-	0.011	-	0.055	-	-	-	0.055	-	-
20	-	-	-	-	0.011	-	-	-	-	-	-	-	0.010
21	-	-	-	-	0.002R	0.105R	-	-	-	-	0.105R	-	-
MEAN	.0110	.0110	.0100	.0100	.0105	-	.0533	.0560	-	.0517	.0530	.0100	.0100
STD DEV	-	.0000	.0014	-	.0007	-	.0015	-	-	.0029	.0024	-	.0000
REL STD	-	-1.0	14.1	-	6.3	-	2.9		-	5.6	4.6	-	-1.0
DES VAL	-	-	-	-	.010	-	-	-	-	-	.052	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 42 PP 82 SAMPLE 3

LAB	82009 PB TOT 5X ICP	82011 PB TOT 5X ICP	82012 PB TOT 5X DCP	82104 PB DIS AAS GF	82302 PB EXT AAS SE	82309 PB EXT AAS GF	82999 LEAD COMMON
1	-	-	-	-	0.012	-	0.012
2	-	-	-	-	0.011	-	0.011
3	0.010	-	-	-	-	-	0.010
6	-	0.011	-	-	-	-	0.011
8	-	-	-	-	-	0.011	0.011
9	-	-	-	-	-	-	0.010
11	-	-	-	-	0.011	-	0.011
14	-	-	-	0.009	-	-	0.009
15	-	-	-	-	-	-	0.002R
16	-	-	0.005R	-	-	-	0.005R
19	0.03 L	-	-	-	-	-	0.03 L
20	-	-	-	-	-	-	0.010
21	-	-	-	0.009	-	-	0.009
MEAN	.0100	.0110	-	.0090	.0113	.0110	.0104
STD DEV	-	-	-	.0000	.0006	-	.0010
REL STD	-	-	-	-1.0	5.1	-	9.3
DES VAL	-	-	-	-	-	-	.010

LAB	00110 IONIC BALANC %	00120 SUM OF CATIONS	00125 SUM OF ANIONS	02011 COLOUR APPARE	02021 COLOUR VIS COM	02023 COLOUR SPECT	02024 COL TRU SPECT	02040 COLOUR COMMON	02041 CONDUCT SPEC 25	02060 CONDUCT COMMON	02073 TURB HACH	02074 TURB NPLMTRI	02077 TURB HACH FZ
1	-	-	-	-	-	-	-	-	37.	37.	0.4	-	-
2	-0.66	0.327	0.331	160.	-	-	-	160.	36.	36.	0.3	-	-
3	3.7	0.333	0.309	120.	-	-	-	120.	37.1	37.1	0.20	-	-
4	-	-	-	-	140.	-	-	140.	37.1	37.1	-	-	-
5	-	-	-	130.	-	-	-	130.	36.1	36.1	0.14	-	-
6	-	-	-	-	-	-	-	-	38.	38.	-	0.14	-
7	3.6	0.30	0.28	153.	-	-	-	153.	36.0	36.0	0.17	-	-
8	3.54	0.376	0.350	-	-	-	-	-	40.3	40.3	-	-	-
9	4.6	0.34	0.31	-	-	-	-	-	39.	39.	-	-	-
10	8.76	0.329	0.276	-	-	90.	-	90. *	35.	35.	-	0.2	-
11	-	-	-	105.	-	-	-	105.	35.	35.	-	-	0.1
14	-	-	-	-	-	-	-	-	36.8	36.8	-	-	-
15	-	-	-	120.	-	-	-	120.	37.5	37.5	-	0.1 L	-
16	-	-	-	-	-	-	-	-	41.	41. *	0.1	-	-
19	-	-	-	-	-	-	-	-	38.9	38.9	-	-	-
20	-	0.337	-	-	-	-	-	-	36.	36.	-	0.6	-
21	6.28	0.331	0.291	-	-	-	180.	180. *	32.9	32.9	-	0.50	-
MEAN	4.2600	.3341	.3067	131.3333	140.0000	90.0000	180.0000	133.1111	37.0412	37.0412	.2183	.3600	.1000
STD DEV	2.8844	.0209	.0270	21.1818	-	-	-	28.2110	2.0063	2.0063	.1118	.2245	-
REL STD	67.7	6.2	8.8	16.1	-	-	-	21.2	5.4	5.4	51.2	62.4	-
DES VAL	-	-	-	-	-	-	-	131.042	-	36.570	-	-	-

LAB	02081 TURB RATIO	02090 TURBIDTY COMMON	05105 BORON AA CARM	05106 BORON F AZOMETH	05107 BORON ICP DA	05111 BORON F ICP DA	05190 BORON COMMON	06006	06009 TOC CO2 IR	06051 TIC COMB IR	06101 DOC IR /DIF	06104 DOC UV CO2 IR	06107 DOC UV CO2 PHE
1	-	0.4	-	-	0.008	-	0.008	-	-	-	-	-	10.6
2	-	0.3	-	-	-	-	-	-	-	-	-	-	8.7
3	-	0.20	-	-	-	-	-	-	-	-	-	9.3	-
4	0.17	0.17	0.152R	-	-	-	0.152R	-	-	-	-	1.62 R	-
5	-	0.14	-	-	-	-	-	-	-	-	13.9	-	-
6	-	0.14	-	-	-	-	-	-	-	-	-	-	-
7	-	0.17	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	0.22 L	-	-	0.22 L	-	-	-	-	-	-
10	-	0.2	-	-	-	0.01	0.01	-	-	-	-	-	-
11	-	0.1	-	-	-	-	-	-	-	-	-	-	-
15	-	0.1 L	-	-	0.01 L	-	0.01	-	12.5	1.0 L	-	-	-
16	-	0.1	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	0.004	-	0.004	-	14.2	1.0 L	-	-	-
20	-	0.6 *	-	-	-	-	-	13.1	-	1. L	-	-	-
21	-	0.50 *	-	-	-	-	-	-	-	-	-	-	-
MEAN	.1700	.2517	-	-	.0060	.0100	.0073	13.1000	13.3500	-	13.9000	9.3000	9.6500
STD DEV	-	.1643	-	-	.0028	-	.0031	-	1.2021	-	-	-	1.3435
REL STD	-	65.3	-	-	47.1	-	41.7	-	9.0	-	-	-	13.9
DES VAL	-	.296	-	-	-	-	.088	-	-	-	-	-	-

LAB	06109 DOC UV CO2 OH	06112 DOC PER IR	06150 D O C COMMON	06151 DIC IR COMBUST	06152 DIC UV CO2 IR	06154 DIC AA CO2 PHE	06159 DIC AA CO2 OH	06490 D I C COMMON	07005 TKN INDO BL	07010 TKN AA SAL	07015 TKN DIG BERTHEL	07016 TKN BLK AMM-SAL	07021 TKN BLK DIG BER
1	-	-	10.6	-	-	0.5 L	-	0.5 L	-	-	-	-	0.25
2	-	-	8.7 *	-	-	-	-	-	-	-	-	-	-
3	-	-	9.3 *	-	0.2	-	-	0.2	-	0.273	-	-	-
4	-	-	1.62 R	-	0.713	-	-	0.713	-	-	-	-	-
5	-	-	13.9 *	0.87	-	-	-	0.87	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	0.8 R	-
8	-	-	-	-	-	-	-	-	-	-	0.25	-	-
10	9.0	-	9.0 *	-	-	-	0.6	0.6	-	-	-	-	-
15	-	-	12.5	-	-	-	-	1.0 L	-	-	-	-	-
16	-	13.1	13.1	-	0.8	-	-	0.8	-	-	-	-	-
19	-	-	14.2 *	-	-	-	-	1.0 L	-	-	-	-	0.21
20	-	-	13.1	-	-	-	-	1. L	-	-	-	0.25	-
21	-	-	-	-	-	-	-	-	0.255	-	-	-	-
MEAN	9.0000	13.1000	11.6000	.8700	.5710	-	.6000	.6366	.2550	.2730	.2500	.2500	.2300
STD DEV	-	-	2.2028	-	.3242	-	-	.2641	-	-	-	-	.0283
REL STD	-	-	19.0	-	56.8	-	-	41.5	-	-	-	-	12.3
DES VAL	-	-	11.138	-	-	-	-	.524	-	-	-	-	-

LAB	07090 TKN COMMON	07109 NO3+NO2 AA HYD	07110 NO3+NO2 AA2 CD	07111 NO3+NO2 DIS SPEC	07112 NO3+NO2 UF AA CD	07390 NITRATE COMMON	07505 NH3 TOT AA BERT	07540 NH3 TOT AA SAL	07555 NH3 DIS AA PHEN	07556 NH3 DIS INDO	07557 NH3 DIS AA INDO	07562 NH3 DIS AA EDTA	07590 AMMONIA COMMON
1	0.25	-	-	0.044	-	0.044	-	-	-	-	-	0.003	0.003
2	-	-	0.06	-	-	0.06 *	-	-	-	-	-	-	-
3	0.273	-	-	-	0.047	0.047	0.008	-	-	-	-	-	0.008
4	-	-	0.048	-	-	0.048	-	0.005L	-	-	-	-	0.005L
5	-	-	0.046	-	-	0.046	-	-	-	-	0.005	-	0.005
6	0.8 R	0.03 L	-	-	-	0.03 L	-	-	-	-	0.01 L	-	0.01 L
7	-	-	-	-	0.04	0.04	-	-	-	-	-	-	-
8	0.25	-	0.05	-	-	0.05	-	-	0.013	-	-	-	0.013
9	-	0.04	-	-	-	0.04	-	-	-	-	-	-	-
10	-	0.025	-	-	-	0.025*	-	-	0.010	-	-	-	0.010
11	-	-	-	-	-	-	-	0.03 L	-	-	-	-	0.03 L
13	-	-	0.03	-	-	0.03	-	0.1 L	-	-	-	-	0.1 L
14	-	-	-	0.03 L	-	0.03 L	-	-	-	-	-	-	-
15	-	-	0.043	-	-	0.043	-	-	0.027	-	-	-	0.027R
19	0.21 *	-	0.05	-	-	0.05	-	-	0.02 L	-	-	-	0.02 L
20	0.25	-	0.06	-	-	0.06 *	0.009	-	-	-	-	-	0.009
21	0.255	-	-	0.012	-	0.012*	-	-	-	0.005L	-	-	0.005L
MEAN	.2480	.0325	.0484	.0280	.0435	.0425	.0085	-	.0167	-	.0050	.0030	.0080
STD DEV	.0206	.0106	.0096	.0226	.0049	.0130	.0007	-	.0091	-	-	-	.0036
REL STD	8.3	32.6	19.9	80.8	11.4	30.6	8.3	-	54.4	-	-	-	44.7
DES VAL	.336	-	-	-	-	.031	-	-	-	-	-	-	.021

LAB	07600 T N PER AUTO	07601 T N UV AA SUL	07602 T N CALC'D	07605 T N UV HY SUL	07651 T N DIS UV AA	07655 T N DIS UV EDTA	07690 TOT N COMMON	07790 T N DIS COMMON	09103 F DIS COL SP	09105 F DIS SP EL	09106 F DIS EL POT	09107 F DIS AUT POT	09108 F DIS SP EL
1	-	-	-	-	-	-	-	-	-	-	-	0.03	-
2	-	0.10	-	-	-	-	-	0.10 *	-	-	0.05 L	-	-
3	-	0.205	-	-	-	-	-	0.205	-	-	-	-	0.03
4	-	-	-	-	0.258	-	-	0.258*	-	-	-	-	-
5	-	-	-	-	-	0.196	-	0.196	-	-	0.05 L	-	-
6	-	-	-	-	-	-	-	-	0.1 L	-	-	-	-
10	-	-	-	0.20	-	-	-	0.20	-	0.04	-	-	-
11	-	-	-	-	-	-	-	-	-	0.05 L	-	-	-
15	-	-	-	-	-	-	-	-	-	0.05 L	-	-	-
19	-	-	0.26	-	-	-	0.26	-	-	-	-	-	-
20	0.31	-	-	-	-	-	0.31 *	-	-	0.1 L	-	-	-
21	-	-	0.267	-	-	-	0.267	-	-	-	0.092R	-	-
MEAN	.3100	.1525	.2635	.2000	.2580	.1960	.2790	.1918	-	.0400	-	.0300	.0300
STD DEV	-	.0742	.0049	-	-	-	.0271	.0572	-	-	-	-	-
REL STD	-	48.7	1.9	-	-	-	9.7	29.8	-	-	-	-	-
DES VAL	-	-	-	-	-	-	.344	.204	-	-	-	-	-

LAB	09116 F DIS IC	09190 FLUORIDE COMMON	10101 ALKLNTY TITR'N	10108 ALKLNTY POT TIT	10109 ALKLNTY POT TIT	10111 ALKLNTY TIT PRO	10112 ALKLNTY TIT CON	10190 ALKLINTY COMMON	10301 PH	10390 PH COMMON	10601 HARDNSS CALC'D	10602 HARDNSS CALC'D	10603 HARDNSS TITR'N
1	-	0.03	-	-	-	-	-	-	6.03	6.03	-	-	-
2	-	0.05 L	4.2	-	-	-	-	4.2	6.4	6.4	-	7.25	-
3	-	0.03	-	-	-	2.8	-	2.8	6.40	6.40	-	-	-
4	-	-	2.5	-	-	-	-	2.5	6.35	6.35	-	-	-
5	-	0.05 L	3.00	-	-	-	-	3.00	6.45	6.45	-	-	-
6	-	0.1 L	-	-	20. L	-	-	20. L	6.9	6.9	-	-	12. R
7	-	-	2.5	-	-	-	-	2.5	6.4	6.4	-	-	7.5
8	-	-	-	-	2.00	-	-	2.00	6.35	6.35	-	8.58	-
9	-	-	-	5.	-	-	-	5.	6.21	6.21	-	7.	-
10	-	0.04	-	-	-	-	3.2	3.2	6.40	6.40	-	-	-
11	-	0.05 L	2.7	-	-	-	-	2.7	6.2	6.2	-	7.1	-
13	-	-	3.	-	-	-	-	3.	5.8	5.8	-	10.2 R	-
14	-	-	4.39	-	-	-	-	4.39	6.28	6.28	6.8	-	-
15	-	0.05 L	5.1	-	-	-	-	5.1	6.3	6.3	-	8.8	-
16	0.1 L	0.1 L	4.0	-	-	-	-	4.0	5.88	5.88	-	6.0	-
19	-	-	-	-	6.	-	-	6. *	6.4	6.4	-	7.47	-
20	-	0.1 L	5.0	-	-	-	-	5.0	6.4	6.4	-	7.4	-
21	-	0.092R	3.5	-	-	-	-	3.5	6.00	6.00	-	7.6	-
MEAN	-	.0333	3.6264	5.0000	4.0000	2.8000	3.2000	3.6806	6.2861	6.2861	6.8000	7.4667	7.5000
STD DEV	-	.0058	.9647	-	2.8284	-	-	1.1630	.2487	.2487	-	.8359	-
REL STD	-	17.3	26.6	-	70.7	-	-	31.6	4.0	4.0	-	11.2	-
DES VAL	-	.028	-	-	-	-	-	3.235	-	6.265	-	-	-

LAB	10606 HARDNSS CALC'D	10690 HARDNESS COMMON	11001 NA TOT AAS	11005 NA TOT ICP	11102 NA F AAS	11103 NA DIS FL PH	11104 NA DIS FLAME	11105 NA DIS AAS DA	11107 NA UF FL PH	11111 NA DIS ICP	11311 NA EXT ICP	11990 SODIUM COMMON	12002 MG TOT AAS DA
2	-	7.25	-	-	-	4.0	-	-	-	-	-	4.0	-
3	7.2	7.2	-	-	-	-	-	-	4.13	-	-	4.13	-
5	-	-	-	-	-	4.1	-	-	-	-	-	4.1	-
6	-	12. R	-	-	5.	-	-	-	-	-	-	5. *	-
7	-	7.5	-	-	-	-	-	3.62	-	-	-	3.62 *	-
8	-	8.58 *	-	-	-	-	-	-	-	-	4.55	4.55	-
9	-	7.	-	4.2	-	-	-	-	-	-	-	4.2	-
10	-	-	-	3.92	-	-	-	-	-	-	-	3.92	-
11	-	7.1	-	-	3.6	-	-	-	-	-	-	3.6 *	-
13	-	10.2 R	-	-	-	-	-	-	-	4.0	-	4.0	-
14	-	6.8	4.60	-	-	-	-	-	-	-	-	4.60 *	-
15	-	8.8 *	-	-	-	-	-	-	-	4.0	-	4.0	-
16	-	6.0 *	-	-	-	-	-	-	-	-	-	-	-
19	-	7.47	-	3.68	-	-	-	-	-	-	-	3.68	-
20	-	7.4	-	-	-	-	4.2	-	-	-	-	4.2	0.62
21	-	7.6	-	-	3.95	-	-	-	-	-	-	3.95	-
MEAN	7.2000	7.3917	4.6000	3.9333	4.1833	4.0500	4.2000	3.6200	4.1300	4.0000	4.5500	4.1033	.6200
STD DEV	-	.7409	-	.2603	.7286	.0707	-	-	-	.0000	-	.3803	-
REL STD	-	10.0	-	6.6	17.4	1.7	-	-	-	-1.0	-	9.3	-
DES VAL	-	7.488	-	-	-	-	-	-	-	-	-	4.103	-

LAB	12005 MG TOT ICP	12101 MG DIS CALC'D	12102 MG DIS AAS DA	12106 MG UF AAS DA	12107 MG DIS AAS AUT	12111 MG DIS ICP	12311 MG EXT ICP	12990 MGNESIUM COMMON	14000 SILICA ?	14090 SILICA ?	14102 SILICA ANSA AA	14103 SILICA MOL SUL	14105 SILICA MOL ASC
2	-	-	-	-	0.67	-	-	0.67	-	-	2.53	-	-
3	-	-	-	0.64	-	-	-	0.64	-	-	-	-	-
5	-	-	0.667	-	-	-	-	0.667	-	-	-	-	2.3
6	-	1.0 R	-	-	-	-	-	1.0 R	-	-	-	-	-
7	-	-	0.62	-	-	-	-	0.62	-	-	-	-	-
8	-	-	-	-	-	-	0.81	0.81	-	-	-	-	2.3
9	0.7	-	-	-	-	-	-	0.7	-	-	-	-	-
10	0.63	-	-	-	-	-	-	0.63	-	-	-	-	2.20
11	-	-	0.6	-	-	-	-	0.6	-	-	-	-	-
13	-	-	-	-	-	0.69	-	0.69	-	-	-	-	-
14	-	-	0.63	-	-	-	-	0.63	-	-	-	-	-
15	-	-	-	-	-	0.7	-	0.7	-	-	-	-	-
19	0.693	-	-	-	-	-	-	0.693	-	-	-	2.35	-
20	-	-	-	-	-	-	-	0.62	-	-	-	-	2.3
21	-	-	-	0.70	-	-	-	0.70	2.52	2.52	-	-	-
MEAN	.6743	-	.6293	.6700	.6700	.6950	.8100	.6693	2.5200	2.5200	2.5300	2.3500	2.2750
STD DEV	.0386	-	.0281	.0424	-	.0071	-	.0535	-	-	-	-	.0500
REL STD	5.7	-	4.5	6.3	-	1.0	-	8.0	-	-	-	-	2.2
DES VAL	-	-	-	-	-	-	-	.700	-	-	-	-	-

LAB	14106 SI FIL MOL ASC	14107 SILICA MOLY AA	14111 SILICA ICP DA	14190 SILICA COMMON	15301 T P ACL AA ASC	15313 T P ACL AA SNCL	15401 T P UV AA ASC	15403 T P UF AA SNCL	15406 T P UF AA ASC	15407 T P ASC AC	15409 T P BLK AA ASC	15413 T P ACL AA SNCL	15421 T P BLK DIG ASC
1	-	2.5	-	2.5	-	-	-	-	-	-	-	-	0.005
2	-	-	-	2.53	-	-	-	-	-	-	-	0.005	-
3	2.37	-	-	2.37	-	-	-	-	-	-	-	0.006	-
4	-	-	-	-	-	-	-	-	0.004	-	-	-	-
5	-	-	-	2.3	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	0.03 R	-	-
7	-	-	-	-	-	-	-	0.006	-	-	-	-	-
8	-	-	-	2.3	-	-	-	-	-	-	-	0.008	-
9	-	-	2.3	2.3	-	-	-	-	-	-	-	-	-
10	-	-	-	2.20	-	-	0.010L	-	-	-	-	-	-
11	-	-	-	-	-	0.007	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-	0.009	-	-	-	-
15	-	-	2.18	2.18	-	-	-	-	0.006	-	-	-	-
19	-	-	-	2.35	-	-	-	-	0.02 L	-	-	-	-
20	-	-	-	2.3	0.005	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-	-	0.007	-	-	-
MEAN	2.3700	2.5000	2.2400	2.3330	.0050	.0070	-	.0060	.0063	.0070	-	.0063	.0050
STD DEV	-	-	.0849	.1125	-	-	-	-	.0025	-	-	.0015	-
REL STD	-	-	3.8	4.8	-	-	-	-	39.7	-	-	24.1	-
DES VAL	-	-	-	2.288	-	-	-	-	-	-	-	-	-

LAB	15490 TOT P COMMON	16206	16303 SO4 DIS TIT THO	16304 SO4 DIS AUTO BA	16306 SO4 DIS AA MTB	16307 SO4 UF AA MTB	16309 SO4 DIS I C	16310 SO4 DIS AA CALM	16311 SO4 DIS IC	16990 SULFATE COMMON	17203 CL DIS AA FE	17204 CL DIS AG TIT	17206 CL DIS AA HG
1	0.005	-	-	-	-	-	-	-	-	-	-	-	5.4
2	0.005	-	-	4.9	-	-	2.9	-	-	2.9	-	-	-
3	0.006	-	-	-	-	2.1	-	-	-	2.1 *	-	-	-
4	0.004	-	-	-	-	-	-	-	-	-	-	-	-
5	-	3.2	-	-	-	-	-	-	-	3.2	-	-	5.9
6	0.03 R	-	-	10. L	-	-	-	-	-	10. L	-	6.	-
7	0.006	-	-	-	3.3	-	-	-	-	3.3 *	5.5	-	-
8	0.008	-	-	-	5.25 R	-	-	-	-	5.25 R	-	-	7.
9	-	-	-	-	-	-	2.7	-	-	2.7	-	-	-
10	0.010L	-	-	-	-	-	-	2.8	-	2.8	-	-	-
11	0.007	-	-	-	4.3 R	-	-	-	-	4.3 R	-	-	4.8
13	0.009	-	-	-	2.9	-	-	-	-	2.9	-	-	6.0
14	-	-	-	-	-	-	2.89	-	-	2.89	-	-	-
15	0.006	-	-	-	-	-	-	-	-	-	-	-	6.7
16	-	-	-	-	-	-	-	-	2.	2. *	-	-	-
19	0.02 L	-	-	-	-	-	-	-	-	-	-	-	5.83
20	0.005	-	-	-	4.6 R	-	-	-	-	4.6 R	5.7	-	-
21	0.007	-	2.0	-	-	-	-	-	-	2.0 *	6.2	-	-
MEAN	.0062	3.2000	2.0000	4.9000	3.1000	2.1000	2.8300	2.8000	2.0000	2.6790	5.8000	6.0000	5.9471
STD DEV	.0015	-	-	-	.2828	-	.1127	-	-	.4798	.3606	-	.7427
REL STD	23.8	-	-	-	9.1	-	4.0	-	-	17.9	6.2	-	12.5
DES VAL	.009	-	-	-	-	-	-	-	-	2.799	-	-	-

LAB	17208 CL DIS AA HG	17209 CL DIS I C	17210 CL DIS TIT CON	17211 CL DIS IC	17990 CHLORIDE COMMON	19001 K TOT AAS	19005 K TOT ICP	19102 K DIS AAS	19103 K DIS FLM PH	19104 K DIS FLAME	19105 K DIS AAS DA	19106 K DIS AAS LI	19107 K DIS FLM PH
1	-	-	-	-	5.4	-	-	-	-	-	-	-	-
2	-	4.9	-	-	4.9 *	-	-	-	0.29	-	-	-	-
3	5.6	-	-	-	5.6	-	-	-	-	-	-	-	0.32
5	-	-	-	-	5.9	-	-	-	0.3	-	-	-	-
6	-	-	-	-	6.	-	-	0.4	-	-	-	-	-
7	-	-	-	-	5.5	-	-	0.20	-	-	-	-	-
8	-	-	-	-	7. *	-	-	-	-	-	-	-	-
9	-	5.4	-	-	5.4	-	0.3	-	-	-	-	-	-
10	-	-	5.4	-	5.4	-	0.30	-	-	-	-	-	-
11	-	-	-	-	4.8 *	-	-	-	-	-	-	0.3	-
13	-	-	-	-	6.0	-	-	-	-	-	-	-	-
14	-	5.03	-	-	5.03	0.28	-	-	-	-	-	-	-
15	-	-	-	-	6.7 *	-	-	-	-	-	0.29	-	-
16	-	-	-	1. L	1. *	-	-	-	-	-	-	-	-
19	-	-	-	-	5.83	-	0.289	-	-	-	-	-	-
20	-	-	-	-	5.7	-	-	-	0.4	-	-	-	-
21	-	-	-	-	6.2	-	-	-	-	0.25	-	-	-
MEAN	5.6000	5.1100	5.4000	-	5.7100	.2800	.2963	.3000	.3300	.2500	.2900	.3000	.3200
STD DEV	-	.2594	-	-	.5997	-	.0064	.1414	.0608	-	-	-	-
REL STD	-	5.1	-	-	10.5	-	2.1	47.1	18.4	-	-	-	-
DES VAL	-	-	-	-	5.592	-	-	-	-	-	-	-	-

LAB	19111 K DIS ICP	19301 K EXT HNO3 AA	19990 PTASSIUM COMMON	20003 CA TOT AAS LA	20005 CA TOT ICP	20050 CA DIS AAS NO	20100 CA DIS CALC'D	20103 CA DIS AAS	20108 CA DIS AAS UF	20110 CA DIS AAS AUT	20111 CA DIS ICP	20311 CA EXT ICP	20990 CALCIUM COMMON
2	-	-	0.29	-	-	-	-	-	-	1.8	-	-	1.8
3	-	-	0.32	-	-	-	-	-	1.84	-	-	-	1.84
5	-	-	0.3	-	-	-	-	1.81	-	-	-	-	1.81
6	-	-	0.4 *	-	-	-	3.2 R	-	-	-	-	-	3.2 R
7	-	-	0.20	-	-	-	-	1.68	-	-	-	-	1.68
8	-	0.27	0.27	-	-	-	-	-	-	-	-	2.10 R	2.10 R
9	-	-	0.3	-	1.8	-	-	-	-	-	-	-	1.8
10	-	-	0.30	-	1.68	-	-	-	-	-	-	-	1.68
11	-	-	0.3	-	-	-	-	1.9	-	-	-	-	1.9
13	0.26	-	0.26	-	-	-	-	-	-	-	1.84	-	1.84
14	-	-	0.28	-	-	1.70	-	-	-	-	-	-	1.70
15	-	-	0.29	-	-	-	-	-	-	-	1.8	-	1.8
19	-	-	0.289	-	1.85	-	-	-	-	-	-	-	1.85
20	-	-	0.4 *	1.94	-	-	-	-	-	-	-	-	1.94
21	-	-	0.25	-	-	-	-	-	1.9	-	-	-	1.9
MEAN	.2600	.2700	.2966	1.9400	1.7767	1.7000	-	1.7967	1.8700	1.8000	1.8200	-	1.8108
STD DEV	-	-	.0507	-	.0874	-	-	.1106	.0424	-	.0283	-	.0830
REL STD	-	-	17.1	-	4.9	-	-	6.2	2.3	-	1.6	-	4.6
DES VAL	-	-	.273	-	-	-	-	-	-	-	-	-	1.799

DATES RECEIVED

1 89/05/19	2 89/06/29	3 89/05/11	3 89/06/30	4 89/06/30
5 89/07/10	6 89/05/24	6 89/06/29	7 89/08/09	8 89/06/29
9 89/06/22	10 89/06/29	11 89/06/30	13 89/06/28	14 89/07/04
15 89/06/28	16 89/06/28	19 89/06/30	20 89/06/30	21 89/06/20

NOTE: ALL CONCENTRATION UNITS ARE EXPRESSED IN MG/L OF EACH ELEMENT, THE EXCEPTIONS BEING: COLOUR IN RELATIVE UNITS, CONDUCTIVITY IN USIE/CM, TURBIDITY IN JTU OR NTU, NITROGEN ANALYSES IN "N", ALKALINITY & HARDNESS IN CACO3, SILICA IN SIO2, AND SULFATE IN SO4.

Environment Canada | Environnement Canada
Conservation and Protection | Conservation et Protection

Canada Centre for Inland Waters
National Water Research Institute
867 Lakeshore Road, P.O. Box 5050
Burlington, Ontario
L7R 4A6

Your file Votre référence

Our file Notre référence

November 1 Novembre, 1989.

To: Participants & Managers in:
A: Participants et Directeurs dans:

Federal-Provicial Quality Assurance Program
Programme d'Assurance-Qualité Fédéral-Provincial (PAQFP)

Final Report/Rapport Dernier: FPQA Studies/Etudes 43-44

Vous trouverez en annexe le résumé dernier de l'étude F/P susmentionées.

Comme vous pouvez le constater, les labos 10 & 16 n'ont pas envoyé leur résultats. C'est la premiere fois depuis que 10 ans que des participants ont font défaut, et j'espere que c'est un cas temporaire et que tous les labos continueront à participer activement au QA/QC comme dans le passé.

Si vous avez de commentaire sur ce résumé, ou des corrections valides à notre base de données, veuillez me les transmettre.

I have enclosed the final report for the above mentioned studies.

As you may see in the flagged results table, laboratories 10 & 16 did not submit results. I hope that this is a temporary case, and that all laboratories continue their QA actively as in the past.

If you have any comments on this report, or any legitimate corrections to the data base, please do not hesitate to communicate them.

Harry A

H. Alkema
Quality Assurance Project
Research & Applications Branch

Canada

LISTE DE DIFFUSION / DISTRIBUTION

Fédéral / Provincial / Federal

Mr. Haig Agemian
NWQL, CCIW

Mr. Albert Boyko
EP, Western & Northern Reg.

Mr. Guy Brun
Atlantic Region, WQB

Mr. William Coedy
Northern Affairs Pgm, NWT

M. Laurent Côté
Laboratoire de Montréal, P Q

Ms. Dominique Duval
St. Lawrence Centre Lab, P Q

Mr. Brian Douglas
PEI Dept. of Agriculture

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EP, Pacific & Yukon Region

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BC Research Corp

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Environment N B

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Laboratoire de Québec

cc.

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NWRI, CCIW

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RESEARCH & APPLICATIONS BRANCH

FINAL REPORT

REPORT NO. RAB 89–18 (Eng)

FEDERAL PROVINCIAL QUALITY ASSURANCE PROGRAM

STUDIES 43 AND 44

for July and August 1989

TRACE METALS, MAJOR IONS, NUTRIENTS AND PHYSICAL PARAMETERS IN SURFACE WATERS

by

H. Alkema

Quality Assurance Project
National Water Research Institute
Burlington, Ontario

October 1989

(Ce rapport est aussi disponible en français)

Introduction

As part of an on-going study, the Quality Assurance Section, NWRI in Burlington, Ontario, has been sending reference water samples bi-monthly to chemical laboratories participating in the FP program. This report summarizes the most recent FP interlaboratory quality assurance studies: FP 43 and 44, for the months July and August, 1989. These two studies dealt with trace metals, major ions, nutrients and physical parameters. The concentrations were from medium to high.

Study Design

Four water samples were submitted to each laboratory for chemical analyses. Two samples were submitted for trace metals analysis, while the remaining two were submitted for major ions, nutrients and some physical measurements. The following is a breakdown of the four samples:

FP 43 – Sample 1 – 125 ml, high level* for trace metals (3% HNO_3)
Sample 2 – up to 1 L, major ions etc., stored at 4°C

FP 44 – Sample 3 – 1 L, low level* for trace metals (0.2% HNO_3)
Sample 4 – up to 1 L, major ions, etc., stored at 4°C

* for definitions see Appendix 1

Treatment of Data

Each laboratory was asked to perform only those analyses which were routine to their particular laboratory, using the general methodology guidelines listed above. Results for these analyses were reported as required by the standard report sheets provided with the QA samples. Submitted results were tabulated for each parameter, first for each method reported, and then for

all methods combined. These data, and the resulting statistics are presented in the Data Summary. (attached)

Preliminary data summaries (RAB # 89-15), including problematic results, were sent September 5, and September 28. Each laboratory was given three weeks to notify us of any errors in data transcription, compilation, or flags.

Performance Indicators

In the Federal Provincial QA program, two types of reference samples are used for the accuracy assessment. These are Reference Waters (RMs) and Certified Reference waters (CRMs) which have Design Values for the stable parameters. Also, regional samples are used occasionally as natural representative samples. The means for these regional samples, and the Design Values for the reference waters are used to test each reported result for accuracy.

Percentage deviations from the reference values are used as an indication by the laboratory head to determine the extent of the discrepancies between the laboratory result and the reference value. However, please keep in mind that at low levels, high % deviations are often seen, and may be misleading if interpreted too strictly.

A result which deviates more than the greater of 10% or 1 standard deviation from the reference value is marked with an asterisk in the data table and its value tabulated in the flagged data table (Table 1). Results reported with an "L" (less than) or flagged with an "R" (rejectable) are not used in the statistical calculations. Performance indicators are fully explained in Appendix II.

Comments on Laboratory Performance

Results accompanied with a 'less than' are difficult to appraise. If a design value or mean is significantly lower than the detection limit given by a particular laboratory, then that detection limit is too high. Such a result is assigned an 'HDL' and is tabulated for each laboratory in Table 1.

If, on the other hand, the detection limit reported is far lower than the mean or design value, then the use of 'less than' is clearly inadequate and the result is flagged low. The magnitude of the deviation from the mean in such a case is taken from the detection limit given.

Attached are two tables listing flagged data by laboratory (Table 1), and listing parameters for which there was a high standard deviation (Table 2). Formerly called a high coefficient of variation, the standard deviation is generated with standardized criteria that are included with the automated flagging routine. These automated criteria have been in use since March 1988 (Study FP 27), and should provide a more accurate and consistent listing of the difficult to analyze parameters or levels. A listing of the criteria used to indicate high deviation of analysis is available on request. Your comments would be appreciated.

Provincial laboratories average number of deviations per sample was 1.3.
Federal laboratories average number of deviations per sample was 1.2.

APPENDIX I

Definitions of Types of Metals Analysis

1. HIGH LEVEL ANALYSIS

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

2. LOW LEVEL ANALYSIS

Analysis is 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, or DCP.
3. Digestion of aqueous phase and ICAP or DCP analysis.
4. Graphite tube (flameless) AAS.

Updated March 1989.

APPENDIX II

Performance Indicators

1. Flagged Results

As a first indication that analysis results are appreciably deviant from the expected value, each submitted result is tested with the 10% or 1 Standard Deviation Rule. When a result is found to deviate more than 10%, or more than 1 standard deviation when this is greater than 10%, the result is flagged with an asterisk in the data summary and tabled for that laboratory in the Flagged Data Table. Typically at low levels the 10% criteria is too small and the 1 standard deviation criteria effectively indicates deviant analytical results. As performance indicator, the flagged results indicate to laboratory heads that in-house QC procedures and the methodology concerned need to be ivestigated. Results may still be comparable.

2. Grubbs' Rejectable Results

For every parameter, each laboratory result is statistically tested to see if it is outlying. Outlying results are caused by non random causes such as a faulty calibration or incorrect transcription. These outlying results, calculated by the Grubbs' procedure,* and indicated in the data tables with an 'R', are noncomparable with the other data for that parameter.

3. A High Standard Deviation for a Parameter

Occasionally data for a difficult to analyse parameter yields a very high relative standard deviation (RSD). When a high RSD is not due to outlying results, there are noncomparable results within the data set. In such a case, the RSD for that parameter is indicated in Table 2, entitiled: High Standard Deviations.

4. High Detection Limits (HDL's)

Each laboratory determines its own detection limits according to its own requirements. When major differences in detection limits occur, an HDL is indicated for the particular laboratory in the Flagged Data Table. An HDL indicates that low level analysis may not be comparable with the analyses of other laboratories.

* reference : Frank E. Grubbs, Technometrics, 1969, p. 1.

TABLE 1: FP & PPWB LABORATORIES FLAGGED RESULTS - STUDIES FP 43-44

LAB 1	FLAGS :	ALUMINUM	14%		LEAD	-22%	R	D O C	-72% L
		SILICA	571%	R	PTASSIUM	-21%		HARDNESS	-12%
		MGNESIUM	-16%		PTASSIUM	-15%		CALCIUM	-12%
LAB 2	FLAGS :	SODIUM	18%		SODIUM	16%			
	HDL :	T N DIS							
LAB 3	FLAGS :	T N DIS	57%		VANADIUM	-17%	R	SULFATE	-25% R
LAB 4	FLAGS :	D O C	-77%		NITRATE	195%	R	T N DIS	22%
	HDL :	ALKLINTY							
LAB 5	FLAGS :	D O C	60%		D O C	332%	R	D I C	-17%
		AMMONIA	-74%	L					
	HDL :	SILICA							
LAB 6	FLAGS :	TKN	3100%	R	AMMONIA	1528%	R	PH	17% R
		TOT P	122%		ALUMINUM	27%		MANGNESE	-15%
		IRON	19%		COBALT	-15%		NICKEL	-19%
		MOLYBNUM	-13%		CADMIUM	-19%		TKN	1233% R
		NITRATE	29%		AMMONIA	160%	R	MGNESIUM	-23% R
		TOT P	156%		PTASSIUM	21%		CALCIUM	12%
	HDL :	ALKLINTY							
LAB 7	FLAGS :	NONE							
LAB 8	FLAGS :	COPPER	-13%		CHROMIUM	49%	R	COBALT	13%
		LEAD	24%		SULFATE	12%			
	HDL :	ALKLINTY			SILICA			ALUMINUM	
		TKN							
LAB 9	FLAGS :	ALKLINTY	269%		SODIUM	20%	R	ALUMINUM	15%
		IRON	25%		CADMIUM	15%		NITRATE	-45%
		SODIUM	23%	R					
LAB 10	FLAGS :	NO RESULTS REPORTED							
LAB 11	FLAGS :	MANGNESE	-84%	R	MANGNESE	18%		ZINC	-24%
	HDL :	NITRATE			AMMONIA			AMMONIA	
LAB 13	FLAGS :	TOT P	122%		CHLORIDE	-15%	R	PTASSIUM	-20%
		PTASSIUM	-15%						
	HDL :	AMMONIA							
LAB 14	FLAGS :	MANGNESE	-22%	R	COPPER	-93%	R	HARDNESS	174% R
		MGNESIUM	721%	R	SULFATE	15%			
LAB 15	FLAGS :	AMMONIA	365%	R	ALKLINTY	971%	R	PH	40% R
		SULFATE	-11%		ALUMINUM	75%	R	LEAD	-67% R
		SILICA	-13%						
	HDL :	D O C			D I C				
LAB 16	FLAGS :	NO RESULTS REPORTED							

..../2

LAB 19	FLAGS :	CHROMIUM	-12%		TKN	420%	R	AMMONIA	2691% R
		SILICA	124%		SULFATE	-14%		PTASSIUM	-20%
		CHROMIUM	-22%		D O C	63%		TKN	247% R
		AMMONIA	679%	R	SULFATE	-11%		PTASSIUM	24%
	HDL :	NITRATE			TOT P			LEAD	
LAB 20	FLAGS :	CHROMIUM	-44%	R	COPPER	24%	R	ZINC	32%
	HDL :	SILICA							
LAB 21	FLAGS :	PTASSIUM	-12%		ALUMINUM	15%		MANGNESE	32%
		IRON	19%		ZINC	29%		MOLYBNUM	-19%

NOTE: A VERY HIGH FREQUENCY OF FLAGGED RESULTS (OR A HIGH %) IS INDICATIVE OF POOR PERFORMANCE. ON THE OTHER HAND, LABS WITH FEW IF ANY FLAGS ARE JUDGED TO HAVE VERY GOOD PERFORMANCE.

ALSO, AN "R" FLAG INDICATES A NON COMPARABLE RESULT, THAT IS, ONE PRODUCED WITH NON RANDOM FACTORS. AN "L" FLAG INDICATES A 'LESS THAN' RESULT LOWER THAN THE REFERENCE VALUE.

TABLE 2: HIGH STANDARD DEVIATION

PARAMETER		LEVEL
D O C	AT	.725 PPM
T N DIS	AT	.029 PPM
SILICA	AT	.015 PPM
BORON	AT	.031 PPM
D O C	AT	.737 PPM

DATA SUMMARY

FEDERAL-PROVINCIAL & PRAIRIE PROVINCES QUALITY ASSURANCE PROGRAMS

STUDY NO. FP 43 PP 83 DATE: 01/07/89 DUE DATE: 31/08/89 PAGE 1

SAMPLE 1 SPIKED SAMPLE. TRACE METALS DA. (IN 3.0% HNO3)

LAB	13004 AL TOT AAS GF	13009 AL TOT 5X ICP	13030 Al ToT ICP	13102 AL DIS AAS DA	13111 AL DIS ICP DA	13302 AL EXT AAS DA	13321 AL EXT ICP DA	13999 ALUMINUM COMMON	23009 V TOT 5X ICP	23011 V TOT 5X ICP	23111 V DIS ICP DA	23321 V EXT ICP DA
1	-	-	3.050	-	-	-	-	3.050 *	2.320	-	-	-
2	-	-	-	-	-	2.6	-	2.6	-	-	-	-
3	-	-	-	-	-	2.84	2.87	2.87	-	-	-	2.36
6	-	2.6	-	-	-	-	-	2.6	-	2.2	-	-
8	-	-	-	-	-	2.9	-	2.9	-	-	-	-
9	-	-	-	-	2.8	-	-	2.8	-	-	2.37	-
15	-	-	-	-	2.69	-	-	2.69	-	-	2.25	-
19	-	2.43	-	-	-	-	-	2.43	2.26	-	-	-
20	2.402	-	-	-	-	-	-	2.402	2.255	-	-	-
21	-	-	-	2.9	-	-	-	2.9	-	-	-	-
MEAN	2.4020	2.5150	3.0500	2.9000	2.7450	2.7800	2.8700	2.7242	2.2783	2.2000	2.3100	2.3600
STD DEV	-	.1202	-	-	.0778	.1587	-	.2153	.0362	-	.0849	-
REL STD	-	4.8	-	-	2.8	5.7	-	7.9	1.6	-	3.7	-
DES VAL	-	-	-	-	-	-	-	2.6823	-	-	-	-

LAB	23999 VANADIUM COMMON	24009 CR TOT 5X ICP	24011 CR TOT 5X ICP	24104 CR DIS AAS DA	24111 CR DIS ICP DA	24302 CR EXT AAS DA	24311 CR EXT ICP DA	24321 CR EXT ICP DA	24999 CHROMIUM COMMON	25003 MN TOT 5X ICP	25004 MN TOT AAS DA	25009 MN TOT COL BIS
1	2.320	0.306	-	-	-	-	-	-	0.306	0.268	-	-
3	2.36	-	-	-	-	-	-	0.305	0.305	-	-	-
6	2.2	-	0.31	-	-	-	-	-	0.31	-	-	-
8	-	-	-	-	-	0.27	-	-	0.27	-	-	-
9	2.37	-	-	-	0.30	-	-	-	0.30	-	-	-
11	-	-	-	-	-	0.300	-	-	0.300	-	0.041 R	-
13	-	-	-	-	-	-	0.29	-	0.29	-	-	-
15	2.25	-	-	-	0.305	-	-	-	0.305	-	-	-
19	2.26	0.263	-	-	-	-	-	-	0.263 *	-	-	0.261
20	2.255	0.168 R	-	-	-	-	-	-	0.168 R	-	-	-
21	-	-	-	0.33	-	-	-	-	0.33	-	-	-
MEAN	2.2879	.2845	.3100	.3300	.3025	.2850	.2900	.3050	.2979	.2680	-	.2610
STD DEV	.0632	.0304	-	-	.0035	.0212	-	-	.0195	-	-	-
REL STD	2.8	10.7	-	-	1.2	7.4	-	-	6.5	-	-	-
DES VAL	2.3229	-	-	-	-	-	-	-	.2996	-	-	-

LAB	25010 MN TOT 5X ICP	25011 MN TOT 5X ICP	25104 MN DIS AAS DA	25111 MN DIS ICP DA	25304 MN EXT AAS DA	25311 MN EXT ICP DA	25321 MN EXT ICP DA	25999 MANGNESE COMMON	26009 FE TOT 5X ICP	26011 FE TOT 5X ICP	26104 FE DIS AAS DA	26111 FE DIS ICP DA
1	-	-	-	-	-	-	-	0.268	1.090	-	-	-
2	-	-	-	-	0.28	-	-	0.28	-	-	-	-
3	-	-	-	-	0.264	-	0.261	0.261	-	-	-	-
6	-	0.24	-	-	-	-	-	0.24	-	1.0	-	-
8	-	-	-	-	-	0.25	-	0.25	-	-	-	-
9	-	-	-	0.26	-	-	-	0.26	-	-	-	1.14
11	-	-	-	-	-	-	-	0.041 R	-	-	-	-
13	-	-	-	-	-	0.26	-	0.26	-	-	-	-
14	-	-	0.205 R	-	-	-	-	0.205 R	-	-	1.09	-
15	-	-	-	0.269	-	-	-	0.269	-	-	-	1.15
19	-	-	-	-	-	-	-	0.261	1.09	-	-	-
20	0.247	-	-	-	-	-	-	0.247	1.044	-	-	-
21	-	-	0.27	-	-	-	-	0.27	-	-	1.12	-
MEAN	.2470	.2400	.2700	.2645	.2720	.2550	.2610	.2605	1.0747	1.0000	1.1050	1.1450
STD DEV	-	-	-	.0064	.0113	.0071	-	.0115	.0266	-	.0212	.0071
REL STD	-	-	-	2.4	4.2	2.8	-	4.4	2.5	-	1.9	.6
DES VAL	-	-	-	-	-	-	-	.2632	-	-	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 43 PP 83 SAMPLE 1

LAB	26304 FE EXT AAS DA	26311 FE EXT ICP DA	26321 FE EXT ICP DA	26999 IRON COMMON	27009 CO TOT 5X ICP	27011 CO TOT 5X ICP	27101 CO DIS AAS DA	27111 CO DIS ICP DA	27301 CO EXT AAS DA	27321 CO EXT ICP DA	27999 COBALT COMMON	28009 NI TOT 5X ICP
1	-	-	-	1.090	1.070	-	-	-	-	-	1.070	1.240
2	1.1	-	-	1.1	-	-	-	-	-	-	-	-
3	1.12	-	1.14	1.14	-	-	-	-	-	1.04	1.04	-
6	-	-	-	1.0	-	1.0	-	-	-	-	1.0	-
8	-	1.09	-	1.09	-	-	-	-	1.09	-	1.09	-
9	-	-	-	1.14	-	-	-	1.06	-	-	1.06	-
11	1.10	-	-	1.10	-	-	-	-	1.13	-	1.13	-
13	-	1.0	-	1.0	-	-	-	-	-	-	-	-
14	-	-	-	1.09	-	-	-	-	-	-	-	-
15	-	-	-	1.15	-	-	-	1.06	-	-	1.06	-
19	-	-	-	1.09	1.08	-	-	-	-	-	1.08	1.20
20	-	-	-	1.044	1.003	-	-	-	-	-	1.003	1.209
21	-	-	-	1.12	-	-	1.07	-	-	-	1.07	-
MEAN	1.1067	1.0450	1.1400	1.0888	1.0510	1.0000	1.0700	1.0600	1.1100	1.0400	1.0603	1.2163
STD DEV	.0115	.0636	-	.0483	.0419	-	-	.0000	.0283	-	.0389	.0210
REL STD	1.0	6.1	-	4.4	4.0	-	-	-1.0	2.5	-	3.7	1.7
DES VAL	-	-	-	1.0894	-	-	-	-	-	-	1.0678	-

LAB	28011 NI TOT 5X ICP	28101 NI DIS AAS DA	28111 NI DIS ICP DA	28301 NI EXT AAS DA	28311 NI EXT ICP DA	28321 NI EXT ICP DA	28999 NICKEL COMMON	29009 CU TOT 5X ICP	29011 CU TOT 5X ICP	29106 CU DIS AAS DA	29111 CU DIS ICP DA	29306 CU EXT AAS DA
1	-	-	-	-	-	-	1.240	0.286	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	0.29
3	-	-	-	-	-	1.26	1.26	-	-	-	-	-
6	1.2	-	-	-	-	-	1.2	-	0.28	-	-	-
8	-	-	-	-	1.25	-	1.25	-	-	-	-	-
9	-	-	1.25	-	-	-	1.25	-	-	-	0.27	-
11	-	-	-	1.19	-	-	1.19	-	-	-	-	0.276
13	-	-	-	-	1.20	-	1.20	-	-	-	-	-
14	-	-	-	-	-	-	-	-	-	0.021 R	-	-
15	-	-	1.23	-	-	-	1.23	-	-	-	0.312	-
19	-	-	-	-	-	-	1.20	0.286	-	-	-	-
20	-	-	-	-	-	-	1.209	0.281	-	-	-	-
21	-	1.27	-	-	-	-	1.27	-	-	0.29	-	-
MEAN	1.2000	1.2700	1.2400	1.1900	1.2250	1.2600	1.2272	.2843	.2800	.2900	.2910	.2830
STD DEV	-	-	.0141	-	.0354	-	.0284	.0029	-	-	.0297	.0099
REL STD	-	-	1.1	-	2.9	-	2.3	1.0	-	-	10.2	3.5
DES VAL	-	-	-	-	-	-	1.2344	-	-	-	-	-

LAB	29311 CU EXT ICP DA	29321 CU EXT ICP DA	29999 COPPER COMMON	30009 ZN TOT 5X ICP	30011 ZN TOT 5X ICP	30104 ZN DIS AAS DA	30111 ZN DIS ICP DA	30304 ZN EXT AAS DA	30311 ZN EXT ICP DA	30321 ZN EXT ICP DA	30999 ZINC COMMON	38111 SR DIS ICP DA
1	-	-	0.286	0.310	-	-	-	-	-	-	0.310	-
2	-	-	0.29	-	-	-	-	0.31	-	-	0.31	-
3	-	0.287	0.287	-	-	-	-	-	-	0.323	0.323	-
6	-	-	0.28	-	0.31	-	-	-	-	-	0.31	-
8	0.250	-	0.250 *	-	-	-	-	-	0.300	-	0.300	-
9	-	-	0.27	-	-	-	0.31	-	-	-	0.31	0.50
11	-	-	0.276	-	-	-	-	0.314	-	-	0.314	-
13	0.26	-	0.26	-	-	-	-	-	0.32	-	0.32	-
14	-	-	0.021 R	-	-	0.323	-	-	-	-	0.323	-
15	-	-	0.312	-	-	-	0.324	-	-	-	0.324	0.521
19	-	-	0.286	0.326	-	-	-	-	-	-	0.326	-
20	-	-	0.281	0.305	-	-	-	-	-	-	0.305	-
21	-	-	0.29	-	-	0.31	-	-	-	-	0.31	-
MEAN	.2550	.2870	.2807	.3137	.3100	.3165	.3170	.3120	.3100	.3230	.3142	.5105
STD DEV	.0071	-	.0158	.0110	-	.0092	.0099	.0028	.0141	-	.0082	.0148
REL STD	2.8	-	5.6	3.5	-	2.9	3.1	.9	4.6	-	2.6	2.9
DES VAL	-	-	.2889	-	-	-	-	-	-	-	.3144	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 43 PP 83 SAMPLE 1

LAB	38321 SR EXT ICP DA	38999 STRNTIUM COMMON	42009 MO TOT 5X ICP	42011 MO TOT 5X ICP	42101 MO DIS AAS DA	42111 MO DIS ICP DA	42121 MO EXT ICP DA	42999 MOLYBNUM COMMON	48009 CD TOT 5X ICP	48011 CD TOT 5X ICP	48101 CD DIS AAS DA	48111 CD DIS ICP DA
1	-	-	4.680	-	-	-	-	4.680	0.237	-	-	-
3	0.494	0.494	-	-	-	-	4.59	4.59	-	-	-	-
6	-	-	-	4.3	-	-	-	4.3	-	0.22	-	-
9	-	0.50	-	-	-	4.58	-	4.58	-	-	-	0.24
15	-	0.521	-	-	-	4.52	-	4.52	-	-	-	0.232
19	-	-	4.63	-	-	-	-	4.63	0.240	-	-	-
20	-	-	4.484	-	-	-	-	4.484	0.222	-	-	-
21	-	-	-	-	4.4	-	-	4.4	-	-	0.23	-
MEAN	.4940	.5050	4.5980	4.3000	4.4000	4.5500	4.5900	4.5230	.2330	.2200	.2300	.2360
STD DEV	-	.0142	.1018	-	-	.0424	-	.1255	.0096	-	-	.0057
REL STD	-	2.8	2.2	-	-	.9	-	2.8	4.1	-	-	2.4
DES VAL	-	.4891	-	-	-	-	-	4.6231	-	-	-	-

LAB	48301 CD EXT AAS DA	48311 CD EXT ICP DA	48321 CD EXT ICP DA	48999 CADMIUM COMMON	56009 BA TOT 5X ICP	56011 BA TOT 5X ICP	56101	56111 BA DIS ICP DA	56301 BA EXT AAS DA	56321 BA EXT ICP DA	56999 BARIUM COMMON	82009 PB TOT 5X ICP
1	-	-	-	0.237	2.540	-	-	-	-	-	2.540	-
2	0.24	-	-	0.24	-	-	-	-	-	-	-	-
3	-	-	0.234	0.234	-	-	-	-	2.55	2.52	2.52	-
6	-	-	-	0.22	-	2.4	-	-	-	-	2.4	-
8	0.24	-	-	0.24	-	-	-	-	-	-	-	-
9	-	-	-	0.24	-	-	-	2.55	-	-	2.55	-
11	0.245	-	-	0.245	-	-	-	-	-	-	-	-
13	-	0.22	-	0.22	-	-	-	-	-	-	-	-
15	-	-	-	0.232	-	-	-	2.70	-	-	2.70	-
19	-	-	-	0.240	2.55	-	-	-	-	-	2.55	1.35
20	-	-	-	0.222	-	-	-	-	-	-	-	1.228
21	-	-	-	0.23	-	-	2.4	-	-	-	2.4	-
MEAN	.2417	.2200	.2340	.2333	2.5450	2.4000	2.4000	2.6250	2.5500	2.5200	2.5229	1.2890
STD DEV	.0029	-	-	.0087	.0071	-	-	.1061	-	-	.1027	.0863
REL STD	1.2	-	-	3.7	.3	-	-	4.0	-	-	4.1	6.7
DES VAL	-	-	-	.2377	-	-	-	-	-	-	2.5300	-

LAB	82011 PB TOT 5X ICP	82101 PB DIS AAS DA	82111 PB DIS ICP DA	82301 PB EXT AAS DA	82302 PB EXT AAS SE	82311 PB EXT ICP DA	82321 PB EXT ICP DA	82999 LEAD COMMON
1	-	-	-	-	1.035 R	-	-	1.035 R
2	-	-	-	1.3	-	-	-	1.3
3	-	-	-	-	-	-	1.35	1.35
6	1.2	-	-	-	-	-	-	1.2
8	-	-	-	-	-	1.25	-	1.25
9	-	-	1.35	-	-	-	-	1.35
11	-	-	-	1.34	-	-	-	1.34
13	-	-	-	-	-	1.25	-	1.25
14	-	1.32	-	-	-	-	-	1.32
15	-	-	1.22	-	-	-	-	1.22
19	-	-	-	-	-	-	-	1.35
20	-	-	-	-	-	-	-	1.228
21	-	1.41	-	-	-	-	-	1.41
MEAN	1.2000	1.3650	1.2850	1.3200	-	1.2500	1.3500	1.2973
STD DEV	-	.0636	.0919	.0283	-	.0000	-	.0661
REL STD	-	4.7	7.2	2.1	-	-1.0	-	5.1
DES VAL	-	-	-	-	-	-	-	1.3295

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 43 PP 83 SAMPLE 2

LAB	00110 IONIC BALANC %	00120 SUM OF CATIONS	00125 SUM OF ANIONS	02011 COLOUR APPARE	02021 COLOUR VIS COM	02023 COLOUR SPECT	02024 COL TRU SPECT	02040 COLOUR COMMON	02041 CONDUCT SPEC 25	02060 CONDUCT COMMON	02073 TURB HACH	02074 TURB NPLMTRI
1	-2.63	3.58	3.77	-	-	-	0.6	0.6	452.	452.	0.14	-
2	2.35	3.887	3.709	5. L	-	-	-	5. L	448.	448.	0.2	-
3	0.08	3.724	3.718	5. L	-	-	-	5. L	445.	445.	0.1	-
4	-	-	-	-	5. L	-	-	5. L	446.	446.	-	-
5	0.083	3.802	3.796	5. L	-	-	-	5. L	445.	445.	0.12	-
6	-0.76	3.84	3.90	-	-	-	-	-	440.	440.	-	0.20
7	-0.6	3.78	3.82	1.	-	-	-	1.	445.	445.	0.2	-
8	1.89	3.92	3.76	5. L	-	-	-	5. L	471.	471.	-	0.08
9	1.87	4.09	3.94	-	-	-	-	-	430.	430.	-	-
11	-	-	-	5. L	-	-	-	5. L	440.	440.	-	-
14	-	-	-	-	-	-	-	-	441.	441.	-	-
15	-	-	-	5.	-	-	-	5.	415.	415.	-	0.1 L
19	-	-	-	-	-	-	-	-	433.	433.	-	-
20	-0.25	3.675	3.693	-	-	2.	-	2.	-	-	-	-
21	-	-	-	-	-	5. L	-	5. L	417.	417.	-	0.1
MEAN	.2259	3.8109	3.7896	3.0000	-	2.0000	.6000	2.1500	440.5714	440.5714	.1520	.1267
STD DEV	1.5836	.1487	.0851	2.8284	-	-	-	1.9891	14.0861	14.0861	.0460	.0643
REL STD	701.1	3.9	2.2	94.3	-	-	-	92.5	3.2	3.2	30.3	50.8
DES VAL	-	-	-	-	-	-	-	2.4851	-	444.426	-	-

LAB	02077 TURB HACH FZ	02081 TURB RATIO	02090 TURBIDTY COMMON	05100 BORON ?	05105 BORON AA CARM	05106 BORON F AZOMETH	05107 BORON ICP DA	05190 BORON COMMON	06009 TOC CO2 IR	06051 TIC COMB IR	06101 DOC IR /DIF	06104 DOC UV CO2 IR
1	-	-	0.14	-	-	-	-	-	-	-	-	-
2	-	-	0.2	-	-	-	-	-	-	-	-	-
3	-	-	0.1	-	-	-	-	-	-	-	-	0.4
4	-	0.17	0.17	-	0.02 L	-	-	0.02 L	-	-	-	0.167
5	-	-	0.12	-	-	-	-	-	-	-	1.16	-
6	-	-	0.20	-	-	-	-	-	-	-	-	0.9
7	-	-	0.2	-	-	-	-	-	-	-	-	-
8	-	-	0.08	-	-	0.05 L	-	0.05 L	-	-	-	-
11	0.1	-	0.1	-	-	-	-	-	-	-	-	-
15	-	-	0.1 L	-	-	-	0.01 L	0.01 L	-	-	-	1. L
19	-	-	-	0.010	-	-	-	0.010	1.00	0.5 L	-	-
21	-	-	0.1	-	-	-	-	-	-	-	-	-
MEAN	.1000	.1700	.1410	.0100	-	-	-	.0100	1.0000	-	1.1600	.4890
STD DEV	-	-	.0477	-	-	-	-	-	-	-	-	.3745
REL STD	-	-	33.8	-	-	-	-	-	-	-	-	76.6
DES VAL	-	-	.1832	-	-	-	-	.01188	-	-	-	-

LAB	06107 DOC UV CO2 PHE	06150 D O C COMMON	06151 DIC IR COMBUST	06152 DIC UV CO2 IR	06154 DIC AA CO2 PHE	06490 D I C COMMON	07005 TKN INDO BL	07015 TKN DIG BERTHEL	07016 TKN BLK AMM-SAL	07021 TKN BLK DIG BER	07090 TKN COMMON	07109 NO3+NO2 AA HYD
1	0.2 L	0.2 *	-	-	0.5 L	0.5 L	-	-	-	0.02	0.02	-
2	0.5 L	0.5 L	-	-	-	-	-	-	-	-	-	-
3	-	0.4	-	0.1 L	-	0.1 L	-	-	-	-	-	-
4	-	0.167 *	-	-	-	-	-	-	-	-	-	-
5	-	1.16 *	0.52	-	-	0.52	-	-	-	-	-	-
6	-	0.9	-	-	-	-	-	-	0.8 R	-	0.8 R	0.03
8	-	-	-	-	-	-	-	0.020 L	-	-	0.020 L	-
9	-	-	-	-	-	-	-	-	-	-	-	0.02
15	-	1. L	-	1. L	-	1. L	-	-	-	-	-	-
19	-	1.00	-	-	-	0.5 L	-	-	-	0.13 R	0.13 R	-
20	-	-	-	-	-	-	-	-	0.03	-	0.03	-
21	-	-	-	-	-	-	0.02 L	-	-	-	0.02 L	-
MEAN	-	.7254	.5200	-	-	.5200	-	-	.0300	.0200	.0250	.0250
STD DEV	-	.4220	-	-	-	-	-	-	-	-	.0071	.0071
REL STD	-	58.2	-	-	-	-	-	-	-	-	28.3	28.3
DES VAL	-	.5292	-	-	-	.6236	-	-	-	-	.03185	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 43 PP 83 SAMPLE 2

LAB	07110 NO3+NO2 AA2 CD	07111 NO3+NO2 DIS SPEC	07112 NO3+NO2 UF AA CD	07390 NITRATE COMMON	07505 NH3 TOT AA BERT	07540 NH3 TOT AA SAL	07555 NH3 DIS AA PHEN	07556 NH3 DIS INDO	07557 NH3 DIS AA INDO	07562 NH3 DIS AA EDTA	07590 AMMONIA COMMON	07601 T N UV AA SUL
1	-	0.019	-	0.019	-	-	-	-	-	0.002	0.002	-
2	0.01	-	-	0.01	-	-	-	-	-	-	-	0.1 L
3	-	-	0.030	0.030	0.008	-	-	-	-	-	0.008	0.045
4	0.059 R	-	-	0.059 R	-	0.005 L	-	-	-	-	0.005 L	-
5	0.020	-	-	0.020	-	-	-	-	0.004	-	0.004	-
6	-	-	-	0.03	-	-	-	-	0.07 R	-	0.07 R	-
7	-	-	0.02	0.02	-	-	-	-	-	-	-	-
8	0.02	-	-	0.02	-	-	0.002	-	-	-	0.002	-
9	-	-	-	0.02	-	-	-	-	-	-	-	-
11	0.02 L	-	-	0.02 L	-	0.02 L	-	-	-	-	0.02 L	-
13	0.02	-	-	0.02	-	0.1 L	-	-	-	-	0.1 L	-
14	-	0.01	-	0.01	-	-	-	-	-	-	-	-
15	0.007	-	-	0.007	-	-	0.020 R	-	-	-	0.020 R	-
19	0.02 L	-	-	0.02 L	-	-	0.12 R	-	-	-	0.12 R	-
20	0.03	-	-	0.03	-	-	0.005	-	-	-	0.005	-
21	-	0.024	-	0.024	-	-	-	0.005	-	-	0.005	-
MEAN	.0178	.0177	.0250	.0200	.0080	-	.0035	.0050	.0040	.0020	.0043	.0450
STD DEV	.0083	.0071	.0071	.0076	-	-	.0021	-	-	-	.0023	-
REL STD	46.3	40.2	28.3	37.8	-	-	60.6	-	-	-	51.9	-
DES VAL	-	-	-	.02634	-	-	-	-	-	-	.00469	-

LAB	07602 T N CALC'D	07651 T N DIS UV AA	07655 T N DIS UV EDTA	07690 TOT N COMMON	07790 T N DIS COMMON	09103 F DIS COL SP	09105 F DIS SP EL	09106 F DIS EL POT	09107 F DIS AUT POT	09108 F DIS SP EL	09190 FLUORIDE COMMON	10101 ALKLNTY TITR'N
1	-	-	-	-	-	-	-	-	0.01 L	-	0.01 L	1.10
2	-	-	-	-	0.1 L	-	-	0.05 L	-	-	0.05 L	-
3	-	-	-	-	0.045 *	-	-	-	-	0.01 L	0.01 L	-
4	-	0.020	-	-	0.020	-	-	-	-	-	-	1.0 L
5	-	-	0.021	-	0.021	-	-	0.050 L	-	-	0.050 L	0.5 L
6	-	-	-	-	-	0.1 L	-	-	-	-	0.1 L	-
7	-	-	-	-	-	-	-	-	-	-	-	0.1 L
8	-	-	-	-	-	-	0.05 L	-	-	-	0.05 L	-
11	-	-	-	-	-	-	0.06	-	-	-	0.06	0.7
13	-	-	-	-	-	-	-	-	-	-	-	1.
14	-	-	-	-	-	-	-	-	-	-	-	1.66
15	-	-	-	-	-	-	0.05 L	-	-	-	0.05 L	8.7 R
19	0.13	-	-	0.13	-	-	0.30 R	-	-	-	0.30 R	-
20	0.06	-	-	0.06	-	-	0.10 L	-	-	-	0.10 L	2.1
21	-	-	-	-	-	-	-	0.1 L	-	-	0.1 L	2.1
MEAN	.0950	.0200	.0210	.0950	.0287	-	.0600	-	-	-	.0600	1.4433
STD DEV	.0495	-	-	.0495	.0142	-	-	-	-	-	-	.5960
REL STD	52.1	-	-	52.1	49.4	-	-	-	-	-	-	41.3
DES VAL	-	-	-	.07750	.05008	-	-	-	-	-	.02487	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 43 PP 83 SAMPLE 2

LAB	10108 ALKLNTY POT TIT	10109 ALKLNTY POT TIT	10110 ALKLNTY GRN TIT	10111 ALKLNTY TIT PRO	10190 ALKLINTY COMMON	10301 PH	10302	10390 PH COMMON	10602 HARDNSS CALC'D	10603 HARDNSS TITR'N	10606 HARDNSS CALC'D	10690 HARDNESS COMMON
1	-	-	-	-	1.10	5.16	-	5.16	138.9	-	-	138.9
2	-	-	-0.5	-	-0.5	5.7	-	5.7	144.0	-	-	144.0
3	-	-	-	0.2	0.2	5.5	-	5.5	-	-	144.1	144.1
4	-	-	-	-	1.0 L	5.65	-	5.65	-	-	-	-
5	-	-	-	-	0.5 L	5.52	-	5.52	147.9	-	-	147.9
6	-	20. L	-	-	20. L	6.4 R	-	6.4 R	-	150.	-	150.
7	-	-	-	-	0.1 L	5.5	-	5.5	-	146.0	-	146.0
8	-	1.00 L	-	-	1.00 L	5.45	-	5.45	152.	-	-	152.
9	3.	-	-	-	3. *	5.41	-	5.41	155.	-	-	155.
11	-	-	-	-	0.7	5.7	-	5.7	140.	-	-	140.
13	-	-	-	-	1.	5.7	-	5.7	148.9	-	-	148.9
14	-	-	-	-	1.66	5.38	-	5.38	405.4 R	-	-	405.4 R
15	-	-	-	-	8.7 R	7.7 R	-	7.7 R	147.	-	-	147.
19	-	2.	-	-	2.	5.3	-	5.3	133.	-	-	133.
20	-	-	-	-	2.1	-	5.6	5.6	143.9	-	-	143.9
21	-	-	-	-	2.1	5.34	-	5.34	143.	-	-	143.
MEAN	3.0000	2.0000	-.5000	.2000	1.3360	5.4854	5.6000	5.4936	144.8727	148.0000	144.1000	145.2643
STD DEV	-	-	-	-	1.0391	.1699	-	.1661	6.2359	2.8284	-	5.6492
REL STD	-	-	-	-	77.8	3.1	-	3.0	4.3	1.9	-	3.9
DES VAL	-	-	-	-	.8123	-	-	5.4852	-	-	-	148.080

LAB	11001 NA TOT AAS	11005 NA TOT ICP	11102 NA F AAS	11103 NA DIS FL PH	11104 NA DIS FLAME	11105 NA DIS AAS DA	11107 NA UF FL PH	11111 NA DIS ICP	11311 NA EXT ICP	11990 SODIUM COMMON	12005 MG TOT ICP	12101 MG DIS CALC'D
1	-	-	-	18.0	-	-	-	-	-	18.0	-	-
2	-	-	-	22.6	-	-	-	-	-	22.6 *	-	-
3	-	-	-	-	-	-	18.8	-	-	18.8	-	-
5	-	-	-	19.0	-	-	-	-	-	19.0	-	-
6	-	-	19.	-	-	-	-	-	-	19.	-	10.
7	-	-	-	-	-	18.5	-	-	-	18.5	-	-
8	-	-	-	-	-	-	-	-	19.5	19.5	-	-
9	-	23. R	-	-	-	-	-	-	-	23. R	10.	-
11	-	-	19.	-	-	-	-	-	-	19.	-	-
13	-	-	-	-	-	-	-	20.0	-	20.0	-	-
14	19.0	-	-	-	-	-	-	-	-	19.0	-	-
15	-	-	-	-	-	-	-	19.7	-	19.7	-	-
19	-	20.0	-	-	-	-	-	-	-	20.0	9.92	-
20	-	-	-	-	19.0	-	-	-	-	19.0	-	-
21	-	-	19.1	-	-	-	-	-	-	19.1	-	-
MEAN	19.0000	20.0000	19.0333	19.8667	19.0000	18.5000	18.8000	19.8500	19.5000	19.3714	9.9600	10.0000
STD DEV	-	-	.0577	2.4194	-	-	-	.2121	-	1.0766	.0566	-
REL STD	-	-	.3	12.2	-	-	-	1.1	-	5.6	.6	-
DES VAL	-	-	-	-	-	-	-	-	-	19.150	-	-

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 43 PP 83 SAMPLE 2

LAB	12102 MG DIS AAS DA	12105 MG DIS AAS DA	12106 MG UF AAS DA	12107 MG DIS AAS AUT	12111 MG DIS ICP	12311 MG EXT ICP	12990 MGNESIUM COMMON	14000 SILICA ?	14090 SILICA ?	14102 SILICA ANSA AA	14103 SILICA MOL SUL	14105 SILICA MOL ASC
1	-	9.0	-	-	-	-	9.0	-	-	-	-	-
2	-	-	-	9.5	-	-	9.5	-	-	0.1 L	-	-
3	-	-	9.1	-	-	-	9.1	-	-	-	-	-
5	9.54	-	-	-	-	-	9.54	-	-	-	-	0.2 L
6	-	-	-	-	-	-	10.	-	-	-	-	-
7	9.5	-	-	-	-	-	9.5	-	-	-	-	-
8	-	-	-	-	-	10.1	10.1	-	-	-	-	0.2 L
9	-	-	-	-	-	-	10.	-	-	-	-	-
11	9.4	-	-	-	-	-	9.4	-	-	0.02 L	-	-
13	-	-	-	-	9.90	-	9.90	-	-	-	-	-
14	79.1 R	-	-	-	-	-	79.1 R	-	-	-	-	-
15	-	-	-	-	9.9	-	9.9	-	-	-	-	-
19	-	-	-	-	-	-	9.92	-	-	-	0.0334	-
20	-	-	-	-	9.3	-	9.3	-	-	-	-	0.5 L
21	-	-	9.7	-	-	-	9.7	0.085	0.085	-	-	-
MEAN	9.4800	9.0000	9.4000	9.5000	9.7000	10.1000	9.6329	.0850	.0850	-	.0334	-
STD DEV	.0721	-	.4243	-	.3464	-	.3520	-	-	-	-	-
REL STD	.8	-	4.5	-	3.6	-	3.7	-	-	-	-	-
DES VAL	-	-	-	-	-	-	9.4512	-	-	-	-	-

LAB	14106 SI FIL MOL ASC	14107 SILICA MOLY AA	14111 SILICA ICP DA	14190 SILICA COMMON	15301 T P ACL AA ASC	15313 T P ACL AA SNCL	15401 T P UV AA ASC	15406 T P UF AA ASC	15407 T P ASC AC	15413 T P ACL AA SNCL	15421 T P BLK DIG ASC	15490 TOT P COMMON
1	-	0.1 R	-	0.1 R	-	-	-	-	-	-	0.001	0.001
2	-	-	-	0.1 L	-	-	-	-	-	0.001	-	0.001
3	0.02 L	-	-	0.02 L	-	-	-	-	-	0.0007	-	0.0007
4	-	-	-	-	-	-	-	0.003	-	-	-	0.003
5	-	-	-	0.2 L	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	0.01	-	-	-	-	0.01 *
7	-	-	-	-	-	-	-	0.001 L	-	-	-	0.001 L
8	-	-	-	0.2 L	-	-	-	-	-	0.001 L	-	0.001 L
9	-	-	0.02	0.02	-	-	-	-	-	-	-	-
11	-	-	-	0.02 L	-	0.007	-	-	-	-	-	0.007
13	-	-	-	-	-	-	-	0.010	-	-	-	0.010 *
15	-	-	0.05 L	0.05 L	-	-	-	-	-	-	-	-
19	-	-	-	0.0334*	-	-	-	0.02 L	-	-	-	0.02 L
20	-	-	-	0.5 L	0.003	-	-	-	-	-	-	0.003
21	-	-	-	-	-	-	-	-	0.003 L	-	-	0.003 L
MEAN	-	-	.0200	.0267	.0030	.0070	.0100	.0065	-	.0009	.0010	.0045
STD DEV	-	-	-	.0095	-	-	-	.0049	-	.0002	-	.0040
REL STD	-	-	-	35.5	-	-	-	76.1	-	25.0	-	88.9
DES VAL	-	-	-	.01491	-	-	-	-	-	-	-	.00513

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 43 PP 83 SAMPLE 2

LAB	16302 SO4 DIS TURB BA	16303 SO4 DIS TIT THO	16304 SO4 DIS AUTO BA	16306 SO4 DIS AA MTB	16307 SO4 UF AA MTB	16309 SO4 DIS I C	16990 SULFATE COMMON	17203 CL DIS AA FE	17204 CL DIS AG TIT	17206 CL DIS AA HG	17208 CL DIS AA HG	17209 CL DIS I C
1	-	-	-	39.	-	-	39.	-	-	104.0	-	-
2	-	-	35.7	-	-	36.0	36.0	-	-	-	-	105.
3	-	-	-	-	34.5	-	34.5	-	-	-	106.6	-
5	-	-	-	36.8	-	-	36.8	-	-	107.	-	-
6	-	-	37.	-	-	-	37.	-	108.	-	-	-
7	-	-	-	37.8	-	-	37.8	107.5	-	-	-	-
8	-	-	-	38.	-	-	38.	-	-	105.	-	-
9	-	-	-	-	-	37.	37.	-	-	-	-	110.
11	-	-	-	41.	-	-	41.	-	-	106.	-	-
13	-	-	-	38.12	-	-	38.12	-	-	90. R	-	-
14	-	-	-	-	-	42.5	42.5 *	-	-	-	-	104.1
15	-	-	-	33.	-	-	33. *	-	-	108.	-	-
19	32.0	-	-	-	-	-	32.0 *	-	-	108.	-	-
20	-	-	-	37.0	-	-	37.0	104.	-	-	-	-
21	-	35.3	-	-	-	-	35.3	110.	-	-	-	-
MEAN	32.0000	35.3000	36.3500	37.5900	34.5000	38.5000	37.0013	107.1667	108.0000	106.3333	106.6000	106.3667
STD DEV	-	-	.9192	2.2725	-	3.5000	2.7298	3.0139	-	1.6330	-	3.1786
REL STD	-	-	2.5	6.0	-	9.1	7.4	2.8	-	1.5	-	3.0
DES VAL	-	-	-	-	-	-	37.114	-	-	-	-	-

LAB	17990 CHLORIDE COMMON	19001 K TOT AAS	19005 K TOT ICP	19102 K DIS AAS	19103 K DIS FLM PH	19104 K DIS FLAME	19105 K DIS AAS DA	19106 K DIS AAS LI	19107 K DIS FLM PH	19111 K DIS ICP	19301 K EXT HNO3 AA	19990 PTASSIUM COMMON
1	104.0	-	-	-	0.7	-	-	-	-	-	-	0.7 *
2	105.	-	-	-	0.96	-	-	-	-	-	-	0.96
3	106.6	-	-	-	-	-	-	-	0.89	-	-	0.89
5	107.	-	-	-	0.8	-	-	-	-	-	-	0.8
6	108.	-	-	0.8	-	-	-	-	-	-	-	0.8
7	107.5	-	-	0.81	-	-	-	-	-	-	-	0.81
8	105.	-	-	-	-	-	-	-	-	-	0.85	0.85
9	110.	-	0.9	-	-	-	-	-	-	-	-	0.9
11	106.	-	-	-	-	-	-	0.9	-	-	-	0.9
13	90. R	-	-	-	-	-	-	-	-	0.71	-	0.71 *
14	104.1	0.85	-	-	-	-	-	-	-	-	-	0.85
15	108.	-	-	-	-	-	0.94	-	-	-	-	0.94
19	108.	-	0.71	-	-	-	-	-	-	-	-	0.71 *
20	104.	-	-	-	0.9	-	-	-	-	-	-	0.9
21	110.	-	-	-	-	0.78	-	-	-	-	-	0.78 *
MEAN	106.6571	.8500	.8050	.8050	.8400	.7800	.9400	.9000	.8900	.7100	.8500	.8333
STD DEV	2.0601	-	.1344	.0071	.1143	-	-	-	-	-	-	.0838
REL STD	1.9	-	16.7	.9	13.6	-	-	-	-	-	-	10.1
DES VAL	105.411	-	-	-	-	-	-	-	-	-	-	.8846

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 43 PP 83 SAMPLE 2

LAB	20005 CA TOT ICP	20050 CA DIS AAS NO	20100 CA DIS CALC'D	20103 CA DIS AAS	20107 CA DIS AAS	20108 CA DIS AAS UF	20110 CA DIS AAS AUT	20111 CA DIS ICP	20115	20311 CA EXT ICP	20990 CALCIUM COMMON
1	-	-	-	-	40.8	-	-	-	-	-	40.8
2	-	-	-	-	-	-	42.	-	-	-	42.
3	-	-	-	-	-	42.7	-	-	-	-	42.7
5	-	-	-	43.5	-	-	-	-	-	-	43.5
6	-	-	43.	-	-	-	-	-	-	-	43.
7	-	-	-	43.4	-	-	-	-	-	-	43.4
8	-	-	-	-	-	-	-	-	-	44.5	44.5
9	45.	-	-	-	-	-	-	-	-	-	45.
11	-	-	-	41.	-	-	-	-	-	-	41.
13	-	-	-	-	-	-	-	42.2	-	-	42.2
14	-	43.8	-	-	-	-	-	-	-	-	43.8
15	-	-	-	-	-	-	-	42.5	-	-	42.5
19	45.4	-	-	-	-	-	-	-	-	-	45.4
20	-	-	-	-	-	-	-	-	42.3	-	42.3
21	-	-	-	-	-	39.0	-	-	-	-	39.0
MEAN	45.2000	43.8000	43.0000	42.6333	40.8000	40.8500	42.0000	42.3500	42.3000	44.5000	42.7400
STD DEV	.2828	-	-	1.4154	-	2.6163	-	.2121	-	-	1.6766
REL STD	.6	-	-	3.3	-	6.4	-	.5	-	-	3.9
DES VAL	-	-	-	-	-	-	-	-	-	-	42.535

DATA SUMMARY

FEDERAL-PROVINCIAL & PRAIRIE PROVINCES QUALITY ASSURANCE PROGRAMS

STUDY NO. FP 44 PP 84 DATE: 01/08/89 DUE DATE: 31/08/89

SAMPLE 3 SPIKED SAMPLE. TRACE METALS -LOW. (IN 0.2% HNO3)

LAB	13004 AL TOT AAS GF	13009 AL TOT 5X ICP	13030	13111 AL DIS ICP DA	13302 AL EXT AAS DA	13305 AL EXT AAS SE	13999 ALUMINUM COMMON	23002 V TOT AAS SE	23009 V TOT 5X ICP	23011 V TOT 5X ICP	23111 V DIS ICP DA	23999 VANADIUM COMMON
1	-	-	0.051	-	-	-	0.051	-	0.021	-	-	0.021
2	-	-	-	-	-	0.05	0.05	-	-	-	-	-
3	-	0.059	-	-	-	0.0500	0.0500	0.0174R	0.020	-	-	0.0174R
6	-	0.066	-	-	-	-	0.066 *	-	-	0.02	-	0.02
8	-	-	-	-	0.2 L	-	0.2 L	-	-	-	-	-
9	-	-	-	0.06	-	-	0.06 *	-	-	-	0.02	0.02
15	0.091 R	-	-	-	-	-	0.091 R	-	-	-	0.02	0.02
19	-	0.0507	-	-	-	-	0.0507	-	0.0202	-	-	0.0202
20	0.05	-	-	-	-	-	0.05	-	-	-	-	-
21	0.060	-	-	-	-	-	0.060 *	-	-	-	-	-
MEAN	.0550	.0586	.0510	.0600	-	.0500	.0547	-	.0204	.0200	.0200	.0202
STD DEV	.0071	.0077	-	-	-	.0000	.0063	-	.0005	-	.0000	.0004
REL STD	12.9	13.1	-	-	-	-1.0	11.6	-	2.6	-	-1.0	2.1
DES VAL	-	-	-	-	-	-	.05209	-	-	-	-	.02104

LAB	24003 CR TOT AAS SE	24004 CR TOT AAS GF	24009 CR TOT 5X ICP	24011 CR TOT 5X ICP	24111 CR DIS ICP DA	24303 CR EXT AAS SE	24999 CHROMIUM COMMON	25003 MN TOT 5X ICP	25004 MN TOT AAS DA	25009 MN TOT COL BIS	25010 MN TOT 5X ICP	25011 MN TOT 5X ICP
1	-	-	0.024	-	-	-	0.024	0.020	-	-	-	-
3	0.0251	-	0.0254	-	-	-	0.0251	-	0.021	-	0.0215	-
6	-	-	-	0.024	-	-	0.024	-	-	-	-	0.018
8	-	0.041 R	-	-	-	-	0.041 R	-	-	-	-	-
9	-	0.031	-	-	-	-	0.031	-	-	-	-	-
11	-	-	-	-	-	0.026	0.026	-	0.025	-	-	-
15	-	-	-	-	0.029	-	0.029	-	-	-	-	-
19	-	-	0.0215	-	-	-	0.0215*	-	-	0.0194	-	-
20	-	0.029	-	-	-	-	0.029	-	-	-	-	-
21	-	0.024	-	-	-	-	0.024	-	-	-	-	-
MEAN	.0251	.0280	.0236	.0240	.0290	.0260	.0260	.0200	.0230	.0194	.0215	.0180
STD DEV	-	.0036	.0020	-	-	-	.0031	-	.0028	-	-	-
REL STD	-	12.9	8.4	-	-	-	11.9	-	12.3	-	-	-
DES VAL	-	-	-	-	-	-	.02759	-	-	-	-	-

LAB	25107 MN DIS AAS GF	25111 MN DIS ICP DA	25304 MN EXT AAS DA	25311 MN EXT ICP DA	25999 MANGNESE COMMON	26003 FE TOT AAS GF	26005 FE TOT AAS SE	26009 FE TOT 5X ICP	26011 FE TOT 5X ICP	26107 FE DIS AAS GF	26111 FE DIS ICP DA	26305 FE EXT AAS SE
1	-	-	-	-	0.020	-	-	0.050	-	-	-	-
2	-	-	0.023	-	0.023	-	-	-	-	-	-	0.048
3	-	-	-	-	0.021	-	0.0492	0.0503	-	-	-	-
6	-	-	-	-	0.018 *	-	-	-	0.057	-	-	-
8	-	-	-	0.023	0.023	-	-	-	-	-	-	-
9	-	0.02	-	-	0.02	-	-	-	-	-	0.06	-
11	-	-	-	-	0.025 *	-	-	-	-	-	-	0.049
15	-	0.022	-	-	0.022	-	-	-	-	-	0.052	-
19	-	-	-	-	0.0194	-	-	0.0494	-	-	-	-
20	0.023	-	-	-	0.023	-	-	-	-	0.051	-	-
21	0.028	-	-	-	0.028 *	0.057	-	-	-	-	-	-
MEAN	.0255	.0210	.0230	.0230	.0220	.0570	.0492	.0499	.0570	.0510	.0560	.0485
STD DEV	.0035	.0014	-	-	.0028	-	-	.0005	-	-	.0057	.0007
REL STD	13.9	6.7	-	-	12.8	-	-	.9	-	-	10.1	1.5
DES VAL	-	-	-	-	.02123	-	-	-	-	-	-	-

LAB	26311 FE EXT ICP DA	26999 IRON COMMON	27002 CO TOT AAS SE	27003 CO TOT AAS GF	27009 CO TOT 5X ICP	27011 CO TOT 5X ICP	27111 CO DIS ICP DA	27999 COBALT COMMON	28002 NI TOT AAS SE	28007 NI TOT AAS GF	28009 NI TOT 5X ICP	28011 NI TOT 5X ICP
1	-	0.050	-	-	0.024	-	-	0.024	-	-	0.027	-
2	-	0.048	-	-	-	-	-	-	-	-	-	-
3	-	0.0492	0.0241	-	0.0233	-	-	0.0241	0.0264	-	0.0252	-
6	-	0.057 *	-	-	-	0.021	-	0.021 *	-	-	-	0.022
8	0.052	0.052	-	0.028	-	-	-	0.028 *	-	-	-	-
9	-	0.06 *	-	-	-	-	0.024	0.024	-	-	-	-
11	-	0.049	-	-	-	-	-	-	-	-	-	-
15	-	0.052	-	-	-	-	0.026	0.026	-	-	-	-
19	-	0.0494	-	-	0.0258	-	-	0.0258	-	-	0.0270	-
20	-	0.051	-	-	-	-	-	-	-	0.028	-	-
21	-	0.057 *	-	0.026	-	-	-	0.026	-	0.030	-	-
MEAN	.0520	.0522	.0241	.0270	.0244	.0210	.0250	.0249	.0264	.0290	.0264	.0220
STD DEV	-	.0040	-	.0014	.0013	-	.0014	.0021	-	.0014	.0010	-
REL STD	-	7.6	-	5.2	5.3	-	5.7	8.4	-	4.9	3.9	-
DES VAL	-	.04786	-	-	-	-	-	.02468	-	-	-	-

LAB	28111 NI DIS ICP DA	28302 NI EXT AAS SE	28309 NI EXT AAS GF	28999 NICKEL COMMON	29003 CU TOT AAS GF	29005 CU TOT AAS SE	29009 CU TOT 5X ICP	29011 CU TOT 5X ICP	29111 CU DIS ICP DA	29305 CU EXT AAS SE	29311 CU EXT ICP DA	29999 COPPER COMMON
1	-	-	-	0.027	-	-	0.052	-	-	-	-	0.052
2	-	-	-	-	-	-	-	-	-	0.053	-	0.053
3	-	-	-	0.0264	-	0.0540	0.0532	-	-	-	-	0.0540
6	-	-	-	0.022 *	-	-	-	0.050	-	-	-	0.050
8	-	-	0.026	0.026	-	-	-	-	-	-	0.047	0.047
9	0.03	-	-	0.03	-	-	-	-	0.055	-	-	0.055
11	-	0.026	-	0.026	-	-	-	-	-	0.055	-	0.055
15	0.03	-	-	0.03	-	-	-	-	0.059	-	-	0.059
19	-	-	-	0.0270	-	-	0.0506	-	-	-	-	0.0506
20	-	-	-	0.028	0.067 R	-	-	-	-	-	-	0.067 R
21	-	-	-	0.030	0.054	-	-	-	-	-	-	0.054
MEAN	.0300	.0260	.0260	.0272	.0540	.0540	.0519	.0500	.0570	.0540	.0470	.0530
STD DEV	.0000	-	-	.0025	-	-	.0013	-	.0028	.0014	-	.0033
REL STD	-1.0	-	-	9.1	-	-	2.5	-	5.0	2.6	-	6.2
DES VAL	-	-	-	.02704	-	-	-	-	-	-	-	.05412

LAB	30003 ZN TOT AAS GF	30005 ZN TOT AAS SE	30009 ZN TOT 5X ICP	30011 ZN TOT 5X ICP	30111 ZN DIS ICP DA	30304 ZN EXT AAS DA	30305 ZN EXT AAS SE	30311 ZN EXT ICP DA	30999 ZINC COMMON	38009 SR TOT ICP DA	38111 SR DIS ICP DA	38999 STRNTIUM COMMON
1	-	-	0.035	-	-	-	-	-	0.035	-	-	-
2	-	-	-	-	-	0.035	-	-	0.035	-	-	-
3	-	0.0345	0.0333	-	-	-	-	-	0.0345	0.182	-	0.182
6	-	-	-	0.034	-	-	-	-	0.034	-	-	-
8	-	-	-	-	-	-	-	0.036	0.036	-	-	-
9	-	-	-	-	0.036	-	-	-	0.036	-	0.18	0.18
11	-	-	-	-	-	-	0.026	-	0.026 *	-	-	-
15	-	-	-	-	0.036	-	-	-	0.036	-	0.188	0.188
19	-	-	0.0358	-	-	-	-	-	0.0358	-	-	-
20	0.045	-	-	-	-	-	-	-	0.045 *	-	-	-
21	0.044	-	-	-	-	-	-	-	0.044 *	-	-	-
MEAN	.0445	.0345	.0347	.0340	.0360	.0350	.0260	.0360	.0361	.1820	.1840	.1833
STD DEV	.0007	-	.0013	-	.0000	-	-	-	.0050	-	.0057	.0042
REL STD	1.6	-	3.7	-	-1.0	-	-	-	13.9	-	3.1	2.3
DES VAL	-	-	-	-	-	-	-	-	.03409	-	-	.1776

DATA SUMMARY - FED-PROV & PPWB QA PROGRAMS

STUDY NO. FP 44 PP 84 SAMPLE 3

LAB	42000	42009 MO TOT 5X ICP	42011 MO TOT 5X ICP	42111 MO DIS ICP DA	42999 MOLYBNUM COMMON	48002 CD TOT AAS SE	48003 CD TOT AAS GF	48004	48009 CD TOT 5X ICP	48011 CD TOT 5X ICP	48111 CD DIS ICP DA	48302 CD EXT AAS SE
1	-	0.018	-	-	0.018	-	-	-	0.020	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	0.021
3	-	0.0169	-	-	0.0169	0.0204	-	-	0.0185	-	-	-
6	-	-	0.016	-	0.016 *	-	-	-	-	0.017	-	-
9	-	-	-	0.02	0.02	-	-	0.024	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	0.0231
15	-	-	-	0.020	0.020	-	-	-	-	-	0.022	-
19	-	0.0201	-	-	0.0201	-	-	-	0.0210	-	-	-
20	-	-	-	-	-	-	0.023	-	-	-	-	-
21	0.015	-	-	-	0.015 *	-	0.022	-	-	-	-	-
MEAN	.0150	.0183	.0160	.0200	.0180	.0204	.0225	.0240	.0198	.0170	.0220	.0221
STD DEV	-	.0016	-	.0000	.0021	-	.0007	-	.0013	-	-	.0015
REL STD	-	8.9	-	-1.0	11.7	-	3.1	-	6.3	-	-	6.7
DES VAL	-	-	-	-	.01848	-	-	-	-	-	-	-

LAB	48309 CD EXT AAS GF	48999 CADMIUM COMMON	56000 BA ?	56009 BA TOT 5X ICP	56011 BA TOT 5X ICP	56111 BA DIS ICP DA	56999 BARIUM COMMON	82002 PB TOT AAS SE	82004 PB TOT AAS GF	82009 PB TOT 5X ICP	82011 PB TOT 5X ICP	82302 PB EXT AAS SE
1	-	0.020	-	0.022	-	-	0.022	-	-	-	-	0.022
2	-	0.021	-	-	-	-	-	-	-	-	-	0.026
3	-	0.0204	-	0.0250	-	-	0.0250	0.0244	-	0.0245	-	-
6	-	0.017 *	-	-	0.022	-	0.022	-	-	-	0.029	-
8	0.021	0.021	-	-	-	-	-	-	-	-	-	-
9	-	0.024 *	-	-	-	0.024	0.024	-	0.025	-	-	-
11	-	0.0231	-	-	-	-	-	-	-	-	-	0.025
15	-	0.022	-	-	-	0.026	0.026	-	0.0086R	-	-	-
19	-	0.0210	-	0.0241	-	-	0.0241	-	-	0.03 L	-	-
20	-	0.023	-	-	-	-	-	-	0.025	-	-	-
21	-	0.022	0.024	-	-	-	0.024	-	0.025	-	-	-
MEAN	.0210	.0213	.0240	.0237	.0220	.0250	.0239	.0244	.0250	.0245	.0290	.0243
STD DEV	-	.0019	-	.0015	-	.0014	.0015	-	.0000	-	-	.0021
REL STD	-	8.9	-	6.5	-	5.7	6.1	-	.0	-	-	8.6
DES VAL	-	.02091	-	-	-	-	.02350	-	-	-	-	-

LAB	82309 PB EXT AAS GF	82999 LEAD COMMON
1	-	0.022
2	-	0.026
3	-	0.0244
6	-	0.029
8	0.032	0.032 *
9	-	0.025
11	-	0.025
15	-	0.0086R
19	-	0.03 L
20	-	0.025
21	-	0.025
MEAN	.0320	.0259
STD DEV	-	.0029
REL STD	-	11.2
DES VAL	-	.02579

LAB	00110 IONIC BALANC %	00120 SUM OF CATIONS	00125 SUM OF ANIONS	02011 COLOUR APPARE	02021 COLOUR VIS COM	02023 COLOUR SPECT	02024 COL TRU SPECT	02040 COLOUR COMMON	02041 CONDUCT SPEC 25	02060 CONDUCT COMMON	02073 TURB HACH	02074 TURB NPLMTRI
1	-5.83	1.86	2.09	-	-	-	1.7	1.7	231.	231.	0.05	-
2	1.91	2.094	2.016	5. L	-	-	-	5. L	230.	230.	0.2	-
3	-3.24	2.008	1.882	5. L	-	-	-	5. L	228.	228.	0.1	-
4	-	-	-	-	5. L	-	-	5. L	227.	227.	-	-
5	-0.94	2.058	2.097	5. L	-	-	-	5. L	233.	233.	0.10	-
6	-1.64	2.08	2.15	-	-	-	-	-	218.	218.	-	0.16
7	-1.0	2.03	2.04	3.	-	-	-	3.	225.	225.	0.1	-
8	-1.03	2.14	2.18	5. L	-	-	-	5. L	241.	241.	-	0.08
9	4.81	2.29	2.08	-	-	-	-	-	220.	220.	-	-
11	-	-	-	5. L	-	-	-	5. L	220.	220.	-	-
14	-	-	-	-	-	-	-	-	221.	221.	-	-
15	-	-	-	5.	-	-	-	5.	215.	215.	-	0.1 L
19	-	-	-	-	-	-	-	-	218.	218.	-	-
20	-0.78	2.001	2.033	-	-	3.	-	3.	-	-	-	-
21	-	-	-	-	-	5. L	-	5. L	209.	209.	-	0.15
MEAN	-.8425	2.0623	2.0631	4.0000	-	3.0000	1.7000	3.1750	224.0000	224.0000	.1100	.1300
STD DEV	3.1811	.1161	.0865	1.4142	-	-	-	1.3623	8.3205	8.3205	.0548	.0436
REL STD	-1.0	5.6	4.2	35.4	-	-	-	42.9	3.7	3.7	49.8	33.5
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-

LAB	02077 TURB HACH FZ	02081 TURB RATIO	02090 TURBIDTY COMMON	05100 BORON ?	05105 BORON AA CARM	05106 BORON F AZOMETH	05107 BORON ICP DA	05190 BORON COMMON	06009 TOC CO2 IR	06051 TIC COMB IR	06101 DOC IR /DIF	06104 DOC UV CO2 IR
1	-	-	0.05	-	-	-	-	-	-	-	-	-
2	-	-	0.2	-	-	-	-	-	-	-	-	-
3	-	-	0.1	-	-	-	-	-	-	-	-	0.6
4	-	0.12	0.12	-	0.047	-	-	0.047	-	-	-	0.611
5	-	-	0.10	-	-	-	-	-	-	-	3.18 R	-
6	-	-	0.16	-	-	-	-	-	-	-	-	1.0
7	-	-	0.1	-	-	-	-	-	-	-	-	-
8	-	-	0.08	-	-	0.05 L	-	0.05 L	-	7.0	-	-
11	0.1	-	0.1	-	-	-	-	-	-	-	-	-
15	-	-	0.1 L	-	-	-	0.01 L	0.01 L	-	-	-	1. L
19	-	-	-	0.0141	-	-	-	0.0141	1.2	6.4	-	-
21	-	-	0.15	-	-	-	-	-	-	-	-	-
MEAN	.1000	.1200	.1160	.0141	.0470	-	-	.0306	1.2000	6.7000	-	.7370
STD DEV	-	-	.0433	-	-	-	-	.0233	-	.4243	-	.2278
REL STD	-	-	37.3	-	-	-	-	76.1	-	6.3	-	30.9
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-

LAB	06107 DOC UV CO2 PHE	06150 D O C COMMON	06151 DIC IR COMBUST	06152 DIC UV CO2 IR	06154 DIC AA CO2 PHE	06490 D I C COMMON	07005 TKN INDO BL	07015 TKN DIG BERTHEL	07016 TKN BLK AMM-SAL	07021 TKN BLK DIG BER	07090 TKN COMMON	07109 NO3+NO2 AA HYD
1	0.51	0.51	-	-	6.5	6.5	-	-	-	0.035	0.035	-
2	0.5	0.5	-	-	-	-	-	-	-	-	-	-
3	-	0.6	-	6.9	-	6.9	-	-	-	-	-	-
4	-	0.611	-	-	-	-	-	-	-	-	-	-
5	-	3.18 R	5.32	-	-	5.32 *	-	-	-	-	-	-
6	-	1.0	-	-	-	-	-	-	0.5 R	-	0.5 R	0.07
8	-	-	-	-	-	7.0	-	0.20 L	-	-	0.20 L	-
9	-	-	-	-	-	-	-	-	-	-	-	0.03
15	-	1. L	-	6. L	-	6. L	-	-	-	-	-	-
19	-	1.2 *	-	-	-	6.4	-	-	-	0.13 R	0.13 R	-
20	-	-	-	-	-	-	-	-	0.04	-	0.04	-
21	-	-	-	-	-	-	0.02 L	-	-	-	0.02 L	-
MEAN	.5050	.7368	5.3200	6.9000	6.5000	6.4240	-	-	.0400	.0350	.0375	.0500
STD DEV	.0071	.2918	-	-	-	.6677	-	-	-	-	.0035	.0283
REL STD	1.4	39.6	-	-	-	10.4	-	-	-	-	9.4	56.6
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-

LAB	07110 NO3+NO2 AA2 CD	07111 NO3+NO2 DIS SPEC	07112 NO3+NO2 UF AA CD	07390 NITRATE COMMON	07505 NH3 TOT AA BERT	07540 NH3 TOT AA SAL	07555 NH3 DIS AA PHEN	07556 NH3 DIS INDO	07557 NH3 DIS AA INDO	07562 NH3 DIS AA EDTA	07590 AMMONIA COMMON	07601 T N UV AA SUL
1	-	0.058	-	0.058	-	-	-	-	-	0.01	0.01	-
2	0.05	-	-	0.05	-	-	-	-	-	-	-	0.1 L
3	-	-	0.056	0.056	0.005 L	-	-	-	-	-	0.005 L	0.068
4	0.059	-	-	0.059	-	0.005 L	-	-	-	-	0.005 L	-
5	0.055	-	-	0.055	-	-	-	-	0.002 L	-	0.002 *	-
6	-	-	-	0.07 *	-	-	-	-	0.02 R	-	0.02 R	-
7	-	-	0.05	0.05	-	-	-	-	-	-	-	-
8	0.06	-	-	0.06	-	-	0.004	-	-	-	0.004	-
9	-	-	-	0.03 *	-	-	-	-	-	-	-	-
11	0.04	-	-	0.04	-	0.02 L	-	-	-	-	0.02 L	-
13	0.05	-	-	0.05	-	0.1 L	-	-	-	-	0.1 L	-
14	-	0.06	-	0.06	-	-	-	-	-	-	-	-
15	0.059	-	-	0.059	-	-	0.009	-	-	-	0.009	-
19	0.05	-	-	0.05	-	-	0.06 R	-	-	-	0.06 R	-
20	0.06	-	-	0.06	-	-	0.005 L	-	-	-	0.005 L	-
21	-	0.061	-	0.061	-	-	-	0.005 L	-	-	0.005 L	-
MEAN	.0537	.0597	.0530	.0543	-	-	.0065	-	-	.0100	.0077	.0680
STD DEV	.0068	.0015	.0042	.0094	-	-	.0035	-	-	-	.0032	-
REL STD	12.6	2.6	8.0	17.3	-	-	54.4	-	-	-	41.9	-
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-

LAB	07602 T N CALC'D	07651 T N DIS UV AA	07655 T N DIS UV EDTA	07690 TOT N COMMON	07790 T N DIS COMMON	09103 F DIS COL SP	09105 F DIS SP EL	09106 F DIS EL POT	09107 F DIS AUT POT	09108 F DIS SP EL	09190 FLUORIDE COMMON	10101 ALKLNTY TITR'N
1	-	-	-	-	-	-	-	-	0.03	-	0.03	30.09
2	-	-	-	-	0.1 L	-	-	0.05 L	-	-	0.05 L	28.7
3	-	-	-	-	0.068	-	-	-	-	0.03	0.03	-
4	-	0.088	-	-	0.088 *	-	-	-	-	-	-	29.1
5	-	-	0.060	-	0.060	-	-	0.050 L	-	-	0.050 L	29.8
6	-	-	-	-	-	0.1 L	-	-	-	-	0.1 L	-
7	-	-	-	-	-	-	-	-	-	-	-	28.2
8	-	-	-	-	-	-	0.05 L	-	-	-	0.05 L	-
11	-	-	-	-	-	-	0.05 L	-	-	-	0.05 L	30.6
13	-	-	-	-	-	-	-	-	-	-	-	28.0
14	-	-	-	-	-	-	-	-	-	-	-	31.4
15	-	-	-	-	-	-	0.05 L	-	-	-	0.05 L	31.1
19	0.18	-	-	0.18	-	-	0.23 R	-	-	-	0.23 R	-
20	0.10	-	-	0.10	-	-	0.10 L	-	-	-	0.10 L	31.8
21	-	-	-	-	-	-	-	0.1 L	-	-	0.1 L	31.6
MEAN	.1400	.0880	.0600	.1400	.0720	-	-	-	.0300	.0300	.0300	30.0355
STD DEV	.0566	-	-	.0566	.0144	-	-	-	-	-	.0000	1.3822
REL STD	40.4	-	-	40.4	20.0	-	-	-	-	-	-1.0	4.6
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-

LAB	10108 ALKLNTY POT TIT	10109 ALKLNTY POT TIT	10111 ALKLNTY TIT PRO	10190 ALKLINTY COMMON	10301 PH	10302	10390 PH COMMON	10602 HARDNSS CALC'D	10603 HARDNSS TITR'N	10606 HARDNSS CALC'D	10690 HARDNESS COMMON	11001 NA TOT AAS
1	-	-	-	30.09	7.73	-	7.73	54.1	-	-	54.1 *	-
2	-	-	-	28.7	7.7	-	7.7	57.27	-	-	57.27	-
3	-	-	29.6	29.6	7.64	-	7.64	-	-	60.6	60.6	-
4	-	-	-	29.1	7.83	-	7.83	-	-	-	-	-
5	-	-	-	29.8	7.88	-	7.88	62.4	-	-	62.4	-
6	-	32.	-	32.	7.9	-	7.9	-	64.	-	64.	-
7	-	-	-	28.2	7.7	-	7.7	-	62.4	-	62.4	-
8	-	29.6	-	29.6	7.20	-	7.20	64.7	-	-	64.7	-
9	31.	-	-	31.	7.44	-	7.44	64.	-	-	64.	-
11	-	-	-	30.6	7.4	-	7.4	60.	-	-	60.	-
13	-	-	-	28.0	7.3	-	7.3	66.2	-	-	66.2	-
14	-	-	-	31.4	7.42	-	7.42	62.0	-	-	62.0	17.6
15	-	-	-	31.1	8.0	-	8.0	62.2	-	-	62.2	-
19	-	30.	-	30.	7.8	-	7.8	65.6	-	-	65.6	-
20	-	-	-	31.8	-	7.4	7.4	60.93	-	-	60.93	-
21	-	-	-	31.6	7.29	-	7.29	60.4	-	-	60.4	-
MEAN	31.0000	30.5333	29.6000	30.1619	7.6153	7.4000	7.6019	61.6500	63.2000	60.6000	61.7867	17.6000
STD DEV	-	1.2858	-	1.2654	.2536	-	.2508	3.4786	1.1314	-	3.1624	-
REL STD	-	4.2	-	4.2	3.3	-	3.3	5.6	1.8	-	5.1	-
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-

LAB	11005 NA TOT ICP	11102 NA F AAS	11103 NA DIS FL PH	11104 NA DIS FLAME	11105 NA DIS AAS DA	11107 NA UF FL PH	11111 NA DIS ICP	11311 NA EXT ICP	11990 SODIUM COMMON	12005 MG TOT ICP	12101 MG DIS CALC'D	12102 MG DIS AAS DA
1	-	-	17.0	-	-	-	-	-	17.0	-	-	-
2	-	-	20.9	-	-	-	-	-	20.9 *	-	-	-
3	-	-	-	-	-	17.4	-	-	17.4	-	-	-
5	-	-	17.7	-	-	-	-	-	17.7	-	-	3.82
6	-	17.	-	-	-	-	-	-	17.	-	2.9 R	-
7	-	-	-	-	17.4	-	-	-	17.4	-	-	3.8
8	-	-	-	-	-	-	-	18.5	18.5	-	-	-
9	22. R	-	-	-	-	-	-	-	22. R	4.1	-	-
11	-	18.	-	-	-	-	-	-	18.	-	-	3.8
13	-	-	-	-	-	-	17.10	-	17.10	-	-	-
14	-	-	-	-	-	-	-	-	17.6	-	-	3.60
15	-	-	-	-	-	-	18.3	-	18.3	-	-	-
19	18.64	-	-	-	-	-	-	-	18.64	4.00	-	-
20	-	-	-	17.7	-	-	-	-	17.7	-	-	-
21	-	18.0	-	-	-	-	-	-	18.0	-	-	-
MEAN	18.6400	17.6667	18.5333	17.7000	17.4000	17.4000	17.7000	18.5000	17.9457	4.0500	-	3.7550
STD DEV	-	.5774	2.0793	-	-	-	.8485	-	.9996	.0707	-	.1038
REL STD	-	3.3	11.2	-	-	-	4.8	-	5.6	1.7	-	2.8
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-

LAB	12105 MG DIS AAS DA	12106 MG UF AAS DA	12107 MG DIS AAS AUT	12111 MG DIS ICP	12311 MG EXT ICP	12990 MGNESIUM COMMON	14000 SILICA ?	14090 SILICA ?	14102 SILICA ANSA AA	14103 SILICA MOL SUL	14105 SILICA MOL ASC	14106 SI FIL MOL ASC
1	3.2	-	-	-	-	3.2 *	-	-	-	-	-	-
2	-	-	3.6	-	-	3.6	-	-	2.0	-	-	-
3	-	3.5	-	-	-	3.5	-	-	-	-	-	1.79
5	-	-	-	-	-	3.82	-	-	-	-	1.8	-
6	-	-	-	-	-	2.9 R	-	-	-	-	-	-
7	-	-	-	-	-	3.8	-	-	-	-	-	-
8	-	-	-	-	4.20	4.20	-	-	-	-	1.8	-
9	-	-	-	-	-	4.1	-	-	-	-	-	-
11	-	-	-	-	-	3.8	-	-	1.79	-	-	-
13	-	-	-	3.73	-	3.73	-	-	-	-	-	-
14	-	-	-	-	-	3.60	-	-	-	-	-	-
15	-	-	-	4.0	-	4.0	-	-	-	-	-	-
19	-	-	-	-	-	4.00	-	-	-	1.91	-	-
20	-	-	-	3.7	-	3.7	-	-	-	-	1.8	-
21	-	3.97	-	-	-	3.97	1.72	1.72	-	-	-	-
MEAN	3.2000	3.7350	3.6000	3.8100	4.2000	3.7871	1.7200	1.7200	1.8950	1.9100	1.8000	1.7900
STD DEV	-	.3323	-	.1652	-	.2634	-	-	.1485	-	.0000	-
REL STD	-	8.9	-	4.3	-	7.0	-	-	7.8	-	-1.0	-
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-

LAB	14107 SILICA MOLY AA	14111 SILICA ICP DA	14190 SILICA COMMON	15301 T P ACL AA ASC	15313 T P ACL AA SNCL	15401 T P UV AA ASC	15406 T P UF AA ASC	15407 T P ASC AC	15413 T P ACL AA SNCL	15421 T P BLK DIG ASC	15490 TOT P COMMON	16302 SO4 DIS TURB BA
1	1.8	-	1.8	-	-	-	-	-	-	0.001	0.001	-
2	-	-	2.0	-	-	-	-	-	0.001 L	-	0.001 L	-
3	-	-	1.79	-	-	-	-	-	0.0007	-	0.0007	-
4	-	-	-	-	-	-	0.003 L	-	-	-	0.003 L	-
5	-	-	1.8	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	0.01	-	-	-	-	0.01 *	-
7	-	-	-	-	-	-	0.004	-	-	-	0.004	-
8	-	-	1.8	-	-	-	-	-	0.0015	-	0.0015	-
9	-	1.9	1.9	-	-	-	-	-	-	-	-	-
11	-	-	1.79	-	0.005 L	-	-	-	-	-	0.005 L	-
13	-	-	-	-	-	-	0.007	-	-	-	0.007	-
15	-	1.58	1.58 *	-	-	-	-	-	-	-	-	-
19	-	-	1.91	-	-	-	0.02 L	-	-	-	0.02 L	35.6
20	-	-	1.8	0.003 L	-	-	-	-	-	-	0.003 L	-
21	-	-	-	-	-	-	-	0.003	-	-	0.003	-
MEAN	1.8000	1.7400	1.8170	-	-	.0100	.0055	.0030	.0011	.0010	.0039	35.6000
STD DEV	-	.2263	.1094	-	-	-	.0021	-	.0006	-	.0035	-
REL STD	-	13.0	6.0	-	-	-	38.6	-	51.4	-	89.2	-
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-

LAB	16303 SO4 DIS TIT THO	16304 SO4 DIS AUTO BA	16306 SO4 DIS AA MTB	16307 SO4 UF AA MTB	16309 SO4 DIS I C	16990 SULFATE COMMON	17203 CL DIS AA FE	17204 CL DIS AG TIT	17206 CL DIS AA HG	17208 CL DIS AA HG	17209 CL DIS I C	17990 CHLORIDE COMMON
1	-	-	41.	-	-	41.	-	-	22.2	-	-	22.2
2	-	38.5	-	-	39.0	38.5	-	-	-	-	22.5	22.5
3	-	-	-	30.0 R	-	30.0 R	-	-	-	22.1	-	22.1
5	-	-	40.1	-	-	40.1	-	-	23.5	-	-	23.5
6	-	40.	-	-	-	40.	-	24.	-	-	-	24.
7	-	-	40.6	-	-	40.6	23.2	-	-	-	-	23.2
8	-	-	45.	-	-	45. *	-	-	23.	-	-	23.
9	-	-	-	-	39.	39.	-	-	-	-	23.	23.
11	-	-	43.	-	-	43.	-	-	21.	-	-	21.
13	-	-	40.2	-	-	40.2	-	-	22.	-	-	22.
14	-	-	-	-	43.0	43.0	-	-	-	-	24.8	24.8
15	-	-	38.	-	-	38.	-	-	22.9	-	-	22.9
19	-	-	-	-	-	35.6 *	-	-	21.1	-	-	21.1
20	-	-	39.5	-	-	39.5	22.2	-	-	-	-	22.2
21	37.7	-	-	-	-	37.7	21.9	-	-	-	-	21.9
MEAN	37.7000	39.2500	40.9250	-	40.3333	40.0857	22.4333	24.0000	22.2429	22.1000	23.4333	22.6267
STD DEV	-	1.0607	2.1651	-	2.3094	2.4251	.6807	-	.9572	-	1.2097	1.0215
REL STD	-	2.7	5.3	-	5.7	6.0	3.0	-	4.3	-	5.2	4.5
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-

LAB	19001 K TOT AAS	19005 K TOT ICP	19102 K DIS AAS	19103 K DIS FLM PH	19104 K DIS FLAME	19105 K DIS AAS DA	19106 K DIS AAS LI	19107 K DIS FLM PH	19111 K DIS ICP	19301 K EXT HNO3 AA	19990 PTASSIUM COMMON	20005 CA TOT ICP
1	-	-	-	1.40	-	-	-	-	-	-	1.40 *	-
2	-	-	-	1.6	-	-	-	-	-	-	1.6	-
3	-	-	-	-	-	-	-	1.56	-	-	1.56	-
5	-	-	-	1.6	-	-	-	-	-	-	1.6	-
6	-	-	2.	-	-	-	-	-	-	-	2. *	-
7	-	-	1.55	-	-	-	-	-	-	-	1.55	-
8	-	-	-	-	-	-	-	-	-	1.55	1.55	-
9	-	1.8	-	-	-	-	-	-	-	-	1.8	19.
11	-	-	-	-	-	-	1.7	-	-	-	1.7	-
13	-	-	-	-	-	-	-	-	1.40	-	1.40 *	-
14	1.62	-	-	-	-	-	-	-	-	-	1.62	-
15	-	-	-	-	-	1.84	-	-	-	-	1.84	-
19	-	2.04	-	-	-	-	-	-	-	-	2.04 *	19.68
20	-	-	-	1.6	-	-	-	-	-	-	1.6	-
21	-	-	-	-	1.49	-	-	-	-	-	1.49	-
MEAN	1.6200	1.9200	1.7750	1.5500	1.4900	1.8400	1.7000	1.5600	1.4000	1.5500	1.6500	19.3400
STD DEV	-	.1697	.3182	.1000	-	-	-	-	-	-	.1932	.4808
REL STD	-	8.8	17.9	6.5	-	-	-	-	-	-	11.7	2.5
DES VAL	-	-	-	-	-	-	-	-	-	-	-	-

LAB	20050 CA DIS AAS NO	20100 CA DIS CALC'D	20103 CA DIS AAS	20107 CA DIS AAS	20108 CA DIS AAS UF	20110 CA DIS AAS AUT	20111 CA DIS ICP	20115	20311 CA EXT ICP	20990 CALCIUM COMMON
1	-	-	-	16.4	-	-	-	-	-	16.4 *
2	-	-	-	-	-	17.0	-	-	-	17.0
3	-	-	-	-	18.5	-	-	-	-	18.5
5	-	-	18.7	-	-	-	-	-	-	18.7
6	-	20.8	-	-	-	-	-	-	-	20.8 *
7	-	-	18.4	-	-	-	-	-	-	18.4
8	-	-	-	-	-	-	-	-	19.0	19.0
9	-	-	-	-	-	-	-	-	-	19.
11	-	-	18.	-	-	-	-	-	-	18.
13	-	-	-	-	-	-	19.24	-	-	19.24
14	18.9	-	-	-	-	-	-	-	-	18.9
15	-	-	-	-	-	-	18.4	-	-	18.4
19	-	-	-	-	-	-	-	-	-	19.68
20	-	-	-	-	-	-	-	18.3	-	18.3
21	-	-	-	-	18.4	-	-	-	-	18.4
MEAN	18.9000	20.8000	18.3667	16.4000	18.4500	17.0000	18.8200	18.3000	19.0000	18.5813
STD DEV	-	-	.3512	-	.0707	-	.5940	-	-	1.0285
REL STD	-	-	1.9	-	.4	-	3.2	-	-	5.5
DES VAL	-	-	-	-	-	-	-	-	-	-

DATES RECEIVED

1 89/08/29	2 89/08/31	3 89/08/14	3 89/09/08	4 89/09/08
5 89/09/15	6 89/07/25	6 89/09/12	7 89/09/19	8 89/09/05
9 89/08/31	10 89/--/--	11 89/08/29	13 89/09/11	14 89/09/26
15 89/08/22	16 89/--/--	19 89/08/29	20 89/08/31	21 89/09/01

NOTE: ALL CONCENTRATION UNITS ARE EXPRESSED IN MG/L OF EACH ELEMENT, THE EXCEPTIONS BEING: COLOUR IN RELATIVE UNITS, CONDUCTIVITY IN USIE/CM, TURBIDITY IN JTU OR NTU, NITROGEN ANALYSES IN "N", ALKALINITY & HARDNESS IN CACO3, SILICA IN SIO2, AND SULFATE IN SO4.

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SUR LES EAUX
C.P. 5050
Burlington, Canada
L7R 4A6