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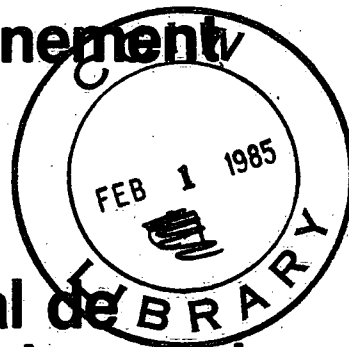


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Summary Report on PPWB, QC Studies for
Major Ions, Nutrients, Physical Parameters
and Trace Metals in Spiked Water Samples
(PP19-20, PP21-22, PP23-24)

H. Alkema

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

MANUSCRIPT NO. 116-AMD-6-84-HA

Summary Report on PPWB, QC Studies for
Major Ions, Nutrients, Physical Parameters
and Trace Metals in Spiked Water Samples
(PP19-20, PP21-22, PP23-24)

H. Alkema

Executive Summary PPQC 19-24

Under the auspices of the Prairie Provinces Board, a quality assurance program was initiated for assessing and improving the comparability of water quality data generated by the Federal WQB Calgary Lab (ECS) and the Alberta, Saskatchewan and Manitoba provincial laboratories.

In the first phase of this program, interlab studies are designed and conducted bi-monthly on some 40 parameters involving some 100 analytical procedures.

Six studies were sent out in the period of March 1984 to August 1984. These studies dealt with the analysis of trace metals, major ions, nutrients, and physical parameters in spiked water samples.

A number of key analyses were identified to be out of control and subsequently brought to the attention of the lab managers to help improve the quality of the data and to alert them to re-evaluate their internal quality control.

DISTRIBUTION

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FROM
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H. Alkema
QAMS, NWRI
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SECURITY - CLASSIFICATION - DE SÉCURITÉ
OUR FILE / NOTRE RÉFÉRENCE
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DATE 7 August 1984

SUBJECT
OBJET
Final Summary Report on Prairie Provinces Water Board QC.
PPQC Studies 19 and 20 (PP 19-20)

I have enclosed the final report for PP 19-20

This report is the second for 1984. Data accumulated so far, is presently used to test the plotting programs for graphic presentation of statistical parameters. Please do not forget to make comments or specify transcription errors in the data summaries since any data may be used for the graphic presentations.

Since there were no changes in the data summaries for these studies, no computer printouts are enclosed with this final report.

Harry A.
H. Alkema

SUMMARY REPORT
PPQC STUDIES 19 AND 20
FOR MARCH AND APRIL, 1984

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

by

H. Alkema

June 1984

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

L7R 4A6

This report summarizes the PPWB interlaboratory quality control studies 19 and 20, for the months of March and April, 1984. These two studies dealt with medium and high levels of trace metals, major ions, physical parameters and nutrients.

Sample Particulars

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

- PP 19 - Sample 1 - 125 mL, D/A* of trace metals
(3% HNO₃).
- Sample 2 - up to 1 L, major ions etc., stored
at 4°C.
- PP 20 - Sample 3 - 1 L, S/E* of trace metals
(0.2% HNO₃).
- Sample 4 - up to 1 L, major ions etc., stored
at 4°C.

Data Analysis

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

* For definitions see Appendix I.

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

Data for each parameter were accumulated under a mixed (or combined) method code ending in either 90 or 999. Under these codes, data for each parameter were combined for statistical comparison.

Performance Indicators

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

Comments on Lab Performance

High coefficients of variation (incomparability) were observed for these analyses: Mo by D/A, DOC, and Al, V, and Fe by S/E.

Individual lab deviations are listed below:

- Lab 1 - a high result for Pb by S/E, +25% and DIC, +12%
 - two flagged results Fe by D/A, -19% (R)*; and Zn, 2400% (R)
- Lab 2 - a low result for Fe by S/E, -48%
 - a high result for Cr by D/A, +19% (R)
- Lab 3 - a high result for K, +98% (R); and Mn, +77% (R)
 - a low result for Alkalinity, -12%; Si, -16%; Na, -49% (R); and Cl, -14% (R)
- Lab 4 - a high result for NO₃-NO₂, +11%
 - a high detection limit (HDL) for NH₃
- Lab 5 - high results for F, +24% and +42% (R)
- Lab 6 - a high result for Fe by S/E, +45%
 - a low result for Cu, -60% (R); and K, -10%
 - an HDL for TKN
- Lab 7 - a low bias for conductivity, -19% (R and R)
 - high results for potassium, +23%, and 10%
- Lab 8 - a high result for Cr by D/A, +19% (R); Co by D/A, +12%; Cr by S/E, +30%; Cu by S/E, +38%
 - a low bias for Na, -10%
 - a low result for Pb by S/E, -23%
 - low turbidity results (near the D.L.) (R and R)
 - HDL for TKN and Al by S/E

PPWB labs average number of anomalies per sample is 5/4.

* Rejectable by Grubb's procedure for statistical calculations.

Appendix I

Definitions of Types of Metals Analysis

1. D/A - Direct Aspiration

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

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

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

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

Appendix II

Performance Indicators

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

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

DATA SUMMARY

PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

STUDY NO. 019 DATE: 01/03/84
SOURCE OF SAMPLE SPIKED SAMPLE.

DATE DISTRIBUTED 12-03-84

TABLE 1 SAMPLE 1 = TRACE METALS 3 % HNO3 D/A.

TRACE METALS D/A.

LAB NO	13302 AL EXTBL AAS DA MG/L	13999 ALUMINUM COMBINED MG/L AL	23009 V TOT. ICAP D/A MG/L V	23011 V TOT. ICAP 292 MG/L V	23301 V EXTRBL AAS DA MG/L	23999 VANADIUM COMBINED MG/L V	24004 CR TOTAL GR FRNCE MG/L	24009 CR TOT. ICAP D/A MG/L CR	24011 CR TOT. ICAP 267 MG/L CR	24302 CR AAS D/A MG/L	24303 CR EXTBL AAS SE MG/L	24999 CHROMIUM COMBINED MG/L CR
1	--	--	2.160	--	--	2.1600	--	.292	--	--	--	.2920
2	2.600	2.6000	--	--	--	--	--	--	--	--	--	.3500R
3	2.800	2.8000	--	--	2.500	2.5000	--	--	--	.290	--	.2900
6	--	2.7000	--	2.400	--	2.4000	--	--	.300	--	--	.3000
8	2.600	2.6000	--	--	--	--	.3500R	--	--	--	--	.3500R
MEAN	2.6667	2.6750	2.1600	2.4000	2.5000	2.3533	0.0000	.2920	.3000	.2900	0.0000	.2940
ST DEV	.1155	.0957	0.0000	0.0000	0.0000	.1747	0.0000	0.0000	0.0000	0.0000	0.0000	.0053
REL STD	4.3	3.6	0.0	0.0	0.0	7.4	0.0	0.0	0.0	0.0	0.0	1.8
SPIKE	--	--	--	--	--	--	--	--	--	--	--	--
BGD	--	--	--	--	--	--	--	--	--	--	--	--
% REC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ST BIAS	.1155	.0957	0.0000	0.0000	0.0000	.1747	0.0000	0.0000	0.0000	0.0000	0.0000	.0053

LAB NO	25003 MN TOT. ICAP D/A MG/L MN	25011 MN DIG ICAP 257 MN MG/L	25111 MN DISVD ICAP 258 UG/L MN	25304 MN EXTBL AAS DA MG/L	25999 MANGAN. COMBINED MG/L MN	26011 FE TOTAL 5X ICAP MG/L FE	26111 FE DISVD ICAP 260 MG/L FE	26304 FE EXTBL AAS DA MG/L	26999 IRON COMBINED MG/L FE	27003 CO TOTAL GR FRNCE MG/L	27009 CO TOT. ICAP D/A MG/L CO	27011 CO DIG ICAP 288 MG/L CO
1	.244	--	--	--	.2440	--	--	.880R	.8800R	--	1.000	--
2	--	--	--	.280	.2800	--	--	1.100	1.1000	--	--	--
3	--	--	--	.280	.2800	--	--	1.120	1.1200	--	--	--
6	--	.250	--	.2500	.2500	1.100	--	1.1000	1.1000	--	--	1.000
8	--	--	.253	--	.2530	--	1.070	--	1.0700	1.2000	--	--
MEAN	.2440	.2500	.2530	.2800	.2614	1.1000	1.0700	1.1100	1.0975	1.2000	1.0000	1.0000
ST DEV	0.0000	0.0000	0.0000	0.0000	.0173	0.0000	0.0000	.0141	.0206	0.0000	0.0000	0.0000
REL STD	0.0	0.0	0.0	0.0	6.6	0.0	0.0	1.3	1.9	0.0	0.0	0.0
SPIKE	--	--	--	--	--	--	--	--	--	--	--	--
BGD	--	--	--	--	--	--	--	--	--	--	--	--
% REC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ST BIAS	0.0000	0.0000	0.0000	0.0000	.0173	0.0000	0.0000	.0141	.0206	0.0000	0.0000	0.0000

LAB NO	27301 CO EXTBL AAS DA MG/L	27999 CORALT COMBINED MG/L CO	28009 NI TOT. ICAP D/A MG/L NI	28011 NI DIG ICAP 231 NI MG/L	28301 NI EXTBL AAS DA MG/L	28309 NI EXTR AAS FRNC MG/L NI	28999 NICKEL COMBINED MG/L NI	29009 CU TOT. ICAP D/A MG/L CU	29011 CU DIG ICAP 324 MG/L CU	29306 CU EXTBL AAS DA MG/L	29309 CU EXT AAS FRNC MG/L CU	29999 COPPER COMBINED MG/L CU
1	--	1.0000	1.140	--	--	--	1.1400	.269	--	--	--	.2690
2	1.100	1.1000	--	--	1.2000	--	1.2000	--	--	.290	--	.2900
3	1.070	1.0700	--	--	1.2600	--	1.2600	--	--	.290	--	.2900
5	1.0000	1.0000	--	1.300	--	--	1.3000	--	.280	--	--	.2800
8	--	1.2000	--	--	--	1.250	1.2500	--	--	--	.2810	.2810
MEAN	1.0850	1.0740	1.1400	1.3000	1.2300	1.2500	1.2300	.2690	.2800	.2900	.2810	.2820
ST DEV	.0212	.0829	0.0000	0.0000	.0424	0.0000	.0616	0.0000	0.0000	0.0000	0.0000	.0087
REL STD	2.0	7.7	0.0	0.0	3.4	0.0	5.0	0.0	0.0	0.0	0.0	3.1
SPIKE	--	--	--	--	--	--	--	--	--	--	--	--
BGD	--	--	--	--	--	--	--	--	--	--	--	--
% REC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ST BIAS	.0212	.0829	0.0000	0.0000	.0424	0.0000	.0616	0.0000	0.0000	0.0000	0.0000	.0087

DATA SUMMARY

PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

STUDY NO. 019 DATE: 01/03/84
SOURCE OF SAMPLE SPIKED SAMPLE.

DATE DISTRIBUTED 12-03-84

TABLE 1 cont'd SAMPLE 1 = TRACE METALS 3 X HNO3 D/A.

LAB NO	TRACE METALS D/A.											
	30009 ZN TOT. ICAP D/A MG/L ZN	30011 ZN TOT ICAP 213 MG/L ZN	30111 ZN DISVD ICAP 314 UG/L ZN	30304 ZN EXTBL AAS DA MG/L	30999 ZINC COMBINED MG/L ZN	38301 SR EXTBL AAS DA MG/L	38999 STRONT. COMBINED MG/L SR	42009 MO TOT. ICAP D/A MG/L MO	42011 MO TOT ICAP 202 MG/L MO	42301 MO EXTBL AAS DA MG/L	42999 MOLYBD. COMBINED MG/L MO	48009 CD TOT. ICAP DA MG/L CD
1	.305	--	--	--	.3050	--	--	4.200	--	--	4.2000	.238
2	--	--	--	.320	.3200	--	--	--	--	--	--	--
3	--	--	--	.310	.3100	.400	.4000	--	--	3.940	3.9400	--
6	--	.310	--	--	.3100	--	--	--	9.000	--	9.0000	--
8	--	--	.302	--	.3020	--	--	--	--	--	--	--
MEAN	.3050	.3100	.3020	.3150	.3094	.4000	.4000	4.2000	9.0000	3.9400	5.7133	.2380
ST DEV	0.0000	0.0000	0.0000	.0071	.0068	0.0000	0.0000	0.0000	0.0000	0.0000	2.8493	0.0000
REL STD	0.0	0.0	0.0	2.2	2.2	0.0	0.0	0.0	0.0	0.0	49.9	0.0
SPIKE	--	--	--	--	--	--	--	--	--	--	--	--
BGD	--	--	--	--	--	--	--	--	--	--	--	--
% REC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ST BIAS	0.0000	0.0000	0.0000	.0071	.0068	0.0000	0.0000	0.0000	0.0000	0.0000	2.8493	0.0000

LAB NO	TRACE METALS D/A.											
	48011 CD TOT. ICAP 228 MG/L	48301 CO EXTBL AAS DA MG/L	48309 CO EXTRB GR FRNCE MG/L CD	48999 CADMIUM COMBINED MG/LCD	56011 BA TOT. 5X ICAP MG/L BA	56301 BA EXTBL AAS DA MG/L	56999 BARIUM COMBINED MG/L BA	82011 LEAD DIG ICP 220 MG/L PB	82301 PB EXTBL AAS DA MG/L	82302 PB EXTBL AAS SE MG/L	82309 PB EXTRB GR FRNCE MG/L PB	82999 LEAD COMBINED MG/L PB
1	--	--	--	.2380	--	--	--	--	--	1.3900	--	1.3900
2	--	.240	--	.2400	--	--	--	--	--	--	--	1.3000
3	--	.230	--	.2300	--	2.800	2.800	1.300	1.330	--	--	1.3300
6	.240	--	--	.2400	2.500	--	2.500	--	--	--	--	1.3000
8	--	--	.2300	.2300	--	--	--	--	--	--	1.2800	1.2800
MEAN	.2400	.2350	.2300	.2356	2.5000	2.8000	2.6500	1.3000	1.3150	1.3900	1.2800	1.3200
ST DEV	0.0000	.0071	0.0000	.0052	0.0000	0.0000	.2121	0.0000	.0212	0.0000	0.0000	0.0430
REL STD	0.0	3.0	0.0	2.2	0.0	0.0	8.0	0.0	1.6	0.0	0.0	3.3
SPIKE	--	--	--	--	--	--	--	--	--	--	--	--
BGD	--	--	--	--	--	--	--	--	--	--	--	--
% REC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ST BIAS	0.0000	.0071	0.0000	.0052	0.0000	0.0000	.2121	0.0000	.0212	0.0000	0.0000	.0430

TABLE 2 SAMPLE 2 = MAJOR IONS - UNPRESERVED - STORE AT 4 C.

LAB NO	MAJOR IONS 4 C.											
	03110 IONIC BALANC %	00120 SUM OF CATIONS MEQ/L	00125 SUM OF ANIONS MEQ/L	02011 COLOUR A REL UNIT	02021 VISUAL C OMPARSN REL UNIT	02041 SPECIFIC COND 25C USIE/CM	02073 TURB JTU	02074 TURBIDTY NPLMTRIC NTU	02190 COLOR COMBINED REL UNIT	02290 SPE COND COMBINED USIE/CM	02390 TURBIDTY COMBINED JTU/NTU	05105 B AUTOAN CARM AC MG/L
1	-1.940	8.1000	8.4200	--	--	925.0	--	--	--	925.0	--	--
2	-2.250	8.0216	8.3900	5.0L	--	890.0	.20	--	5.0L	890.0	.20	--
3	.843	8.5733	8.4300	--	--	919.1	--	--	--	919.1	--	--
4	--	--	--	--	5.0L	883.0	.21	--	5.0L	883.0	.21	.070
5	3.110	8.5500	8.0300	5.0L	--	832.0	.10	--	5.0L	832.0	.10	--
6	-1.800	8.1000	8.4000	--	--	870.0	--	--	--	870.0	--	--
7	--	--	--	0.0	--	725.0R	.59	.26	0.0	725.0R	.59	--
8	-8.460	7.4500	8.8300	5.0L	--	903.0	--	1.50R	5.0L	903.0	1.50R	--
MEAN	-1.7495	8.1325	8.4167	0.0000	0.0000	888.871	.2750	.2600	0.0000	888.871	.2720	.0700
ST DEV	3.8899	.4120	.2536	0.0000	0.0000	31.7409	.2158	0.0000	0.0000	31.7409	.1870	0.0000
REL STD	-222.3	5.1	3.0	0.0	0.0	3.6	78.5	0.0	0.0	3.6	68.8	0.0000
SPIKE	--	--	--	--	--	--	--	--	--	--	--	--
BGD	--	--	--	--	--	--	--	--	--	--	--	--
% REC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ST BIAS	3.8899	.4120	.2536	0.0000	0.0000	31.7409	.2158	0.0000	0.0000	31.7409	.1870	0.0000

DATA SUMMARY

PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

STUDY NO. 019 DATE: 01/03/84
SOURCE OF SAMPLE SPIKED SAMPLE.

DATE DISTRIBUTED 12-03-84

TABLE 2 cont'd SAMPLE 2 = MAJOR IONS - UNPRESERVED - STORE AT 4 C.

MAJOR IONS 4 C.

LAB NO	09190 F METHOD COMBINED MG/L	10101 CACO3 TO ALK TITR MG/L	10106 T ALK CA CO3 IR D MG/L	10109 T ALKLT POT TITN MG/L CC3	10190 TOT ALK COMBINED MG/L	10301 PH UNITS	10390 PH COMBINED UNITS	10602 T HARDCA CO3 CALC MG/L	10603 TOT HARD TITR MG/L	10690 HARDNSS COMBINED MG/L	11102 NA DISS AAS MG/L NA	11103 NA DISS FL PHOTO MG/L
1	.090	67.00	--	--	67.00	8.000	8.000	249.0	--	249.0	--	60.000
2	.080	60.20	--	--	60.20	8.200	8.200	--	--	--	--	60.000
3	.080	--	60.50	--	60.50	8.120	8.120	--	--	--	--	--
4	--	63.00	--	--	63.00	7.800	7.800	--	--	--	--	--
5	<u>115</u>	63.60	--	--	63.60	7.850	7.850	--	273.0	273.0	--	60.000
6	.100	--	--	70.00	70.00	7.800	7.800	--	260.0	260.0	58.000	--
7	.100L	62.10	--	--	62.10	7.900	7.900	238.0	262.8	262.8	--	--
8	--	--	--	65.00	65.00	7.850	7.850	--	--	238.0	--	--
MEAN	.0930	63.1800	60.5000	67.5000	63.9250	7.9400	7.9400	243.500	265.267	256.560	58.0000	60.0000
ST DEV	.0148	2.4924	0.0000	3.5355	3.3256	.1515	.1515	7.7782	6.8420	13.4413	0.0000	0.0000
REL STD	15.9	3.9	0.0	5.2	5.2	1.9	1.9	3.2	2.6	5.2	0.0	0.0
SPIKE	--	--	--	--	--	--	--	--	--	--	--	--
BGD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% REC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ST BIAS	.0148	2.4924	0.0000	3.5355	3.3256	.1515	.1515	7.7782	6.8420	13.4413	0.0000	0.0000
LAB NO	11105 NA DISS AAS D/A MG/L	11107 NA DISS FL PH UF MG/L	11111 NA DISVD ICAP 589 MG/L NA	11190 SODIUM COMBINED MG/L	12101 MG DISS CALC MG/L	12102 MG FIL AAS OA MG/L	12106 MG DISS AA DA UF MG/L	12107 MG DISS AAS AUTO MG/L	12111 MG DISVD ICAP 279 MG/L MG	12190 MAGNESIU COMBINED MG/L MG	12303 MG UF AAS AUTO MG/L MG	14102 STO2REA UT ANSAD MG/L
1	--	--	--	60.000	--	--	--	--	--	21.0000	21.00	14.800
2	--	--	--	60.000	--	--	--	--	--	20.0000	--	16.000
3	--	57.600	--	57.600	--	--	21.800	20.000	--	21.8000	--	--
4	--	--	--	60.000	21.400	--	--	--	--	21.4000	--	--
5	--	--	--	58.000	22.000	--	--	--	--	22.0000	--	--
6	62.9000	--	--	62.900	--	22.5000	--	--	--	22.5000	--	--
7	--	--	52.600	<u>52.600</u>	--	--	--	--	19.600	19.6000	--	--
8	--	--	--	--	--	--	--	--	--	--	--	--
MEAN	62.9000	57.6000	52.6000	58.7286	21.7000	22.5000	21.8000	20.0000	19.6000	21.1857	21.0000	15.4000
ST DEV	0.0000	0.0000	0.0000	3.2045	.4243	0.0000	0.0000	0.0000	0.0000	1.0621	0.0000	.8485
REL STD	0.0	0.0	0.0	5.5	2.0	0.0	0.0	0.0	0.0	5.0	0.0	5.5
SPIKE	--	--	--	--	--	--	--	--	--	--	--	--
BGD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% REC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ST BIAS	0.0000	0.0000	0.0000	3.2045	.4243	0.0000	0.0000	0.0000	0.0000	1.0621	0.0000	.8485

DATA SUMMARY

PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

STUDY NO. 019 DATE: 01/03/84
 SOURCE OF SAMPLE SPIKED SAMPLE.

DATE DISTRIBUTED 12-03-84

TABLE 2 (cont)

SAMPLE 2 = MAJOR IONS - UNPRESERVED - STORE AT 4 C.

MAJOR IONS 4 C.

LAB NO	20100 CA DIS C 4CAHARD MG/L CA	20101 CA DISS TITRN ED MG/L	20103 CA DISS AAS MG/L	20108 CA DISS AAS UF MG/L	20110 CA DISS AAS AUTO MG/L	20111 CA DISVD ICAP 318 MG/L CA	20190 CALCIUM COMBINED MG/L CA
1	--	--	--	--	67.00	--	67.000
2	--	--	--	--	66.00	--	66.000
3	--	--	--	67.100	--	--	67.100
5	--	74.0000	--	--	--	--	74.000
6	67.0000	--	73.60	--	--	--	67.000
7	--	--	--	--	--	63.00	73.600
8	--	--	--	--	--	--	63.000
MEAN	67.0000	74.0000	73.6000	67.1000	66.5000	63.0000	68.2429
ST DEV	0.0000	0.0000	0.0000	0.0000	.7071	0.0000	4.0570
REL STD	0.0	0.0	0.0	0.0	1.1	0.0	5.9
SPIKE	--	--	--	--	--	--	--
BGD	--	--	--	--	--	--	--
Z RFC	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ST BIAS	0.0000	0.0000	0.0000	0.0000	.7071	0.0000	4.0570

TABLE 3

SAMPLE 3 = TRACE METALS 0.2% HNO3 S/E.

TRACE METALS S/E.

LAB NO	13302 AL EXTRL AAS DA MG/L	13305 AL EXTRL AAS SE MG/L AL	13306 AL UFAAS SE OX/EP MG/L AL	13999 ALUMINUM COMBINED MG/L AL	23009 V TOT. ICAP D/A MG/L V	23011 V TOT. ICAP 292 MG/L V	23302 V EXTRBL SE PHL.6 MG/L	23999 VANADIUM COMBINED MG/L V	24004 CR TOTAL GR FRNCE MG/L	24009 CR TOT. ICAP D/A MG/L CR	24011 CR TOT ICAP 267 MG/L CR	24303 CR EXTRBL AAS SE MG/L
1	--	--	.074	.0740	.013	--	--	.0130	--	.016	--	--
2	--	.0350	--	.0350	--	--	--	--	.0140	--	--	--
3	--	.0240	--	.0240	--	--	.0060	.0060	--	--	--	.0120
5	--	--	--	.0820	--	.020	--	.0200	--	--	.015	--
8	.200L	--	--	.2000L(HDL)	--	--	--	--	.0200	--	--	--
MEAN	0.0000	.0295	.0740	.0538	.0130	.0200	.0060	.0130	.0170	.0160	.0150	.0120
ST DEV	0.0000	.0078	0.0000	.0245	0.0000	0.0000	0.0000	.0070	.0042	0.0000	0.0000	0.0000
REL STD	0.0	26.4	0.0	45.1	0.0	0.0	0.0	53.8	25.0	0.0	0.0	0.0
SPIKE	--	--	--	--	--	--	--	--	--	--	--	--
BGD	--	--	--	--	--	--	--	--	--	--	--	--
Z RFC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ST BIAS	0.0000	.0078	0.0000	.0285	0.0000	0.0000	0.0000	.0070	.0042	0.0000	0.0000	0.0000

LAB NO	24999 CHROMIUM COMBINED MG/L CR	25003 MN TOT. ICAP D/A MG/L MN	25011 MN DIG ICAP 257 MN MG/L	25111 MN DISVD ICAP 258 UG/L MN	25304 MN EXTRBL AAS DA MG/L	25999 MANGAN. COMBINED MG/L MN	26011 FE TOTAL 5X ICAP MG/L FE	26111 FE DISVD ICAP 260 MG/L FE	26304 FE EXTRBL AAS DA MG/L	26305 FE EXTRBL AAS SE MG/L	26999 IRON COMBINED MG/L FE	27003 CO TOTAL GR FRNCE MG/L
1	.0160	.012	--	--	--	.0120	--	--	.030	--	.0300	--
2	.0140	--	--	--	.010	.0100	--	--	--	.0160	.0160	.0130
3	.0120	--	--	--	.020R	.0200R	--	--	--	.0250	.0250	.0130
6	.0150	--	.012	--	--	.0120	.045	--	--	.0450	.0450	.0110
8	.0200	--	--	.020L	--	.0200L	--	.037	--	--	.0370	.0110
MEAN	.0154	.0120	.0120	0.0000	.0100	.0113	.0450	.0370	.0300	.0205	.0306	.0120
ST DEV	.0030	0.0000	0.0000	0.0000	0.0000	.0012	0.0000	0.0000	0.0000	.0064	.0111	.0014
REL STD	19.3	0.0	0.0	0.0	0.0	10.2	0.0	0.0	0.0	31.0	36.3	11.8
SPIKE	--	--	--	--	--	--	--	--	--	--	--	--
BGD	--	--	--	--	--	--	--	--	--	--	--	--
Z RFC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ST BIAS	.0030	0.0000	0.0000	0.0000	0.0000	.0012	0.0000	0.0000	0.0000	.0064	.0111	.0014

DATA SUMMARY

PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

STUDY NO. 020 DATE: 01/04/84
SOURCE OF SAMPLE SPIKED SAMPLE.

DATE DISTRIBUTED 12-03-84

TABLE 3 *with* SAMPLE 3 = TRACE METALS 0.2% HNO3 S/E.

TRACE METALS S/E.

LAB NO	27009 CO TOT. ICAP D/A MG/L CO	27011 CO DIG ICAP 288 MG/L CO	27302 CO EXTBL AAS SE MG/L	27999 COBALT COMBINED MG/L CO	28007 NI TOT AAS FRNC MG/L NI	28009 NI TOT. ICAP D/A MG/L NI	28011 NI DIG ICAP 231 NI MG/L	28302 NI EXTBL AAS SE MG/L	28309 NI EXTR AAS FRNC MG/L NI	28999 NICKEL COMBINED MG/L NI	29009 CU TOT. ICAP D/A MG/L CU	29011 CU DIG ICAP 324 MG/L CU
1	.010	--	--	.0100	--	.011	--	--	--	.0110	.009	--
2	--	--	--	.0130	.0140	--	--	--	--	.0140	--	--
3	--	--	.0120	.0120	--	--	--	.0120	--	.0120	--	--
6	--	.011	--	.0110	--	--	.014	--	--	.0140	--	.005R
8	--	--	--	.0110	--	--	--	--	.013	.0130	--	--
MEAN	.0100	.0110	.0120	.0114	.0140	.0110	.0140	.0120	.0130	.0128	.0090	0.0000
ST DEV	0.0000	0.0000	0.0000	.0011	0.0000	0.0000	0.0000	0.0000	0.0000	.0013	0.0000	0.0000
REL STD	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	10.2	0.0	0.0
SPIKE	--	--	--	--	--	--	--	--	--	--	--	--
BGD	--	--	--	--	--	--	--	--	--	--	--	--
% REC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ST BIAS	0.0000	0.0000	0.0000	.0011	0.0000	0.0000	0.0000	0.0000	0.0000	.0013	0.0000	0.0000

LAB NO	29305 CU EXTBL AAS SE MG/L	29309 CU EXT AAS FRNC MG/L CU	29999 COPPER COMBINED MG/L CU	30009 ZN TOT. ICAP D/A MG/L ZN	30011 ZN TOT ICAP 213 MG/L ZN	30111 ZN DISVD ICAP 314 UG/L ZN	30305 ZN EXTBL AAS SE MG/L	30999 ZINC COMBINED MG/L ZN	38301 SR EXTBL AAS DA MG/L	38999 STRONT. COMBINED MG/L SR	42009 MO TOT. ICAP D/A MG/L MO	42011 MO TOT. ICAP 202 MG/L MO
1	--	--	.0090	.327R	--	--	--	.327UR	--	--	.013	--
2	.0120	--	.0120	--	--	--	--	--	--	--	--	--
3	.0130	--	.0130	--	--	--	.0130	.0130	.150	.1500	--	--
6	--	--	.050R	--	.012	--	--	.0120	--	--	--	.035
8	--	.0180	.0180	--	--	.014	--	.0140	--	--	--	--
MEAN	.0125	.0180	.0130	0.0000	.0120	.0140	.0130	.0130	.1500	.1500	.0130	.0350
ST DEV	.0007	0.0000	.0037	0.0000	0.0000	0.0000	0.0000	.0010	0.0000	0.0000	0.0000	0.0000
REL STD	5.7	0.0	28.8	0.0	0.0	0.0	0.0	7.7	0.0	0.0	0.0	0.0
SPIKE	--	--	--	--	--	--	--	--	--	--	--	--
BGD	--	--	--	--	--	--	--	--	--	--	--	--
% REC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ST BIAS	.0007	0.0000	.0037	0.0000	0.0000	0.0000	0.0000	.0010	0.0000	0.0000	0.0000	0.0000

LAB NO	42999 MOLYBD. COMBINED MG/L MO	48009 CO TOT. ICAP DA MG/L CO	48011 CO TOT. ICAP 228 CO MG/L	48302 CD EXTBL AAS SE MG/L	48309 CD EXTBL GR FRNCE MG/L CD	48999 CACHIUM COMBINED MG/LCD	56011 BA TOT. 5X ICAP MG/L BA	56301 BA EXTBL AAS DA MG/L	56999 BARIUM COMBINED MG/L BA	82011 LEAD DIG ICP 220 MG/L PB	82302 PB EXTBL AAS SE MG/L	82309 PB EXTBL GR FRNCE MG/L PB
1	.0130	.012	--	--	--	.0120	--	--	--	--	.0130	--
2	--	--	--	.0110	--	.0110	--	--	--	--	.0100	--
3	--	--	--	.0120	--	.0120	--	--	--	--	.0110	--
6	.0350	--	.011	--	.0090	.0110	.035	.050L	.035	.010	--	.0080
8	--	--	--	--	--	.0090	--	--	--	--	--	--
MEAN	.0240	.0120	.0110	.0115	.0090	.0110	.0350	0.0000	.0350	.0100	.0113	.0080
ST DEV	.0156	0.0000	0.0000	.0007	0.0000	.0012	0.0000	0.0000	0.0000	0.0000	.0015	0.0000
REL STD	64.8	0.0	0.0	6.1	0.0	11.1	0.0	0.0	0.0	0.0	13.5	0.0
SPIKE	--	--	--	--	--	--	--	--	--	--	--	--
BGD	--	--	--	--	--	--	--	--	--	--	--	--
% REC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ST BIAS	.0156	0.0000	0.0000	.0007	0.0000	.0012	0.0000	0.0000	0.0000	0.0000	.0015	0.0000

DATA SUMMARY

PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

STUDY NO. 020 DATE: 01/04/84
 SOURCE OF SAMPLE SPIKED SAMPLE.

DATE DISTRIBUTED 12-03-84

TABLE 3 (cont) SAMPLE 3 = TRACE METALS 0.2% HNO3 S/E.

TRACE METALS S/E.

LAB NO	82999 LEAD COMBINED MG/L PB
1	.0130
2	.0100
3	.0110
6	.0100
8	.0080
MEAN	.0104
ST DEV	.0018
REL STD	17.5
SPIKE	--
BGD	--
% REC	0.0
ST BIAS	.0018

TABLE 4 SAMPLE 4 = MAJOR IONS - UNPRESERVED - STORE AT 4 C.

MAJOR IONS 4 C.

LAB NO	00110 IONIC BALANC %	00120 SUM OF CATIONS MEQ/L	00125 SUM OF ANIONS MEQ/L	02011 COLOUR A REL UNIT	02021 VISUAL C COMPARSN REL UNIT	02041 SPECIFIC COND 25C USIE/CM	02073 TURB JTU	02074 TURBIDITY NPLMTRIC NTU	02190 COLOR COMBINED REL UNIT	02290 SPE COND COMBINED USIE/CM	02390 TURBIDITY COMBINED JTU/NTU	05105 8 AUTOAN CARN AC MG/L
1	-.090	5.8100	5.8200	--	--	628.0	--	--	--	628.0	--	--
2	.427	5.7320	5.6830	5.0L	--	610.0	.20	--	5.0L	610.0	.20	--
3	-.825	5.1143	5.1994	--	--	628.3	--	--	--	628.3	--	--
4	--	--	--	--	5.0L	612.0	.25	--	5.0L	612.0	.25	--
5	3.780	6.0700	5.6300	5.0L	--	574.0	.16	--	5.0L	574.0	.16	.080
6	3.400	6.0000	5.6000	--	--	598.0	--	.25	--	598.0	.25	--
7	--	--	--	0.0	--	485.0R	.40	--	0.0	485.0R	.40	--
8	-2.560	5.4500	5.7300	5.0L	--	601.0	--	1.00R	5.0L	601.0	1.00R	--
MEAN	.6887	5.6961	5.6104	0.0000	0.0000	607.329	.2525	.2500	0.0000	607.329	.2520	0.0800
ST DEV	2.4669	.3593	.2158	0.0000	0.0000	18.8588	.1050	0.0000	0.0000	18.8588	.0909	0.0000
REL STD	358.2	6.3	3.8	0.0	0.0	3.1	41.6	0.0	0.0	3.1	36.1	0.0
SPIKE	--	--	--	--	--	--	--	--	--	--	--	--
BGD	--	--	--	--	--	--	--	--	--	--	--	--
% REC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ST BIAS	2.4669	.3593	.2158	0.0000	0.0000	18.8588	.1050	0.0000	0.0000	18.8588	.0909	0.0000

DATA SUMMARY

PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

STUDY NO. 020 DATE: 01/04/84
SOURCE OF SAMPLE SPIKED SAMPLE.

DATE DISTRIBUTED 12-03-84

TABLE 4 (cont'd) SAMPLE 4 = MAJOR IONS - UNPRESERVED - STORE AT 4 C.

MAJOR IONS 4 C.

LAB NO	05106 BORON F AUTO AN MG/L B	05190 BORON COMBINED MG/L B	06101 C DIS OR IR /DIFF MG/L	06104 C DOC IR UV CO2EV MG/L	06107 C DOC UV CO2 EV MG/L C	06151 C TIC IR COMBU MG/L	06152 DIC IR UV CO2EV MG/L C	06153 DIC UVIR CO2 EV MG/L C	06154 C DIC AA CO2 PHEN MG/L C	06290 DOC METD COMBINED MG/L	06490 DIC METD COMBINED MG/L	07010 N TKN AUTAN MG/L
1	---	---	---	---	21.60	---	---	---	19.1	21.60	19.10	---
3	---	---	---	20.7	---	---	16.2	---	---	20.70	16.20	---
4	---	.080	---	20.0	---	---	---	16.0	---	20.00	16.00	.808
6	---	---	---	21.0	---	---	---	---	---	21.00	17.00	---
8	.05L	.050L	23.000	---	---	17.000	---	---	---	23.00	17.00	---
MEAN	0.0000	.0800	23.0000	20.5667	21.6000	17.0000	16.2000	16.0000	19.1000	21.2600	17.0750	0.8080
ST DEV	0.0000	0.0000	0.0000	.5132	0.0000	0.0000	0.0000	0.0000	0.0000	1.1305	1.4175	0.0000
REL STD	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	5.3	8.3	0.0
SPIKE	---	---	---	---	---	---	---	---	---	---	---	---
BGD	---	---	---	---	---	---	---	---	---	---	---	---
% REC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ST BIAS	0.0000	0.0000	0.0000	.5132	0.0000	0.0000	0.0000	0.0000	0.0000	1.1305	1.4175	0.0000

LAB NO	07015 TKN DIC AUTOAN MG/L N	07016 TKN BLK DIG AA 2 MG/L N	07021 TKN BLK DIG BERT MG/L N	07090 TKN COMBINED MG/L N	07109 NO3+NO2 F AA HYD MG/L N	07110 NO3+NO2 AA2 CD MG/L N	07111 NO3+NO2 DIS SPEC MG/L N	07112 NO3+NO2 UF AA CD MG/L	07190 NO3+NO2 COMBINED MG/L	07505 N NH3TOT AUTOAN MG/L	07506 N NH3TOT ION ELEC MG/L	07555 N NH3DIS PHENAUTO MG/L
1	---	---	.78	.780	---	2.000	2.080	---	2.0800	---	---	---
3	---	---	---	.808	---	---	---	---	2.0800	---	---	---
4	---	---	---	---	---	2.000	---	1.890	1.8900	.0350	---	---
5	---	---	---	---	---	2.000	---	---	2.0000	---	.100L	---
6	---	.900	---	.900	2.200	2.030	---	---	2.0300	---	---	---
7	---	---	---	.900	---	---	---	2.250	2.2500	---	---	---
8	.900	---	---	.900	---	2.100	---	---	2.1000	---	---	.040
MEAN	.9000	.9000	.7800	.8470	2.2000	2.0325	2.0800	2.0700	2.0688	.0350	0.0000	0.0400
ST DEV	0.0000	0.0000	0.0000	.0623	0.0000	.0472	0.0000	.2546	.1159	0.0000	0.0000	0.0000
REL STD	0.0	0.0	0.0	7.4	0.0	2.3	0.0	12.3	5.6	0.0	0.0	0.0
SPIKE	---	---	---	---	---	---	---	---	---	---	---	---
BGD	---	---	---	---	---	---	---	---	---	---	---	---
% REC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ST BIAS	0.0000	0.0000	0.0000	.0623	0.0000	.0472	0.0000	.2546	.1159	0.0000	0.0000	0.0000

LAB NO	07557 AMM DIS INPHENOL MG/L N	07562 AMMONIA AUT EDTA N MG/L	07590 NH3 METD COMBINED MG/L	07601 TOT. N UV AUTO MG/L	07602 TOT. N CALCO. MG/L N	07651 TOT N F UV AUTAN MG/L	07690 TOT N COMBINED MG/L	09103 FLUORIDE DIS COLR MG/L F	09105 F DIS UF SPEC EL MG/L	09106 F DISS EL POT MG/L	09107 FLUOR F AUTO POT F MG/L	09108 F DIS (F) SPEC EL MG/L
1	---	.028	.0280	---	---	---	---	---	---	---	1.08	---
3	---	---	.0350	2.6000	---	---	2.6000	---	1.100	---	---	1.1000
4	---	---	.1000L(HDL)	---	---	2.2000	---	---	---	---	---	---
5	---	---	.0070	---	---	2.4800	---	---	---	1.580R	---	---
6	.0070	---	.0400	---	---	---	---	1.100	---	---	---	---
8	.0400	---	.0400	---	3.000	---	3.0000	---	1.150	---	---	---
MEAN	.0235	.0280	.0300	2.6000	3.0000	2.3400	2.8000	1.1000	1.1250	0.0000	1.0600	1.1000
ST DEV	.0233	0.0000	0.138	0.0000	0.0000	.1980	.2828	0.0000	.0354	0.0000	0.0000	0.0000
REL STD	99.3	0.0	45.9	0.0	0.0	8.5	10.1	0.0	3.1	0.0	0.0	0.0
SPIKE	---	---	---	---	---	---	---	---	---	---	---	---
BGD	---	---	---	---	---	---	---	---	---	---	---	---
% REC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ST BIAS	.0233	0.0000	.0138	0.0000	0.0000	.1980	.2828	0.0000	.0354	0.0000	0.0000	0.0000

DATA SUMMARY

PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

STUDY NO. 020 DATE: 01/04/84
 SOURCE OF SAMPLE SPIKED SAMPLE.

DATE DISTRIBUTED 12-03-84

TABLE 4 cont'd SAMPLE 4 = MAJOR IONS - UNPRESERVED - STORE AT 4 C.

MAJOR IONS 4 C.

LAB NO	09190 F METHOD COMBINED MG/L	10101 CACO3 TO ALK TITR MG/L	10106 T ALK CA CO3 IR O MG/L	10109 T ALKLY POT TITR MG/L CC3	10190 TOT ALK COMBINED MG/L	10301 PH UNITS	10390 PH COMBINED UNITS	10602 T HARDCA CO3 CALC MG/L	10603 TOT HARD TITR MG/L	10690 HARDNSS COMBINED MG/L	11102 NA DISS AAS MG/L NA	11103 NA DISS FL PHOTO MG/L
1	1.080	83.00	--	--	83.00	7.600	7.600	186.0	--	186.0	--	39.000
2	1.100	74.40	--	--	74.40	8.100	8.100	--	--	--	--	38.000
3	1.100	--	68.10	--	68.10	8.150	8.150	--	--	--	--	--
4	1.580R	77.00	--	--	77.00	7.500	7.500	--	--	--	--	--
5	1.100	77.90	--	--	77.90	7.500	7.500	--	200.0	200.0	--	38.000
6	1.100	--	--	80.00	80.00	7.200	7.200	--	200.0	200.0	36.000	--
7	1.150	76.00	--	--	76.00	7.600	7.600	--	198.3	198.3	--	--
8	1.150	--	--	80.00	80.00	7.450	7.450	181.0	--	181.0	--	--
MEAN	1.1060	77.6600	68.1000	80.0000	77.0500	7.6375	7.6375	183.500	199.433	193.060	36.0000	38.3333
ST DEV	0.0261	3.2555	0.0000	0.0000	4.5002	0.3260	0.3260	3.5355	0.9815	8.9313	0.0000	0.5774
REL STD	2.4	4.2	0.0	0.0	5.8	4.3	4.3	1.9	0.5	4.6	0.0	1.5
SPIKE	--	--	--	--	--	--	--	--	--	--	--	--
BGD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% REC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ST BIAS	0.0261	3.2555	0.0000	0.0000	4.5002	0.3260	0.3260	3.5355	0.9815	8.9313	0.0000	0.5774

LAB NO	11105 NA DISS AAS D/A MG/L	11107 NA DISS FL PH UF MG/L	11111 NA DISVD ICAP 589 MG/L NA	11190 SODIUM COMBINED MG/L	12101 MG DISS CALC MG/L	12106 MG DISS AA DA UF MG/L	12107 MG DISS AAS AUTO MG/L	12111 MG DISVD ICAP 279 MG/L MG	12190 MAGNESIU COMBINED MG/L MG	12303 MG UF AAS AUTO MG/L MG	14102 SIO2 REAA UT ANSAD MG/L	14105 SIO2 REA AUT HOLY MG/L
1	--	--	--	39.000	--	--	--	--	30.0000	30.00	1.300	--
2	--	--	--	34.000	--	--	29.000	--	29.0000	--	1.200	--
3	--	17.600R	--	17.600R	31.000	--	--	--	31.0000	--	--	--
4	--	--	--	38.000	32.300	--	--	--	32.3000	--	--	1.100
5	40.4000	--	--	36.000	34.000	--	--	--	34.0000	--	--	--
6	--	--	--	40.400	32.600	--	--	--	32.6000	--	--	--
8	--	--	33.600	33.600	--	--	--	29.600	29.6000	--	--	1.100
MEAN	40.4000	0.0000	33.6000	37.5000	32.9667	31.0000	29.0000	29.6000	31.2143	30.0000	1.2500	1.1000
ST DEV	0.0000	0.0000	0.0000	2.3925	0.9074	0.0000	0.0000	0.0000	1.8206	0.0000	0.0707	0.0000
REL STD	0.0	0.0	0.0	6.4	2.8	0.0	0.0	0.0	5.8	0.0	5.7	0.0
SPIKE	--	--	--	--	--	--	--	--	--	--	--	--
BGD	--	--	--	--	--	--	--	--	--	--	--	--
% REC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ST BIAS	0.0000	0.0000	0.0000	2.3925	0.9074	0.0000	0.0000	0.0000	1.8206	0.0000	0.0707	0.0000

DATA SUMMARY

PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

STUDY NO. 020 DATE: 01/04/84
 SOURCE OF SAMPLE SPIKED SAMPLE.

DATE DISTRIBUTED 12-03-84

TABLE 4 contd

SAMPLE 4 = MAJOR IONS - UNPRESERVED - STORE AT 4 C.

MAJOR IONS 4 C.

LAB NO	14106 SIO2 REA AUT MOUF MG/L	14190 SILICA R COMBINED MG/L	15406 P TOT UF AUTO ASC MG/L	15409 TP BLOCK ASC AA2 MG/L P	15413 TOT P AU TO SNCL MG/L P	15421 T P BLK DIG ASC MG/L P	15490 TOTAL P COMBINED MG/L	16304 SO4 DISS AUTO BA MG/L	16306 SO4 DISS AUTO MB MG/L	16307 SO4 DISS AAN MBUF MG/L	16309 SO4 DIS I C MG/L SO4	16390 SO4 COMBINED MG/L
1	--	1.3000	--	--	--	.006L	.0060L	--	112.00	--	--	112.00
2	--	1.2000	--	--	.0020	--	.0020	112.00	--	--	112.00	112.00
3	.940	<u>0.9400</u>	--	--	.0016	--	.0016	--	--	109.90	--	109.90
4	--	--	.0030L	--	--	--	.0030L	--	--	--	--	--
5	--	1.1000	--	--	--	--	--	--	107.50	--	--	107.50
6	--	--	--	.0100L	--	--	.0100L	106.00	--	--	--	106.00
7	--	--	--	--	--	--	--	--	113.00	--	--	113.00
8	--	1.1000	--	--	.0010L	--	.0010L	--	114.00	--	--	114.00
MEAN	.9400	1.1200	0.0000	0.0000	.0016	0.0000	.0016	109.000	111.625	109.900	112.000	110.629
ST DEV	0.0000	.1339	0.0000	0.0000	.0003	0.0000	.0003	4.2426	2.8687	0.0000	0.0000	2.9579
REL STD	0.0	11.9	0.0	0.0	15.7	0.0	15.7	3.9	2.6	0.0	0.0	2.7
SPIKE	--	--	--	--	--	--	--	--	--	--	--	--
BGD	--	--	--	--	--	--	--	--	--	--	--	--
% REC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ST BIAS	0.0000	.1339	0.0000	0.0000	.0003	0.0000	.0003	4.2426	2.8687	0.0000	0.0000	2.9579

LAB NO	17203 CL DISS AUTO FE MG/L	17204 CL DISS AG TITN MG/L	17205 CL DISS ION EL MG/L	17206 CL DISS PRE AUTO MG/L	1720A CL DISUF PRE AUTO MG/L	17290 CHLORIDE COMBINED MG/L	19102 K DISS AAS MG/L K	19103 K DISS PHOTO LI MG/L	19107 K DISS PHOTO UF MG/L	19111 K DISSVD ICAP 766 MG/L K	19190 K COMBINED MG/L	20100 CA DIS C 4CAHARD MG/L CA
1	58.00	--	--	--	--	58.00	--	15.500	--	--	15.500	--
2	--	--	59.00	--	--	59.00	--	16.000	--	--	16.000	--
3	--	--	--	--	49.50R	<u>49.50R</u>	--	--	--	--	15.600	--
4	--	--	--	57.00	--	57.00	--	16.600	15.600	--	16.600	--
5	--	58.00	--	--	--	58.00	14.000	--	--	--	14.000	24.0000
6	57.00	--	--	--	--	57.00	17.200	--	--	--	<u>17.200</u>	--
7	--	--	--	57.00	--	57.00	--	--	--	14.200	14.200	--
8	--	--	--	--	--	--	--	--	--	--	--	--
MEAN	57.5000	58.0000	59.0000	57.0000	0.0000	57.6667	15.6000	16.0333	15.6000	14.2000	15.5857	24.0000
ST DEV	.7071	0.0000	0.0000	0.0000	0.0000	.8165	2.2627	.5508	0.0000	0.0000	1.1725	0.0000
REL STD	1.2	0.0	0.0	0.0	0.0	1.4	14.5	3.4	0.0	0.0	7.5	0.0
SPIKE	--	--	--	--	--	--	--	--	--	--	--	--
BGD	--	--	--	--	--	--	--	--	--	--	--	--
% REC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ST BIAS	.7071	0.0000	0.0000	0.0000	0.0000	.8165	2.2627	.5508	0.0000	0.0000	1.1725	0.0000

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DATA SUMMARY

PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

STUDY NO. 020 DATE: 01/04/84
 SOURCE OF SAMPLE SPIKED SAMPLE.

DATE DISTRIBUTED 12-03-84

TABLE 4 (cont)

SAMPLE 4 = MAJOR IONS - UNPRESERVED - STORE AT 4 C.

MAJOR IONS 4 C.

LAB NO	20101 CA DISS TITRATED MG/L	20103 CA DISS AAS MG/L	20108 CA DISS AAS UF MG/L	20110 CA DISS AAS AUTO MG/L	20111 CA DISVD ICAP 318 MG/L CA	20190 CALCIUM COMBINED MG/L CA
1	---	---	---	25.00	---	25.000
2	---	---	---	26.00	---	26.000
3	---	---	28.000	---	---	28.000
5	26.8000	---	---	---	---	26.800
6	---	---	---	---	---	24.000
7	---	28.00	---	---	---	28.000
8	---	---	---	---	23.80	23.800
MEAN	26.8000	28.0000	28.0000	25.5000	23.8000	25.9429
ST DEV	0.0000	0.0000	0.0000	.7071	0.0000	1.7539
REL STD	0.0	0.0	0.0	2.8	0.0	6.8
SPIKE	---	---	---	---	---	---
BGD	---	---	---	---	---	---
% REC	0.0	0.0	0.0	0.0	0.0	0.0
ST BIAS	0.0000	0.0000	0.0000	.7071	0.0000	1.7539

RESULTS RECVD YRMODY

LAB 1	84/05/15
LAB 2	84/04/24
LAB 3	84/03/30 84/05/10
LAB 4	84/05/08
LAB 5	84/05/24
LAB 6	84/03/30 84/05/21
LAB 7	84/03/23
LAB 8	84/05/03

DISTRIBUTION

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MEMORANDUM

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DATE 7 November 1984

SUBJECT / OBJET Final Summary Report on Prairie Provinces Water Board QC
PPQC Studies 21 and 22 (PP21-22)

I have enclosed the final report for PP21-22.

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

Since there were no changes to the data in these studies, no computer printout is enclosed with this report.

Harry A.

H. Alkema

SUMMARY REPORT
PPQC STUDIES 21 AND 22
FOR MAY AND JUNE, 1984

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

by

H. Alkema

October 1984

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

L7R 4A6

This report summarizes the PPWB interlaboratory quality control studies 21 and 22, for the months of May and June, 1984. These two studies dealt with medium and low levels of trace metals, major ions, nutrients and physical parameters.

Sample Particulars

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

PP 21 - Sample 1 - 125 mL, D/A* of trace metals
(3% HNO₃).

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

PP 22 - Sample 3 - 1 L, S/E* of trace metals
(0.2% HNO₃).

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

Data Analysis

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

* For definitions see Appendix I.

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

Data for each parameter were accumulated under a mixed (or combined) method code ending in either 90 or 99. Under these codes, data for each parameter were combined for statistical comparison.

Performance Indicators

Deviant results, those greater than 10%, are circled in Tables 1-4, and a % deviation from the mean is noted in the comments. Flagged results, those with an R or L, are not used in the statistical calculations. Performance indicators were fully explained in the previous report dated August 7, 1984.

Comments on Lab Performance

High coefficients of variation (incomparability) were observed for DOC and ammonia low level analyses.

Individual lab deviations are listed below:

- Lab 1 - a low bias for Cr, -22%
- a high result for Pb by DA, +17%
- a low TKN result, -19%
- a rejectable* result for Ni by DA, NH₃, and F.
- Lab 2 - a low result for Mn by SE, -15%
- a high result for Ni by SE, +32%
- Total P slightly high at the Detection Limit (D.L.)
no deviant results
- Lab 3 - a high result for Zn by DA, +34; Cd by DA, +34%
- a high result for V by SE, +38%; Mo by SE, +30%
- a high DOC result near the D.L.
- a rejectable alkalinity result.
- Lab 4 - a rejectable result for colour, and two for D.I.C.
- a high detection limit (HDL) for NH₃.
- Lab 5 - a high result for F, +18%; Ca, +12%
- erratic results for ammonia, +100%, -70%
- a rejectable result for DOC.
- Lab 6 - a high or low result by DA for Cu, +35%; Mo, +44%; Cd, -29%;
and Pb, -17%
- a high SO₄ result, +11%
- a low F result, -13%

- a rejectable result for Cu by SE
- two rejectable results each for nitrate-nitrite and pH.
- an HDL for TKN?, NH₃?

Lab 7 - a high result for nitrate-nitrite, +10%

Lab 8 - a high result for Cr by DA, +25%; by SE, +38%

- a rejectable result for Pb by SE
- a high result for DOC, +64%; T.N., +10%
- an HDL for TKN.

PPWB average number of anomalies per sample is 2.

* Rejectable by Grubb's procedure for statistical calculation.

Appendix I

Definitions of Types of Metals Analysis

1. D/A - Direct Aspiration

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

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

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

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

DATA SUMMARY

PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 1

SAMPLE = 1 STUDY NO. 021 DATE: 01/05/84 SPIKED SAMPLE.

DISTRIBUTED: 01/05/84

TRACE METALS D/A.

LAB	13302 AL EXTRBL AAS DA MG/L	13998 AL ICP D/A	13999 ALUMINUM COMBINED MG/L AL	23009 V TOT. ICAP D/A MG/L V	23011 V TOT. ICAP 292 MG/L V	23301 V EXTRBL AAS DA MG/L	23998 V ICP D/A	23999 VANADIUM COMBINED MG/L V	24004 CR TOTAL GR FRNCE MG/L	24009 CR TOT. ICAP D/A MG/L CR	24011 CR TOT ICAP 267 MG/L CR
1	--	--	--	0.452	--	--	--	0.452	--	0.047	--
2	0.54	--	0.54	--	--	--	--	--	--	--	--
3	0.54	.53	0.54	--	--	0.56	.49	--	--	--	--
6	0.6	--	0.47	--	0.47	--	--	0.56	--	--	0.057
8	--	--	0.6	--	--	--	--	0.47	--	--	--
MEAN									0.078		
STD. DEV.	.5600	.5300	.5375	.4520	.4700	.5600	.4900	.4940	.0780	.0470	.0570
REL. STD. DES.	.0346	--	.0532	--	--	--	--	.0579	--	--	--
DES. VAL.	6.2	--	9.9	--	--	--	--	11.7	--	--	--
LAB	24302 CR AAS O/A MG/L	24998 CR ICP D/A	24999 CHROMIUM COMBINED MG/L CR	25003 MN TOT. ICAP D/A MG/L MN	25011 MN DIG ICAP 257 MN MG/L	25111 MN DISVO ICAP 258 UG/L MN	25304 MN EXTRBL AAS DA MG/L	25998 MN ICP D/A	25999 MANGAN. COMBINED MG/L MN	26011 FE TOTAL 5X ICAP MG/L FE	26111 FE DISVO ICAP 260 MG/L FE
1	--	--	0.047	0.040	--	--	--	--	0.040	--	--
2	0.07	--	0.07	--	--	--	--	--	0.05	--	--
3	0.06	.077	0.06	--	--	0.05	0.05	0.05	0.05	--	--
6	--	--	0.057	--	0.039	--	--	0.05	0.039	0.25	--
8	--	--	0.078	--	--	0.04	--	0.04	0.04	--	0.24
MEAN											
STD. DEV.	.0650	.0770	.0624	.0400	.0390	.0400	.0500	.0470	.0438	.2500	.2400
REL. STD. DES.	.0071	--	.0120	--	--	--	.00000	--	.0057	--	--
DES. VAL.	10.9	--	19.2	--	--	--	0.0	--	13.0	--	--
LAB	26304 FE EXTRBL AAS DA MG/L	26998 FE ICP D/A	26999 IRON COMBINED MG/L FE	27009 CO TOT. ICAP D/A MG/L CO	27011 CO DIG ICAP 288 MG/L CO	27301 CO EXTRBL AAS DA MG/L	27998 CO ICP D/A	27999 COBALT COMBINED MG/L	28009 NI TOT. ICAP D/A MG/L NI	28011 NI DIG ICAP 231 MG/L NI	28111 NI DISS. ICAP 231 MG/L NI
1	0.22	--	0.22	0.228	--	--	--	0.228	0.025R	--	--
2	0.25	--	0.25	--	--	0.24	--	0.24	--	--	--
3	0.24	.27	0.24	--	--	0.24	.23	0.24	--	--	--
6	--	--	0.25	--	0.23	--	--	0.23	--	0.26	--
8	--	--	0.24	--	--	0.25	--	0.25	--	--	0.27
MEAN											
STD. DEV.	.2367	.2700	.2400	.2280	.2300	.2433	.2300	.2376	--	.2600	.2700
REL. STD. DES.	.0153	--	.0122	--	--	.0058	--	.0089	--	--	--
DES. VAL.	6.5	--	5.1	--	--	2.4	--	3.7	--	--	--

DATA SUMMARY

PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 1

STUDY NO. 021 DATE: 01/05/84 DISTRIBUTED: 01/05/84
 SAMPLE = 1 SPIKED SAMPLE. TRACE METALS D/A.

LAB	82301 PB EXTBAL AAS DA MG/L	82302 PB EXTBAL AAS SE MG/L	82998 PB ICP D/A	82999 LEAD COMBINED MG/L PB
1	--	0.350	--	0.350 *
2	0.30	--	--	0.30
3	0.28	--	.28	0.28
6	--	--	--	0.25 *
8	--	--	--	0.31
MEAN	.2900	.3500	.2800	.2980
STD. DEV.	.0141	--	--	.0370
REL. STD. DES. VAL.	4.9	--	--	12.4

SAMPLE = 2 MAJOR IONS & C.

TABLE 2

LAB	00110 IONIC BALANC %	00120 SUM OF CATIONS MEQ/L	00125 SUM OF ANIONS MEQ/L	02011 COLOUR A REL UNIT	02021 VISUAL C OMPARSN REL UNIT	02041 SPECIFIC COND 25C USIE/CM	02073 TURB JTU	02074 TURBIDITY NPLMTRIC NTU	02190 COLOR COMBINED REL UNIT	02290 CONDUCT COMBINED U S/CM	02390 TURBIDITY COMBINED JTU/NTU
1	-0.249	8.01	8.05	--	--	906.	--	--	--	906.	--
2	1.73	--	--	5. L	--	880.	0.1	--	5. L	880.	0.1
3	-0.8	8.027	8.154	--	--	895.6	--	--	--	895.6	--
4	--	--	--	--	10. R	888.	0.30	--	10. R *	888.	0.30
5	0.96	8.218	8.062	5. L	--	883.	0.10	--	5. L	883.	0.10
6	--	8.4	8.4	--	--	876.	--	0.20	--	876.	0.20
7	--	--	--	2. L	--	918.	0.2	--	2. L	918.	0.2
8	2.79	8.40	7.94	5. L	--	899.	--	0.20	5. L	899.	0.20
MEAN	.8462	8.2110	8.1212	2.0000	10.0000	893.2000	.1750	.2000	6.0000	893.2000	.1833
STD. DEV.	1.4555	.1909	.1734	--	--	14.2400	.0957	0.0000	5.6569	14.2400	.0753
REL. STD. DES. VAL.	164.2	2.3	2.1	--	--	1.6	54.7	0.0	94.3	1.6	41.1

LAB	05105 B AUTOAN CARM AC MG/L	05106 BIBRON F AUTO AN MG/L B	05190 BORCN COMBINED MG/L B	06101 DOC IR/DIFF MG/L	06104 DOC UV CO2 EV MG/L	06107 DOC UV CO2 EV MG/L C	06151 DIC IR COMBUST MG/L	06153 DIC UVIR CO2 EV MG/L C	06154 DIC AA CO2 PHEN MG/L C	06290 DOC METD COMBINED MG/L	06490 DIC METD COMBINED MG/L
1	--	--	--	--	--	1.1	--	--	--	1.1	17.0
2	--	--	--	--	--	1.3	--	--	17.0	1.3	--
3	--	--	--	--	--	--	--	--	--	2.6	--
4	0.17	--	0.17	--	2.6	--	--	--	--	1.8	--
5	--	--	--	0.83 L	1.8	--	15.3	36. R	--	0.83 L	36. R
6	--	--	--	3.0	1.2	--	14.0	--	--	1.2	15.3
8	--	0.05 L	0.05 L	3.0	--	--	--	--	--	3.0	14.0
MEAN	.1700	--	.1700	3.0000	1.8667	1.2000	14.6500	--	17.0000	1.8333	15.4333
STD. DEV.	--	--	--	--	.7024	.1414	.9192	--	--	.7967	1.8044
REL. STD. DES. VAL.	--	--	.063	--	37.6	11.8	6.3	--	--	43.5	9.7

DATA SUMMARY

 PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 2

SAMPLE = 2

STUDY NO. 021
 SPIKED SAMPLE.

DATE: 01/05/84

DISTRIBUTED: 01/05/84

MAJOR IONS 4 C.

LAB	07010 N TKN AUTOAN MG/L	07015 TKN DIG AUTOAN MG/L N	07016 TKN BLK DIG AA 2 MG/L N	07021 TKN BLK DIG BERT MG/L N	07090 TKN COMBINED MG/L N	07109 NO3+NO2 F AA HYD MG/L N	07110 NO3+NO2 AA2 CO MG/L N	07112 NC3+NO2 UF AA CO MG/L	07190 NO3+NO2 COMBINED MG/L	07505 N NH3TOT AUTOAN MG/L	07506 N NH3TOT ION ELEC MG/L
1	--	--	--	0.160	0.160	--	0.604	--	0.604	--	--
2	--	--	--	--	--	--	0.58	--	0.58	--	--
3	0.153	--	--	--	0.153	--	--	0.580	0.580	0.007	--
4	--	--	--	--	--	--	0.58	--	0.58	--	0.1 L
5	--	--	0.2	--	0.2 HDL?	0.44 R	0.588	--	0.588	--	--
6	--	--	--	--	0.20 L HDL	--	--	0.62	0.44 R	--	--
7	--	0.20 L	--	--	--	--	0.62	--	0.62	--	--
8	--	--	--	--	--	--	0.62	--	0.62	--	--
MEAN	.1530	--	.2000	.1600	.1710	--	.5944	.6000	.5960	.0070	--
STD. DEV.	--	--	--	--	.0254	--	.0173	.0283	.0185	--	--
REL. STD. DES.	--	--	--	--	14.8	--	2.9	4.7	3.1	--	--
VAL.	--	--	--	--	.237	--	--	--	.562	--	--
LAB	07555 N NH3DIS PHENAUTO MG/L	07557 AMM DIS INPHENOL MG/L N	07562 AMMONIA AUT EDTA N MG/L	07590 NH3 METD COMBINED MG/L	07601 TOT. N UV AUTO MG/L	07602 TOT. N CALCD. MG/L N	07651 TOT N F UV AUTAN MG/L	07690 TOT N COMBINED MG/L	09103 FLUORIDE DIS COLR MG/L F	09105 F DIS UF SPEC EL MG/L	09106 F DISS EL POT MG/L
1	--	--	0.135R	0.135R	0.64	--	--	--	--	--	--
2	--	--	--	0.007	--	--	--	0.64	--	0.07	--
3	--	--	--	0.1 L	--	--	--	--	--	--	--
4	--	0.044	--	0.044	--	--	0.66	--	--	--	--
5	--	0.02	--	0.02	--	--	0.675	0.675	--	--	0.064
6	0.014	--	--	0.014	--	0.82 L	--	0.82 L	0.1 L	--	--
8	--	--	--	--	--	--	--	--	--	0.1 L	--
MEAN	.3140	.0320	--	.0213	.6400	--	.6675	.6575	--	.0700	.0640
STD. DEV.	--	.0170	--	.0161	--	--	.0106	.0247	--	--	--
REL. STD. DES.	--	53.0	--	75.6	--	--	1.6	3.8	--	--	--
VAL.	--	--	--	.026	--	--	--	.585	--	--	--
LAB	09107 FLUOR F AUTO POT F MG/L	09190 F METHOD COMBINED MG/L	10101 CACO3 TO ALK TITR MG/L	10106 T ALK CA CO3 IR D MG/L	10109 T ALKLT POT TITN MG/L CC3	10190 TOT ALK COMBINED MG/L	10301 PH UNITS	10390 PH COMBINED UNITS	10602 HARDOCA CO3 CALC MG/L	10603 TOT HARD TITR MG/L	10690 HARDNSS COMBINED MG/L
1	0.36 F	0.36 R	63.5	--	--	69.5	8.0	8.0	251.	--	251.
2	--	0.07	62.9	--	--	62.3	7.8	7.8	--	--	--
3	--	--	--	54.9 R	--	64.9	7.80	7.80	--	--	--
4	--	--	65.	--	--	65.	7.9	7.9	--	--	--
5	--	0.064	64.7	--	--	64.7	7.56	7.56	--	--	--
6	--	0.1 L	--	--	68.	68.	7.1 R	7.1 R	--	260.	260.
7	--	--	63.4	--	65.0	65.0	7.7	7.7	--	260.	260.
8	--	0.1 L	--	--	--	--	7.95	7.95	266.	262.5	262.5
MEAN	--	.0670	65.5000	--	66.5000	65.7857	7.8157	7.8157	258.5000	260.8333	259.9000
STD. DEV.	--	.0042	2.4321	--	2.1213	2.2207	.1519	.1519	10.6066	1.4434	5.5498
REL. STD. DES.	--	6.3	3.7	--	3.2	3.4	1.9	1.9	4.1	.6	2.1
VAL.	--	.088	--	--	--	63.832	--	7.951	--	--	259.088

DATA SUMMARY

 PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 2

STUDY NO. 021 DATE: 01/05/84
 SAMPLE = 2 SPIKED SAMPLE.

DISTRIBUTED: 01/05/84

MAJOR IONS 4 C.

LAB	11102 NA DISS AAS MG/L NA	11103 NA DISS FL PHOTO MG/L	11105 NA DISS AAS D/A MG/L	11107 NA DISS FL PH UF MG/L	11114 NA DISVD ICAP 509 MG/L NA	11190 SODIUM COMBINED MG/L	12101 MG DISS CALC MG/L	12102 MG FIL AA DA MG/L	12106 MG DISS AA DA UF MG/L	12107 MG DISS AAS AUTO MG/L	12111 MG DISVD ICAP 279 MG/L MG
1	--	58.	--	--	--	58.	--	--	--	--	--
2	--	60.0	--	--	--	60.9	--	--	--	--	--
3	--	58.5	--	58.7	--	58.7	--	--	19.9	21.	--
4	62.	--	--	--	--	58.5	19.2	--	--	--	--
5	--	--	59.5	--	--	62.	23.	--	--	--	--
6	--	--	--	--	59.7	59.5	--	20.9	--	--	--
7	--	--	--	--	--	59.7	--	--	--	--	--
8	--	--	--	--	--	--	--	--	--	--	22.1
MEAN	62.0000	58.8333	59.5000	58.7000	59.7000	59.4857	21.1000	20.9000	19.9000	21.0000	22.1000
STD.	--	1.0408	--	--	--	1.3184	2.6870	--	--	--	--
REL.	--	1.8	--	--	--	2.2	12.7	--	--	--	--
DES.	--	--	--	--	--	59.441	--	--	--	--	--

LAB	12190 MAGNESIUM COMBINED MG/L MG	12303 MG UF AAS AUTO MG/L MG	14102 SIO2 REAA UT ANSAD MG/L	14105 SIC2 REA AUT MOLY MG/L	14106 SIO2 REA AUT MCFU MG/L	14190 SILICA COMBINED MG/L	15406 P TOT UF AUTO ASC MG/L	15409 TP BLOCK ASC AA2 MG/L P	15413 TOT P AU TO SNCL MG/L P	15421 Y P BLK DIG ASC MG/L P	15490 TOTAL P COMBINED MG/L
1	21.	21.	14.1	--	--	14.1	--	--	--	0.006L	0.006L
2	21.	--	16.	--	--	16.	--	--	0.007	--	0.007
3	19.9	--	--	--	13.88	13.88	--	--	0.007	--	0.007
4	--	--	--	--	--	--	0.003L	--	--	--	0.003L
5	19.2	--	--	14.2	--	14.2	--	--	--	--	--
6	23.	--	--	--	--	--	--	0.01	--	--	0.01
7	20.9	--	--	14.8	--	14.8	--	--	0.007	--	0.007
8	22.1	--	--	--	--	--	--	--	--	--	--
MEAN	21.0143	21.0000	15.0500	14.5000	13.8800	14.5960	--	0.0100	0.0072	--	0.0079
STD.	1.2694	--	1.3435	0.4243	--	0.8556	--	--	0.0003	--	0.0014
REL.	6.0	--	8.9	2.9	--	5.9	--	--	4.8	--	18.1
DES.	21.465	--	--	--	--	14.876	--	--	--	--	0.006

LAB	16304 SO4 DISS AUTO BA MG/L	16306 SO4 DISS AA MB MG/L	16307 SO4 DISS AAN MBUF MG/L	16309 SO4 DISS I C MG/L SO4	16390 SO4 COMBINED MG/L	17203 CL DISS AUTO FE MG/L	17204 CL DISS AG TITN MG/L	17205 CL DISS ION EL MG/L	17206 CL DISS PRE AUTO MG/L	17290 CHLORIDE COMBINED MG/L	19102 K DISS AAS MG/L K
1	70.	68.	--	--	68.	185.	--	--	--	185.	--
2	--	--	--	--	70.	--	--	200.	--	200.	--
3	--	65.5	74.5	70.	74.5	--	--	--	183.5	183.5	--
4	80.	--	--	--	65.5	--	--	--	190.	190.	--
5	--	73.5	--	--	80.	188.	188.	--	--	188.	19.4
6	--	73.	--	--	73.5	190.5	--	--	--	190.5	17.4
7	--	--	--	--	73.	--	--	--	180.	180.	--
8	--	--	--	--	--	--	--	--	--	--	--
MEAN	75.0000	70.0000	74.5000	70.0000	72.0714	187.7500	188.0000	200.0000	184.5000	188.1429	18.4000
STD.	7.0711	3.8344	--	--	4.7559	3.9891	--	--	5.0744	6.4208	1.4142
REL.	9.4	5.6	--	--	6.6	2.1	--	--	2.8	3.4	7.7
DES.	--	--	--	--	70.269	--	--	--	--	196.168	--

DATA SUMMARY

PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 2

STUDY NO. 021 DATE: 01/05/84 DISTRIBUTED: 01/05/84
 SAMPLE = 2 SPIKED SAMPLE. MAJOR IONS 4 C.

LAB	19103 K DISS PHOTO LI MG/L	19107 K DISS PHOTO UF MG/L	19111 K DISSVD ICAP 766 MG/L K	19190 K COMBINED MG/L	20100 CA DIS C .4 CAHARD MG/L CA	20101 CA DISS TITRN ED MG/L	20103 CA DISS AAS MG/L	20108 CA DISS AAS UF MG/L	20110 CA DISS AAS AUTO MG/L	20111 CA DISSVD ICAP 318 MG/L CA	20190 CALCIUM COMBINED MG/L CA
1	18.2	--	--	18.2	--	--	--	--	66.	--	66.
2	17.	--	--	17.	--	--	--	--	67.	--	67.
3	--	18.3	--	18.3	--	--	--	67.5	--	--	67.5
5	18.7	--	--	18.7	--	72.4	--	--	--	--	72.4
6	--	--	--	19.4	66.	--	--	--	--	--	66.
7	--	--	--	17.4	--	--	68.6	--	--	--	68.6
8	--	--	19.1	19.1	--	--	--	--	--	70.1	70.1
MEAN	17.9667	18.3000	19.1000	18.3000	66.0000	72.4000	68.6000	67.5000	66.5000	70.1000	68.2286
STD. DEV.	.8737	--	--	.8679	--	--	--	--	.7071	--	2.3457
REL. STD. DES. VAL.	4.9	--	--	4.7	--	--	--	--	1.1	--	3.4
	--	--	--	18.270	--	--	--	--	--	--	67.631

SAMPLE = 3 TRACE METALS S/E.

DATA SUMMARY

PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 3

STUDY NO. 022 DATE: 01/06/84
 SAMPLE = 3 SPIKED SAMPLE.

DISTRIBUTED: 01/05/84

TRACE METALS S/E.

LAB	27003 CO TOTAL GP FRNCE MG/L	27009 CO TOT. ICAP D/A MG/L CO	27011 CO DIG ICAP 288 MG/L CO	27301 CO EXTBL AAS DA MG/L	27997 CO 10X ICP	27998 CO ICP D/A	27999 COBALT COMBINED MG/L CO	28007 NI TOT AAS FRNC MG/L NI	28009 NI TOT. ICAP D/A MG/L NI	28011 NI DIG ICAP 231 MG/L NI	28111 NI DISS ICAP NI
1	--	0.071	--	--	--	--	0.071	--	0.059	--	--
2	0.06 *	--	--	--	--	--	0.06	0.085	--	--	--
3	--	--	--	0.07	0.057	0.065	0.07	--	--	--	--
6	0.077 *	--	0.063	--	--	--	0.063	--	--	0.067	--
8	--	--	--	--	--	--	0.077	--	--	--	0.051
MEAN	.0685	.0710	.0630	.0700	.0570	.0650	.0682	.0850	.0590	.0670	.0510
STD. DEV.	.0120	--	--	--	--	--	.0068	--	--	--	--
REL. STD. DES. VAL.	17.5	--	--	--	--	--	9.9	--	--	--	--
	--	--	--	--	--	--	.065	--	--	--	--
LAB	28302 NI EXTBL AAS SE MG/L	28997 NI 10X ICP	28998 NI ICP D/A	28999 NICKEL COMBINED MG/L NI	29009 CU TOT. ICAP D/A MG/L CU	29011 CU DIG ICAP 324 MG/L CU	29111 CU DISVD ICAP 325 UG/L CU	29305 CU EXTBL AAS SE MG/L	29306 CU EXTBL AAS DA MG/L	29997 CU 10X ICP	29998 CU ICP D/A
1	--	--	--	0.059	0.045	--	--	--	--	--	--
2	--	--	--	0.085 *	--	--	--	--	--	--	--
3	0.059	0.058	0.063	0.059	--	--	--	0.045	0.05	0.050	0.046
6	--	--	--	0.067	--	0.067R	--	--	--	--	--
8	--	--	--	0.051	--	--	0.05	--	--	--	--
MEAN	.0590	.0580	.0630	.0642	.0450	--	.0500	.0450	.0500	.0500	.0460
STD. DEV.	--	--	--	.0129	--	--	--	--	--	--	--
REL. STD. DES. VAL.	--	--	--	20.1	--	--	--	--	--	--	--
	--	--	--	.064	--	--	--	--	--	--	--
LAB	29999 COPPER COMBINED MG/L CU	30009 ZN TOT. ICAP D/A MG/L ZN	30011 ZN TOT ICAP 213 MG/L ZN	30111 ZN DISVD ICAP 314 UG/L ZN	30304 ZN EXTBL AAS DA MG/L	30997 ZN 10X ICP	30998 ZN ICP D/A	30999 ZINC COMBINED MG/L ZN	38301 SR EXTBL AAS DA MG/L	38997 SR 10X ICP	38998 SR ICP D/A
1	0.045	0.047	--	--	--	--	--	0.047	--	--	--
2	0.05	--	--	--	--	--	--	--	--	--	--
3	0.045	--	--	--	0.05	0.047	0.050	0.05	0.18	.16	.17
6	0.067R	--	0.057	--	--	--	--	0.057	--	--	--
8	0.05	--	--	0.06	--	--	--	0.06	--	--	--
MEAN	.0475	.0470	.0570	.0600	.0500	.0470	.0500	.0535	.1800	.1600	.1700
STD. DEV.	.0029	--	--	--	--	--	--	.0060	--	--	--
REL. STD. DES. VAL.	6.1	--	--	--	--	--	--	11.3	--	--	--
	.052	--	--	--	--	--	--	.050	--	--	--

DATA SUMMARY

 PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 3

SAMPLE = 3

STUDY NO. 022 DATE: 01/06/84
 SPIKED SAMPLE.

DISTRIBUTED: 01/05/84

TRACE METALS S/E.

LAB	38999 STRONT. COMBINED MG/L SR	42009 MO TOT. ICAP D/A MG/L MO	42011 MO TOT. ICAP 202 MG/L MO	42301 MO EXTBL AAS DA MG/L	42997 MO 10X ICP	42998 MO ICP D/A	42999 MOLYBD. COMBINED MG/L MO	48009 CD TOT. ICAP DA MG/L CD	48011 CD TOT. ICAP 220 MG/L CD	48301 CD EXTBL AAS DA MG/L	48302 CD EXTBL AAS SE MG/L
1	--	0.056	--	--	--	--	0.056	0.051	--	--	--
2	0.10	--	--	--	--	--	0.10	--	--	0.05	--
3	--	--	0.16	0.10	.069	.089	0.16	--	--	--	0.057
6	--	--	--	--	--	--	--	0.053	--	--	--
8	--	--	--	--	--	--	--	--	--	0.06	--
MEAN	.1800	.0560	.1600	.1000	.0690	.0880	.1053	.0510	.0530	.0550	.0570
STD.	--	--	--	--	--	--	.0522	--	--	.0071	--
REL.	--	--	--	--	--	--	49.6	--	--	12.9	--
DES.	.165	--	--	--	--	--	.069	--	--	--	--

LAB	48997 CD 10X ICP	48998 CD ICP D/A	48999 CADMIUM COMBINED MG/L CD	56011 BA TOT. 5X ICP MG/L BA	56301 BA EXTBL AAS DA MG/L	56997 BA 10X ICP	56998 BA ICP D/A	56999 BARIUM COMBINED MG/L BA	82011 LEAD DIG ICP 220 MG/L PB	82111 PB DISS ICAP 220 MG/L PB	82301 PB EXTBL AAS DA MG/L
1	--	--	0.051	--	--	--	--	--	--	--	--
2	.039	.050	0.05	--	--	--	--	--	--	--	0.07
3	--	--	0.057	0.028	0.05 L	.021	.023	0.05 L	--	--	--
6	--	--	0.053	--	--	--	--	0.028	0.072	--	--
8	--	--	0.06	--	--	--	--	--	--	0.10 R	--
MEAN	.0390	.0500	.0542	.0280	--	.0210	.0230	.0280	.0720	--	.0700
STD.	--	--	.0042	--	--	--	--	--	--	--	--
REL.	--	--	7.8	--	--	--	--	--	--	--	--
DES.	--	--	.050	--	--	--	--	.025	--	--	--

LAB	82302 PB EXTBL AAS SE MG/L	82997 PB 10X ICP	82998 PB ICP D/A	82999 LEAD COMBINED MG/L PB
1	0.068	--	--	0.068
2	0.066	.059	.045	0.07
3	--	--	--	0.066
6	--	--	--	0.072
8	--	--	--	0.10 R
MEAN	.0670	.0590	.0850	.0690
STD.	.0014	--	--	.0026
REL.	2.1	--	--	3.7
DES.	--	--	--	.067

SAMPLE = 4

MAJOR IONS 4 C.

DATA SUMMARY

PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 4

STUDY NO. 022 DATE: 01/06/84
 SAMPLE = 4 SPIKED SAMPLE.

DISTRIBUTED: 01/05/84

MAJOR IONS 4 C.

LAB	00110 IONIC BALANC %	00120 SUM OF CATIONS MEQ/L	00125 SUM OF ANIONS MEQ/L	02011 COLOUR A REL UNIT	02021 VISUAL C COMPARSN REL UNIT	02041 SPECIFIC COND 25C USIE/CM	02073 TURB JTU	02074 TURBIDTY APLMTRIC NTU	02190 COLOR COMBINED REL UNIT	02290 CONDUCT COMBINED U S/CM	02390 TURBIDTY COMBINED JTU/NTU
1	-.176	5.68	5.70	--	--	612.	--	--	--	612.	--
2	1.3	5.739	5.593	5. L	--	595.	0.2	--	5. L	595.	0.2
3	2.04	6.010	5.770	--	5.	609.6	--	--	--	609.6	--
4	3.4	6.0	5.6	5. L	--	619.	0.35	--	5. L	619.	0.35
5	3.80	6.21	5.76	--	--	591.	0.10	--	5. L	591.	0.10
6				5. L	--	581.	--	0.30	--	581.	0.30
7				--	--	612.5	0.1	--	5. L	612.5	0.1
8				--	--	605.	--	0.25	--	605.	0.25
MEAN	2.0728	5.9279	5.6847	--	5.0000	603.1375	.1875	.2750	5.0000	603.1375	.2167
STD.	1.6125	.2170	.0847	--	--	12.9099	.1181	.0354	--	12.9099	.1033
REL.	77.8	3.7	1.5	--	--	2.1	63.0	12.9	--	2.1	47.7
DES.	--	--	--	--	--	--	--	--	7.500	611.110	.228

LAB	05105 B AUTOAN CARM AC MG/L	05106 BORON F AUTO AN MG/L B	05190 BORON COMBINED MG/L B	06101 DOC IR /DIFF MG/L	06104 DOC UV CO2 EV MG/L	06107 DOC UV CO2 EV MG/L C	06151 DIC IR COMBUST MG/L	06153 DIC UVIR CO2 EV MG/L C	06154 DIC AA CO2 PHEN MG/L C	06290 DOC NETD COMBINED MG/L	06490 DIC NETD COMBINED MG/L
1	--	--	--	--	--	21.7	--	--	18.0	21.7	18.0
2	--	--	--	--	--	22.	--	--	--	22.	--
3	0.20	--	0.20	--	21.4	--	--	--	--	21.4	--
4	--	--	--	0.96 R	22.	--	15.0	39. R	--	22.	39. R
5	--	0.05 L	0.05 L	22.5	21.	--	16.5	--	--	21.	15.0
6	--	--	--	--	--	--	--	--	--	22.5	16.5
7	--	--	--	22.5000	21.4667	21.9500	15.7500	--	18.0000	21.7667	16.5000
8	.2000	--	.2000	--	.5033	.2121	1.0607	--	--	.5241	1.5000
MEAN	--	--	.057	--	2.3	1.0	6.7	--	--	2.4	9.1
STD.	--	--	--	--	--	--	--	--	--	20.043	21.250
REL.	--	--	--	--	--	--	--	--	--	--	--
DES.	--	--	--	--	--	--	--	--	--	--	--

LAB	07010 TKN AUTOAN MG/L	07015 TKN DIC AUTOAN MG/L N	07016 TKN BLK DIG AA 2 MG/L N	07021 TKN BLK DIG BERT MG/L N	07090 TKN COMBINED MG/L N	07109 NO3+NO2 F AA HYD MG/L N	07110 NO3+NO2 AA2 CO MG/L N	07111 NO3+NO2 DIS SPEC MG/L N	07112 NO3+NO2 UF AA CO MG/L	07190 NO3+NO2 COMBINED MG/L	07505 N NH3TOT AUTOAN MG/L
1	--	--	--	0.700	0.700 *	--	--	2.08	--	2.08	--
2	0.802	--	--	--	0.802	--	2.2	--	--	2.2	--
3	--	--	--	--	--	--	2.1	2.02	--	2.02	0.026
4	--	--	1.0	--	--	1.56 R	2.04	--	--	2.1	--
5	--	0.95	--	--	1.0	--	--	--	--	2.04	--
6	--	--	--	--	0.95	--	2.00	2.32	--	2.04	--
7	--	--	--	--	--	--	--	--	--	2.32	--
8	--	--	--	--	--	--	--	--	--	2.00	--
MEAN	.8020	.9500	1.0000	.7000	.8630	--	2.0850	2.0800	2.1700	2.1086	.0260
STD.	--	--	--	--	.1374	--	.0870	--	.2121	.1142	--
REL.	--	--	--	--	15.9	--	4.2	--	9.8	5.4	--
DES.	--	--	--	--	.933	--	--	--	--	2.024	--

DATA SUMMARY

PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 4

STUDY NO. 022 DATE: 01/06/84
 SAMPLE = 4 SPIKED SAMPLE.

DISTRIBUTED: 01/05/84

MAJOR IONS & C.

LAB	07506 N NH3TOT ION ELEC MG/L	07555 N NH3DIS PHENAUTO MG/L	07557 AMM DIS INPHENOL MG/L N	07562 AMMONIA AUT EDTA N MG/L	07590 NH3 METO COMBINED MG/L	07601 TOT. N LV AUTO MG/L	07602 TOT. N CALCD. MG/L N	07651 TOT N F UV AUTAN MG/L	07690 TOT N COMBINED MG/L	09103 FLUORIDE DIS COLR MG/L F	09105 F DIS UF SPEC EL MG/L
1	---	---	---	0.049	0.049	2.6	---	---	2.6	---	---
2	0.1	---	---	---	0.026	---	---	---	---	---	1.2
3	---	---	---	---	0.1	---	---	---	---	---	---
4	---	---	0.011	---	0.011	---	---	2.2	---	---	---
5	---	---	0.06	---	0.06	---	---	2.47	2.47	---	---
6	---	0.042	---	---	0.042	---	---	---	2.95	1.0	---
7	---	---	0.0355	0.0490	---	2.6000	2.9500	2.3350	2.6733	1.0000	1.04
8	---	---	0.0346	---	---	---	---	1.909	2.463	---	1.1200
MEAN	---	---	97.6	---	51.4	---	---	8.2	9.3	---	10.1
STD.	---	0.0420	---	---	0.047	---	---	---	2.468	---	---
REL. DES.	---	---	---	---	---	---	---	---	---	---	---
DEV. VAL.	---	---	---	---	---	---	---	---	---	---	---

LAB	09106 F DISS EL POT MG/L	09107 FLUOR F AUTO POT F MG/L	09190 F METHOD COMBINED MG/L	10101 CACO3 TO ALK TITR MG/L	10106 T ALK CA CO3 IR D MG/L	10109 T ALKTY POT TITN MG/L CC3	10190 TOT ALK COMBINED MG/L	10301 PH UNITS	10390 PH COMBINED UNITS	10602 T HARDCA CO3 CALC MG/L	10603 TOT HARD TITR MG/L
1	---	1.18	1.18	83.	---	---	83.	8.0	8.0	186.	---
2	---	---	1.2	75.2	75.1	---	75.2	7.7	7.7	---	---
3	---	---	---	77.	---	---	75.1	7.82	7.82	---	---
4	1.36	---	1.36	77.6	---	---	77.	7.8	7.8	---	---
5	---	---	1.0	76.9	---	80.	77.6	7.61	7.61	---	198.
6	---	---	---	---	---	---	80.	7.0	7.0	---	200.
7	---	---	1.04	---	---	82.0	76.9	7.8	7.8	---	201.5
8	---	---	---	77.9400	75.1000	81.0000	82.0	7.75	7.75	207.	---
MEAN	1.3600	1.1800	1.1560	77.9400	75.1000	81.0000	78.3500	7.7829	7.7829	196.5000	199.8333
STD.	---	---	1.1431	2.9661	---	1.4142	2.9914	1.204	1.204	14.8492	1.7559
REL. DES.	---	---	12.4	3.8	---	1.7	3.8	1.5	1.5	7.6	.9
DEV. VAL.	---	---	1.124	---	---	---	77.891	---	7.627	---	---

LAB	10690 HARONSS COMBINED MG/L	11102 NA DISS AAS MG/L NA	11103 NA DISS FL PHOTO MG/L	11105 NA DISS AAS D/A MG/L	11107 NA DISS FL PH UF MG/L	11111 AA DISVD ICAP 589 MG/L NA	11190 SODIUM COMBINED MG/L	12101 MG DISS CALC MG/L	12102 MG FIL AAS DA MG/L	12106 MG DISS AA DA UF MG/L	12107 MG DISS AAS AUTO MG/L
1	186.	---	36.	---	---	---	36.	---	---	---	---
2	---	---	39.0	---	---	---	39.0	---	---	---	---
3	---	---	---	---	36.3	---	36.3	---	---	29.9	31.
4	198.	37.	37.5	---	---	---	37.5	29.8	---	---	---
5	200.	---	---	38.5	---	---	37.	31.	---	---	---
6	201.5	---	---	---	---	---	38.5	---	30.6	---	---
7	207.	---	---	---	---	37.7	37.7	---	---	---	---
8	---	---	---	---	---	---	---	---	---	---	---
MEAN	198.5000	37.0000	37.5000	38.5000	36.3000	37.7000	37.4286	30.4000	30.6000	29.9000	31.0000
STD.	7.7460	---	1.5000	---	---	---	1.0950	0.8485	---	---	---
REL. DES.	3.9	---	4.0	---	---	---	2.9	2.8	---	---	---
DEV. VAL.	198.794	---	---	---	---	---	37.373	---	---	---	---

DATA SUMMARY

PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 4

SAMPLE = 4

STUDY NO. 022 DATE: 01/06/84
SPIKED SAMPLE.

DISTRIBUTED: 01/05/84

MAJOR IONS 4 C.

LAB	12111 MG DISVD ICAP 279 MG/L MG	12190 MAGNESIU COMBINED MG/L MG	12303 MG CF AAS ALTO MG/L MG	14102 SIO2 REAA UT ANSAD MG/L	14105 SIO2 REA AUT MCLY MG/L	14106 SIO2 REA AUT MOUF MG/L	14190 SILICA COMBINED MG/L	15406 P TOT UF AUTO ASC MG/L	15409 TP BLOCK ASC AA2 MG/L P	15413 TOT P AU TO SNCL MG/L P	15421 T P BLK DIG ASC MG/L P
1	--	30.	30.	1.0	--	--	1.0	--	--	--	0.0 (6L)
2	--	31.	--	1.2	--	--	1.2	--	--	0.007	--
3	--	29.9	--	1.2	--	1.07	1.07	--	--	0.002	--
4	--	--	--	--	--	--	--	0.004	--	--	--
5	--	29.8	--	--	1.1	--	1.1	--	--	--	--
6	--	31.	--	--	--	--	--	--	0.01 L	--	--
7	--	30.6	--	--	--	--	--	--	--	--	--
8	33.7	33.7	--	--	1.1	--	1.1	--	--	0.002	--
MEAN	33.7000	30.8571	30.0000	1.1000	1.1000	1.0700	1.0940	.0040	--	.0037	--
STD.	--	1.3514	--	.1414	0.0000	--	.0720	--	--	.0029	--
REL.	--	4.4	--	12.9	0.0	--	6.6	--	--	78.7	--
DES.	--	31.608	--	--	--	--	1.124	--	--	--	--

LAB	15490 TOTAL P COMBINED MG/L	16304 SO4 DISS AUTO BA MG/L	16306 SO4 DISS AA MTB MG/L	16307 SO4 DISS AAA MBUF MG/L	16309 SO4 DISS I C SO4 MG/L	16390 SO4 COMBINED MG/L	17203 CL DISS AUTO FE MG/L	17204 CL DISS AG TITN MG/L	17205 CL DISS ION EL MG/L	17206 CL DISS PRE AUTO MG/L	17290 CHLORIDE COMBINED MG/L
1	0.0061	--	107.	--	--	107.	57.	--	--	--	57.
2	0.007	117.0	--	--	117.0	117.0	--	--	58.	--	58.
3	0.002	--	--	113.	--	113.	--	--	--	55.8	55.8
4	0.004	--	--	--	--	--	--	--	--	--	--
5	--	--	115.	--	--	115.	--	--	--	57.0	57.0
6	0.01 L	112.	--	--	--	112.	--	58.	--	--	58.
7	--	--	110.3	--	--	110.3	58.0	--	--	--	58.0
8	0.002	--	115.	--	--	115.	--	--	--	56.	56.
MEAN	.0038	114.5000	111.8250	113.0000	117.0000	112.7571	57.5000	58.0000	58.0000	56.2667	57.1143
STD.	.0024	3.5355	3.9059	--	--	3.3635	.7071	--	--	.6429	.9442
REL.	63.0	3.1	3.5	--	--	3.0	1.2	--	--	1.1	1.7
DES.	.002	--	--	--	--	110.796	--	--	--	--	57.087

LAB	19102 K DISS AAS MG/L K	19103 K DISS PHOTO LI MG/L	19107 K DISS PHOTO UF MG/L	19111 K DISSVD ICAP 766 MG/L K	19190 K COMBINED MG/L	20100 CA DIS C .4CA HARD MG/L CA	20101 CA DISS TITRN ED MG/L	20103 CA DISS AAS MG/L	20108 CA DISS AAS UF MG/L	20110 CA DISS AAS AUTO MG/L	20111 CA DISVD ICAP 318 MG/L CA
1	--	15.8	--	--	15.8	--	--	--	--	25.	--
2	--	15.	--	--	15.	--	--	--	--	26.	--
3	--	--	16.1	--	16.1	--	--	--	25.8	--	--
4	--	--	--	--	16.5	--	--	--	--	--	--
5	17.0	16.5	--	--	17.0	29.	30.2	--	--	--	--
6	15.6	--	--	--	15.6	--	--	25.8	--	--	--
7	--	--	--	16.8	16.8	--	--	--	--	--	--
8	--	--	--	--	--	--	--	--	--	--	27.5
MEAN	16.3000	15.7667	16.1000	16.8000	16.1143	29.0000	30.2000	25.8000	25.8000	25.5000	27.5000
STD.	.9899	.7506	--	--	.7081	--	--	--	--	.7071	--
REL.	6.1	4.8	--	--	4.4	--	--	--	--	2.8	--
DES.	--	--	--	--	15.903	--	--	--	--	--	--

DATA SUMMARY

PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 4
SAMPLE = 4

STUDY NO. 022
SPIKED SAMPLE.

DATE: 01/06/84

DISTRIBUTED: 01/05/84

MAJOR IONS 4 C.

LAB	20190
	CALCIUM
	COMBINED
	MG/L CA
1	25.
2	26.
3	25.8
4	30.2 *
5	29.
6	25.8
7	27.5
8	
MEAN	27.0429
STD. DEV.	1.9303
REL. STD. DEV.	7.1
DES. VAL.	26.411

DATES RECEIVED	1 84/06/10	2 84/06/15	3 84/05/30	3 84/06/12	3 84/07/05
	4 84/06/22	5 84/09/10	6 84/06/04	6 84/06/06	7 84/06/05
	8 84/06/26				

DISTRIBUTION

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cc:

Laboratory Advisor
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Canada Centre for Inland Waters
Burlington, Ontario

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Western Region
Regina, Saskatchewan

Chairman, Committee on Water Quality
Prairie Provinces Water Board
Regina, Saskatchewan

Water Quality Specialist
Prairie Provinces Water Board
Regina, Saskatchewan



MEMORANDUM

NOTE DE SERVICE

H. ALKEMA/IWD-NWRI/4645/jb

TO
A

Distribution

FROM
DE

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

SECURITY - CLASSIFICATION - DE SECURITE
OUR FILE / NOTRE RÉFÉRENCE
YOUR FILE / VOTRE RÉFÉRENCE
DATE 7 November 1984

SUBJECT / OBJET: Final Summary Report on Prairie Province Water Board QC
PPQC Studies 23 and 24 (PP23-24)

I have enclosed the final report for PP 23-24.

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

Since there were no changes to the data in these studies, no computer printout is enclosed with this report.

Harry A.

H. Alkema

SUMMARY REPORT
PPOC STUDIES 23 AND 24
FOR JULY AND AUGUST, 1984

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

by
H. Alkema

October 1984

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

L7R 4A6

This report summarizes the PPWB interlaboratory quality control studies 23 and 24, for the months of July and August, 1984. These two studies dealt mainly with high levels for trace metals, and low levels for major ions, nutrients and physical parameters.

Sample Particulars

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

PP 23 - Sample 1 - 125 mL, D/A* of trace metals
(3% HNO₃).

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

PP 24 - Sample 3 - 1 L, S/E* of trace metals
(0.2% HNO₃).

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

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

Data Analysis

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

* For definitions see Appendix I.

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

Data for each parameter were accumulated under a combined method code ending in either 90 or 99. Under these codes, data for each parameter were combined for statistical comparison.

Performance Indicators

Deviant results, those greater than 10%, are circled in the data tables, and a % deviation from the mean is noted in the comments. Flagged results, those with an R or L, are not used in the statistical calculations. Performance indicators were fully explained in the previous report dated August 7, 1984.

Comments on Lab Performance

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

Individual lab deviations are listed below:

- Lab 1 - a low result for Cu by DA, rejectable * (R), -26%
- a very high result for Al by DA, (R)
- turbidity was biased low.
- Lab 2 - a low Total N result, -20%
- Lab 3 - a low result for Mo by DA, -60%; for Al by SE, -57%
- a high result for: Mn, +29%; Pb, +18%; Zn, +33%
- a high result for Cu by DA, (R), +78%
- a high result for DOC, +60%
- a very high result for TKN at the detection limit (D.L.)
- Lab 4 - a high result for Total P at the D.L.
- a high detection limit (HDL) for NH₃
(no metals were reported).
- Lab 5 - two low results for DOC, one (R), one -38%
- a low result for SO₄, (R), -20%
(no metals were reported).
- Lab 6 - a high bias for Mo, by DA, approx. 150%; and by SE, +150%
- a high result for Al by SE, +48%; Ni by SE, (R), +38%
- a low result for Pb by SE, -22%
- a low result for F (HDL?)
- rejectable result for: Na, -25%; K, +38%; and Mg, high near
the D.L.

* Rejectable by Grubb's procedure for statistical calculation.

- a high result for hardness, +14%
- an HDL for: SO₄, Cl, NH₃?, Total P?, TKN?
- Lab 7 - a low turbidity result
(no metals were reported).
- Lab 8 - a high result for Ni by DA, +21%; Cr by DA, +29%; Fe by SE,
(R), +25%; and Co by SE, +17%
- a low result for Pb by SE, -36%
- a very high DOC result, (R)
- a high Total N result, +34%
- an HDL for Al by SE, NH₃?, TKN?

PPWB labs average number of anomalies per sample is 7/5.

Appendix I

Definitions of Types of Metals Analysis

1. D/A - Direct Aspiration

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

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

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

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

DATA SUMMARY

PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 1

STUDY NO. 023 DATE: 01/07/84
 SAMPLE = 1 SPIKED SAMPLE.

DISTRIBUTED: 03/07/84

TRACE METALS D/A.

LAB	13302 AL EXTBL AAS DA MG/L	13306 AL UFAAS SE OX/EP MG/L AL	13999 ALUMINUM COMBINED MG/L AL	23009 V TOT. ICAP D/A MG/L V	23011 V TOT. ICAP 292 MG/L V	23101 V EXTBL AAS DA MG/L	23999 VANADIUM COMBINED MG/L V	24004 CR TOTAL GR FRNCE MG/L	24009 CR TOT. ICAP D/A MG/L CR	24011 CR TOT ICAP 267 MG/L CR	24302 CR AAS D/A MG/L
1	--	2.54	2.54	2.24	--	--	2.24	--	0.305	--	--
2	2.85	--	2.85	--	--	--	--	--	--	--	--
3	2.4	--	2.4	--	--	--	--	--	--	--	--
6	--	--	2.0	--	--	2.14	--	--	--	--	--
8	2.6	--	2.6	--	2.4	--	2.4	--	--	--	0.31
MEAN	2.6167	2.5400	2.6790	2.2400	2.4000	2.1400	2.2600	0.3000	0.3050	0.3000	0.3100
STD.	0.2255	--	0.2427	--	--	--	0.1311	--	--	--	--
REL.	8.6	--	9.1	--	--	--	5.8	--	--	--	--
DES.	--	--	2.650	--	--	--	2.415	--	--	--	--

LAB	24999 CHROMIUM COMBINED MG/L CR	25003 MN TOT. ICAP D/A MG/L MN	25011 MN DIG ICAP 257 MN MG/L	25111 MN DISVD ICAP 258 UG/L MN	25304 MN EXTBL AAS DA MG/L	25999 MANGAN. COMBINED MG/L MN	26011 FE TOTAL 5X ICAP MG/L FE	26111 FE DISVD ICAP 260 MG/L FE	26304 FE EXTBL AAS DA MG/L	26999 IRON COMBINED MG/L FE	27009 CO TOT. ICAP D/A MG/L CO
1	0.305	0.252	--	--	--	0.252	--	--	0.99	0.99	1.040
2	--	--	--	--	0.26	0.25	--	--	1.1	1.1	--
3	0.31	--	--	--	0.27	0.27	--	--	1.15	1.15	--
6	0.3	--	0.26	--	--	0.25	1.1	1.09	--	1.1	--
8	0.30	--	--	0.246	--	0.246	--	--	--	1.09	--
MEAN	0.3038	0.2520	0.2600	0.2460	0.2650	0.2576	1.1000	1.0900	1.0800	1.0860	1.0400
STD.	0.0048	--	--	--	0.0071	0.0091	--	--	0.0819	0.0586	--
REL.	1.6	--	--	--	2.7	3.5	--	--	7.6	5.4	--
DES.	0.281	--	--	--	--	0.261	--	--	--	1.094	--

LAB	27011 CO DIG ICAP 288 MG/L CO	27301 CO EXTBL AAS DA MG/L	27999 COBALT COMBINED MG/L CO	28009 NI TOT. ICAP D/A MG/L NI	28011 NI DIG ICAP 231 MG/L NI	28101 NI DISS AAS DA MG/L	28301 NI EXTBL AAS DA MG/L	28999 NICKEL COMBINED MG/L NI	29009 CU TOT. ICAP D/A MG/L CU	29011 CU DIG ICAP 324 MG/L CU	29111 CU DISVD ICAP 325 UG/L CU
1	--	--	1.040	1.19	--	--	--	1.19	0.217R	--	--
2	--	--	1.00	--	--	--	1.2	1.2	--	--	--
3	1.1	1.00	1.00	--	--	--	1.28	1.28	--	--	--
6	--	1.15	1.1	--	1.3	--	--	1.3	--	--	--
8	--	--	1.15	--	--	1.30	1.30	1.30	--	0.29	0.278
MEAN	1.1000	1.0750	1.0725	1.1900	1.3000	1.3000	1.2400	1.2540	--	0.2900	0.2780
STD.	--	0.1061	0.0660	--	--	--	0.0566	0.0546	--	--	--
REL.	--	9.9	6.2	--	--	--	4.6	4.4	--	--	--
DES.	--	--	1.077	--	--	--	--	1.229	--	--	--

DATA SUMMARY

PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 1

SAMPLE = 1

STUDY NO. SPIKED SAMPLE.

023 DATE: 01/07/84

DISTRIBUTED: 03/07/84

TRACE METALS D/A.

LAB	29306 CU EXTBL AAS DA MG/L	29999 COPPER COMBINED MG/L CU	30009 ZN TOT. ICAP D/A MG/L ZN	30011 ZN TOT ICAP 213 MG/L ZN	30111 ZN DISSVD ICAP 314 UG/L ZN	30304 ZN EXTBL AAS DA MG/L	30999 ZINC COMBINED MG/L ZN	38301 SR EXTBL AAS DA MG/L	38999 STRCNT. COMBINED MG/L SR	42009 MO TOT. ICAP D/A MG/L MO	42011 MO TOT. ICAP 202 MG/L MO
1	--	0.217R	0.311	--	--	--	0.311	--	--	5.180	--
2	0.31	0.31	--	--	--	--	0.32	--	--	--	--
3	0.30	0.30	--	0.31	--	0.32	0.32	0.48	0.48	--	--
6	--	0.29	--	--	--	--	0.31	--	--	--	9.7
8	--	0.278	--	--	0.290	--	0.290	--	--	--	--
MEAN	.3050	.2945	.3110	.3100	.2900	.3200	.3102	.4800	.4800	5.1800	9.7000
STD.	.0071	.0137	--	--	--	0.0000	.0123	--	--	--	--
REL.	2.3	4.7	--	--	--	0.1	4.0	--	--	--	--
DES.	--	.289	--	--	--	--	.313	--	.483	--	--
LAB	42301 MO EXTBL AAS DA MG/L	42999 MOLYBD. COMBINED MG/L MO	48009 CD TOT. ICAP DA MG/L CD	48011 CD TOT. ICAP 228 MG/L CD	48101 CD DISS AAS DA MG/L	48301 CD EXTBL AAS DA MG/L	48999 CADMIUM COMBINED MG/L CD	56011 BA TOT. 5X ICAP MG/L BA	56301 BA EXTBL AAS DA MG/L	56999 BARIUM COMBINED MG/L BA	82011 LEAD DIG ICF 220 MG/L PB
1	--	5.180	0.242	--	--	--	0.242	--	--	--	--
2	--	1.8	--	--	--	0.23	0.23	--	--	--	--
3	1.8	1.8	--	0.23	--	0.25	0.25	2.6	2.8	2.8	--
6	--	9.7	--	--	0.25	--	0.23	--	--	2.6	1.3
8	--	--	--	--	--	--	0.25	--	--	--	--
MEAN	1.6000	5.5600	.2420	.2300	0.2500	.2400	.2494	2.6000	2.8000	2.7000	1.3000
STD.	--	3.9637	--	--	--	0.0141	0.0100	--	--	.1414	--
REL.	--	71.3	--	--	--	5.9	4.2	--	--	5.2	--
DES.	--	4.483	--	--	--	--	.239	--	--	2.513	--
LAB	82101 PB DISS AAS DA MG/L	82301 PB EXTBL AAS DA MG/L	82999 LEAD COMBINED MG/L PB								
2	--	1.36	1.36								
3	--	1.34	1.34								
6	1.35	--	1.3								
8	--	--	1.35								
MEAN	1.3500	1.3500	1.3375								
STD.	--	.0141	.0263								
REL.	--	1.0	2.0								
DES.	--	--	1.328								

DATA SUMMARY

PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 2

STUDY NO. 023 DATE: 01/07/84 DISTRIBUTED: 03/07/84
 SAMPLE = 2 SPIKED SAMPLE. MAJOR IONS 4 C.

LAB	00110 IONIC BALANC %	00120 SUM OF CATIONS MEQ/L	00125 SUM OF ANIONS MEQ/L	02011 COLOUR A REL UNIT	02021 VISUAL C OMPAREN REL UNIT	02041 SPECIFIC COND 25C USIE/CM	02073 TURB JTU	02074 TURBIDTY NPLMTRIC NTU	02190 COL CR COMBINED REL UNIT	02230 CONDUCT COMBINED U S/CM	02390 TURBIDTY COMBINED JTU/NTU
1	-3.06	2.22	2.36	--	--	234.	0.1 L	--	5. L	234.	0.1
2	1.347	2.177	2.237	5. L	--	229.	--	--	5. L	229.	0.1
3	-3.45	2.254	2.415	--	--	--	--	--	--	--	--
4	0.72	2.262	2.229	5. L	5. L	228.	0.45	--	5. L	228.	0.45
5	7.3	2.2	1.9	--	--	230.	0.38	--	5. L	230.	0.38
6	--	2.35	2.35	--	--	227.0	--	0.45	--	227.0	0.45
7	--	--	--	--	--	231.	0.2 *	--	--	230.	0.2
8	--	--	--	--	--	233.	--	0.35	--	233.	0.35
MEAN	.5714	2.2438	2.2485	--	--	230.1429	.3433	.4000	--	230.1429	.3660
STD.	4.3375	.0611	.1857	--	--	2.5448	.1230	.0707	--	2.5448	.1026
REL.	759.1	2.7	8.3	--	--	1.1	37.6	17.7	--	1.1	28.0
DES.	--	--	--	--	--	--	--	--	3.500	227.250	.335

LAB	05105 B AUTOAN CARM AC MG/L	05106 BORON F AUTO AN MG/L B	05190 BORCN COMBINED MG/L B	06101 DCC IR /DIFF MG/L	06104 DOC UV CO2 EV MG/L	06107 DOC UV CO2 EV MG/L C	06151 DIC TP COMBUST MG/L	06152 DIC IR UV CO2EV MG/L C	06153 DIC UVIR CO2 EV MG/L C	06154 DIC AA CO2 PHEN MG/L C	06290 DOC METD COMBINED MG/L
1	--	--	--	--	--	3.3	--	--	--	20.5	3.3
2	--	--	--	--	--	3.5	--	--	--	--	3.5
3	0.06	--	0.06	--	3.3	--	--	20.4	--	--	3.3
4	--	--	--	2.3	3.5	--	--	--	20.0	--	3.5
5	--	0.05 L	0.05 L	12.0 R	3.0	--	21.	--	--	--	3.0
6	--	--	--	--	--	--	19.2	--	--	--	3.0
7	0.0600	--	0.0600	2.3000	3.2667	3.4000	20.1000	20.4000	20.0000	20.5000	3.1500
8	--	--	--	--	.2517	.1414	1.2728	--	--	--	.4550
MEAN	--	--	--	--	7.7	4.2	6.3	--	--	--	14.4
STD.	--	--	.025	--	--	--	--	--	--	--	3.400
REL.	--	--	--	--	--	--	--	--	--	--	--
DES.	--	--	--	--	--	--	--	--	--	--	--

LAB	06490 DIC METD COMBINED MG/L	07010 N TKN AUTOAN MG/L	07015 TKN DIG AUTOAN MG/L N	07016 TKN BLK DIG AA 2 MG/L N	07021 TKN BLK DIG BERT MG/L N	07030 TKN COMBINED MG/L N	07109 NO3+NO2 F AA HYD MG/L N	07110 NO3+NO2 AAZ CD MG/L N	07112 NO3+NO2 UF AA CD MG/L	07190 NO3+NO2 COMBINED MG/L	07505 N NH3TOT AUTOAN MG/L
1	20.5	--	--	--	6.0	6.0	--	0.44	--	0.44	--
2	--	--	--	--	--	--	--	0.42	--	0.42	--
3	20.4	1.1 G	--	--	--	1.1 G	--	--	0.418	0.418	1.28
4	20.0	--	--	--	--	--	--	0.43	--	0.43	--
5	21.	--	--	5.6	--	5.6	--	0.425	--	0.425	--
6	--	--	--	--	--	--	0.42	--	--	0.42	--
7	19.2	--	5.1	--	--	5.1	--	--	0.44	0.44	--
8	--	--	--	--	--	--	--	0.45	--	0.45	--
MEAN	20.2200	--	5.1000	5.6000	6.0000	5.9667	.4200	.4330	.4290	.4304	1.2800
STD.	.6723	--	--	--	--	.4509	--	.0120	.0156	.0118	--
REL.	3.3	--	--	--	--	8.1	--	2.8	3.6	2.7	--
DES.	20.500	--	--	--	--	5.740	--	--	--	.425	--

DATA SUMMARY

PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 2

STUDY NO. 023 DATE: 01/07/84 DISTRIBUTED: 03/07/84
 SAMPLE = 2 SPIKED SAMPLE. MAJOR IONS 4 C.

LAB	12111 MG DISV ICAP 279 MG/L MG	12190 MAGNESIU COMBINED MG/L MG	12303 MG UF AAS AUTO MG/L MG	14102 SIO2 REA UT ANSAD MG/L	14105 SIO2 REA AUT MCLY MG/L	14106 SIO2 REA AUT MOUF MG/L	14190 SILICA COMBINED MG/L	15406 P TOT UF AUTO ASC MG/L	15409 TP BLOCK ASC AA2 MG/L P	15413 TOT P AU TO SNCL MG/L P	15421 T P BLK DIG ASC MG/L P
1	--	7.	7.	1.1	--	--	1.1	--	--	--	0.016L
2	--	8.0	--	1.3	--	--	1.3	--	--	--	--
3	--	7.8	--	--	--	1.21	1.21	--	--	--	--
4	--	--	--	--	--	--	--	--	--	--	--
5	--	--	--	--	1.2	--	1.2	0.017	--	--	--
6	--	9.0	--	--	--	--	--	--	--	--	--
7	--	7.7	--	--	--	--	--	0.001L	0.01	--	--
8	8.48	8.48	--	--	1.2	--	1.2	--	--	0.004	--
MEAN	8.4800	7.9967	7.0000	1.2000	1.2000	1.2100	1.2020	.0170	.0100	.0040	--
STD.	--	.6871	--	.1414	0.0000	--	.0709	--	--	--	--
REL.	--	8.6	--	11.8	0.3	--	5.9	--	--	--	--
DES.	--	8.219	--	--	--	--	1.131	--	--	--	--

LAB	15490 TOTAL P COMBINED MG/L	16304 SO4 DISS AUTO BA MG/L	16306 SO4 DISS AA MTB MG/L	16307 SO4 DISS AA MBUF MG/L	16309 SO4 DISS I C MG/L SO4	16390 SO4 COMBINED MG/L	17203 CL DISS AUTO FE MG/L	17204 CL DISS AG TITN MG/L	17205 CL DISS ION EL MG/L	17206 CL DISS PRE AUTO MG/L	17208 CL DISS PRE AUTO MG/L
1	0.006L	--	18.	--	--	18.	7.	--	--	--	--
2	--	19.7	--	--	19.6	19.7	--	--	6.7	--	--
3	0.017 *	--	--	18.8	--	18.8	--	--	--	--	6.8
4	--	--	--	--	--	--	15.2 R (MDL)	--	--	--	--
5	0.01	20. L	15.2 R	--	--	20. L (MDL)	--	--	--	6.8	--
6	0.001L	--	19.7	--	--	19.7	6.6	6.0	--	--	--
7	0.004	--	18.5	--	--	18.5	--	--	--	6.6	--
8	--	19.7000	18.7333	18.8000	19.6000	18.3400	6.8000	6.0000	6.7000	6.7000	6.8000
MEAN	.0103	19.7000	18.7333	18.8000	19.6000	18.3400	6.8000	6.0000	6.7000	6.7000	6.8000
STD.	.0065	--	.8737	--	--	.7503	.2828	--	--	.1414	--
REL.	63.0	--	4.7	--	--	4.0	4.2	--	--	2.1	--
DES.	--	--	--	--	--	19.350	--	--	--	--	--

LAB	17290 CHLORIDE COMBINED MG/L	19102 K DISS AAS MG/L K	19103 K DISS PHOTO LI MG/L	19107 K DISS PHOTO UF MG/L	19111 K DISSV ICAP 766 MG/L K	19190 K COMBINED MG/L	20100 CA DISS C 4 CA HARD MG/L CA	20101 CA DISS TITRN ED MG/L	20103 CA DISS AAS MG/L	20108 CA DISS AAS UF MG/L	20110 CA DISS AAS AUTO MG/L
1	7.	--	2.3	--	--	2.3	--	--	--	--	26.
2	6.7	--	2.20	--	--	2.20	--	--	--	--	26.0
3	6.8	--	--	2.48	--	2.48	--	--	--	27.4	--
4	6.8	--	2.4	--	--	2.4	--	28.1	--	--	--
5	6.0	3.5	--	--	--	3.5 R *	29.0	--	--	--	--
6	6.6	2.4	--	--	2.5	2.4	--	--	26.3	--	--
7	6.6	--	--	--	--	2.5	--	--	--	--	--
8	6.6	--	--	--	2.5	2.5	--	--	--	--	--
MEAN	6.6429	2.9500	2.3000	2.4800	2.5000	2.5400	29.0000	28.1000	26.3000	27.4000	26.0000
STD.	.3155	.7778	.1300	--	--	.4357	--	--	--	--	0.0000
REL.	4.7	26.4	4.3	--	--	17.2	--	--	--	--	0.0
DES.	6.836	--	--	--	--	2.547	--	--	--	--	--

DATA SUMMARY

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 PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 2

SAMPLE = 2 STUDY NO. 023 DATE: 01/07/84
 SPIKED SAMPLE.

DISTRIBUTED: 03/07/84

MAJOR IONS 4 C.

LAB	20111 CA DISVD ICAP 318 MG/L CA	20190 CALCIUM COMBINED MG/L CA
1	--	26.
2	--	26.0
3	--	27.4
4	--	28.1
5	--	29.0
6	--	26.3
7	--	28.3
8	28.3	28.3
MEAN	28.3000	27.3000
STD. DEV.	--	1.2193
REL. STD. DEV.	--	4.5
DES. VAL.	--	27.227

DATA SUMMARY

 PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 3

STUDY NO. 024 DATE: 01/08/84
 SAMPLE = 3 SPIKED SAMPLE.

DISTRIBUTED: 03/07/84

TRACE METALS S/E.

LAB	13302 AL EXTBL AAS DA MG/L	13305 AL EXTBL AAS SE MG/L AL	13306 AL UFAAS SE OX/EP MG/L AL	13999 ALUMINUM COMBINED MG/L AL	23009 V TOT. ICAP C/A MG/L V	23011 V TOT. ICAP 292 MG/L V	23302 V EXTBL SE PH1.6 MG/L	23999 VANADIUM COMBINED MG/L V	24004 CR TOTAL GR FRNCE MG/L	24009 CR TOT. ICAP D/A MG/L CR	24011 CR TOT ICAP 267 MG/L CR
1	--	--	0.096	0.096	0.045	--	--	0.045	--	0.063	--
2	--	0.073	--	0.073	--	--	--	--	--	--	--
3	--	0.035	--	0.035	--	--	--	--	0.05	--	--
6	0.2 L	--	--	0.12 * 0.2 L MDL	--	0.06	0.048	0.048	--	--	--
8	--	--	--	--	--	--	--	0.06	--	--	0.067
MEAN	--	.0540	.0960	.0810	.0450	.1600	.0487	.0512	0.085	.0630	.0670
STD.	--	.0269	--	.0362	--	--	--	.0078	--	--	--
REL.	--	49.8	--	44.7	--	--	--	15.3	.0675	--	--
DES.	--	--	--	.082	--	--	--	.049	36.7	--	--
LAB	24303 CP EXTBL AAS SE MG/L	24999 CHROMIUM COMBINED MG/L CR	25003 MN TOT. ICAP D/A MG/L MN	25011 MN DIG ICAP 257 MG/L	25111 MN DISVD ICAP 258 UG/L MN	25304 PN EXTBL AAS DA MG/L	25999 MANGAN. COMBINED MG/L MN	26011 FE TOTAL 5X ICAP MG/L FE	26111 FE DISVD ICAP 260 MG/L FE	26304 FE EXTBL AAS DA MG/L	26305 FE EXTBL AAS SE MG/L
1	--	0.063	0.049	--	--	--	0.049	--	--	0.08	--
2	--	0.05	--	--	--	0.05	0.05	--	--	0.08	--
3	0.062	0.062	--	0.054	--	0.05	0.05	--	--	--	0.077
6	--	0.067	--	--	0.057	--	0.054	0.083	0.100R	--	--
8	--	0.085	--	--	--	--	0.057	--	--	--	--
MEAN	.0620	.0654	.0490	.0540	.0570	.0500	.0520	.0830	--	.0800	.0770
STD.	--	.0127	--	--	--	0.0000	.0034	--	--	0.0000	--
REL.	--	19.4	--	--	--	0.0	6.5	--	--	0.0	--
DES.	--	.067	--	--	--	--	.048	--	--	--	--
LAB	26999 IPON COMBINED MG/L FE	27009 CO TOT. ICAP D/A MG/L CO	27011 CO DIG ICAP 288 MG/L CO	27301 CO EXTBL AAS DA MG/L	27302 CO EXTBL AAS SE MG/L	27999 COBALT COMBINED MG/L CO	28004	28009 NI TOT. ICAP D/A MG/L NI	28011 NI DIG ICAP 231 MG/L NI	28101 NI DISS AAS DA MG/L	28302 NI EXTBL AAS SE MG/L
1	0.08	0.063	--	--	--	0.063	0.07	0.059	--	--	--
2	0.08	--	--	--	--	--	--	--	--	--	--
3	0.077	--	--	--	0.054	0.064	--	--	--	--	0.064
6	0.083	--	0.069	0.082	--	0.081	--	--	0.090R	--	--
8	0.100P	--	--	--	--	0.092 *	--	--	--	0.068	--
MEAN	.0800	.0630	.0690	.0820	.0640	.0895	.0700	.0590	--	.0680	.0640
STD.	.0024	--	--	--	--	.0087	--	--	--	--	--
REL.	3.1	--	--	--	--	12.6	--	--	--	--	--
DES.	.075	--	--	--	--	.055	--	--	--	--	--

DATA SUMMARY

 PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 3

STUDY NO. 024 DATE: 01/08/84
 SAMPLE # 3 SPIKED SAMPLE.

DISTRIBUTED: 03/07/84

TRACE METALS S/E.

LAB	28999 NICKEL COMBINED MG/L NI	29009 CU TOT. ICAP D/A MG/L CU	29011 CU DTG ICAP 324 MG/L CU	29111 CU DISVD ICAP 325 UG/L CU	29305 CU EXTBL AAS SE MG/L	29999 COPPER COMBINED MG/L CU	30009 ZN TOT. ICAP D/A MG/L ZN	30011 ZN TOT ICAP 213 MG/L ZN	30111 ZN DISVD ICAP 314 UG/L ZN	30304 ZN EXTOL AAS DA MG/L	30305 ZN EXTBL AAS SE MG/L
1	0.059	0.046	--	--	--	0.046	0.051	--	--	--	--
2	0.07	--	--	--	--	0.04	--	--	--	0.05	--
3	0.064	--	--	--	0.051	0.051	--	--	--	--	--
6	0.0908	--	0.054	--	0.052	0.054	--	0.055	--	--	0.051
8	0.068	--	--	0.052	--	0.052	--	--	0.054	--	--
MEAN	0.0653	0.0460	0.0540	0.0520	0.0455	0.0486	0.0510	0.0550	0.0540	0.0500	0.0510
STD.	0.0049	--	--	--	0.0078	0.005E	--	--	--	--	--
REL.	7.4	--	--	--	17.1	11.5	--	--	--	--	--
DES.	0.64	--	--	--	--	0.052	--	--	--	--	--

LAB	30999 ZINC COMBINED MG/L ZN	38301 SR EXTBL AAS DA MG/L	38999 STRONT. COMBINED MG/L SR	42009 MO TOT. ICAP D/A MG/L MO	42011 MO TOT. ICAP 202 MG/L MO	42999 MOLYBD. COMBINED MG/L MC	48009 CD TOT. ICAP DA MG/L CD	48011 CD TOT. ICAP 228 MG/L CD	48101 CD DISS AAS DA MG/L	48302 CD EXTBL AAS SE MG/L	48999 CADMIUM COMBINED MG/L CD
1	0.051	--	--	0.080	--	0.080	0.052	--	--	--	0.052
2	0.05	--	--	--	--	--	--	--	--	0.050	0.050
3	0.051	0.16	0.16	--	--	--	--	--	--	0.051	0.051
6	0.055	--	--	--	0.18	0.18	--	--	--	0.051	0.057
8	0.054	--	--	--	--	0.18	0.057	0.06	--	--	0.06
MEAN	0.0522	0.1600	0.1600	0.0800	0.1800	0.1300	0.0520	0.0570	0.0600	0.0505	0.0540
STD.	0.0022	--	--	--	--	0.0707	--	--	--	0.0007	0.0043
REL.	4.2	--	--	--	--	54.4	--	--	--	1.4	8.0
DES.	0.50	--	0.165	--	--	0.69	--	--	--	--	0.650

LAB	56011 BA TOT. 5X ICAP MG/L BA	56301 BA EXTBL AAS DA MG/L	56999 BARIUM COMBINED MG/L BA	82011 LEAD DTG ICP 220 MG/L PB	82301 PB EXTBL AAS SE MG/L	82322 PB EXTBL AAS SE MG/L	82999 LEAD COMBINED MG/L PB
1	--	--	--	--	--	0.071	0.071
2	--	--	--	--	--	0.06	0.06
3	--	0.1	0.1	--	--	0.066	0.066
6	0.028	--	0.029	0.043	0.035	0.066	0.043
8	--	--	--	--	--	0.066	0.035
MEAN	0.0280	--	0.0290	0.0430	0.0350	0.0657	0.0550
STD.	--	--	--	--	--	0.0055	0.0154
REL.	--	--	--	--	--	8.4	28.0
DES.	--	--	0.025	--	--	--	0.67

DATA SUMMARY

 PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 4

STUDY NO. 024 DATE: 01/08/84
 SAMPLE = 4 SPIKED SAMPLE.

DISTRIBUTED: 03/07/84

MAJOR IONS 4 C.

LAB	00110 IONIC BALANC %	00120 SUM OF CATIONS MEQ/L	00125 SUM OF ANIONS MEQ/L	02011 COLOUR A REL UNIT	02021 VISUAL C OMPAREN REL UNIT	02041 SPECIFIC COND 25C USIE/CM	02073 TURB JTU	02074 TURBIDTY NPLMTRIC NTU	02190 COLCR COMBINED REL UNIT	02290 CONDUCT COMBINED U S/CM	02390 TURBIDTY COMBINED JTU/NTU
1	--	--	--	5. L	--	95.	0.1 L	--	5. L	95.	0.1 L
2	-2.80	0.960	1.015	--	--	94.	0.3	--	5. L	94.	0.3
3	3.71	0.909	0.844	5.	5. L	92.5	0.17	--	5. L	92.5	0.17
4	3.4	1.0	0.9	--	--	90.8	0.31	--	5. L	90.8	0.31
5	--	--	--	--	--	92.	--	0.3	--	92.	0.3
6	3.53	1.01	0.94	--	--	95.7	0.2	--	--	95.0	0.2
8	3.53	1.01	0.94	--	--	96.1	--	--	--	96.1	--
MEAN	1.9600	.9698	.9248	5.0000	--	93.6286	.2450	.3000	5.0000	93.6286	.2560
STD.	3.1759	.0459	.0719	--	--	1.9120	.0705	--	--	1.9120	.0658
REL.	162.0	4.7	7.8	--	--	2.0	28.8	--	--	2.0	25.7
DES.	--	--	--	--	--	--	--	--	3.873	93.845	.223
LAB	05105 B AUTOAN CARM AC MG/L	05106 BORON F AUTO AN MG/L B	05190 BORON COMBINED MG/L B	06101 DOC IR /DIFF MG/L	06104 DOC UV CO2 EV MG/L	06107 DOC UV CO2 EV MG/L C	06151 DIC IR COMBUST MG/L	06152 DIC IR UV CO2EV MG/L C	06153 DIC UVIR CO2 EV MG/L C	06154 DIC AA CO2 PHEN. MG/L C	06290 DOC METD COMBINED MG/L
1	--	--	--	--	--	1.1	--	--	--	10.0	1.1
2	--	--	--	--	--	1.3	--	--	--	--	1.3
3	0.04	--	0.04	0.79	2.1	--	--	9.5	--	--	2.1
4	--	--	--	0.79	1.0	--	--	--	8.8	--	1.0
5	--	--	--	1.5	1.2	--	9.9	--	--	--	1.2
6	--	0.05 L	0.05 L	1.5	1.2	--	9.5	--	--	--	1.2
8	0.0400	--	0.0400	1.1450	1.4333	1.2000	9.7000	9.5000	8.8000	10.0000	1.2843
MEAN	0.0400	--	0.0400	1.1450	1.4333	1.2000	9.7000	9.5000	8.8000	10.0000	1.2843
STD.	--	--	--	.5020	.5859	.1414	.2828	--	--	--	.4239
REL.	--	--	--	43.8	40.9	11.4	2.9	--	--	--	33.0
DES.	--	--	.070	--	--	--	--	--	--	--	2.156
LAB	06490 DIC METD COMBINED MG/L	07010 N TKN AUTOAN MG/L	07015 TKN DIG AUTOAN MG/L N	07016 TKN BLK DIG AA 2 MG/L N	07021 TKN BLK DIC BERT MG/L N	07090 TKN COMBINED MG/L N	07109 NO3+NO2 F AA HYD MG/L N	07110 NO3+NO2 AA2 CD MG/L N	07111 NO3+NO2 DIS SPEC MG/L N	07112 NO3+NO2 UF AA CD MG/L	07150 NO3+NO2 COMBINED MG/L
1	10.0	--	--	--	0.100	0.100	--	--	0.290	--	0.290
2	9.5	1.1 G	--	--	--	1.1 G	--	--	--	--	0.28
3	8.8	--	--	--	--	--	--	0.28	--	--	0.28
4	9.9	--	--	0.3	--	0.3	0.3	0.31	0.294	0.294	0.31
5	--	--	--	--	--	--	0.3	0.294	--	--	0.294
6	9.5	--	0.20	--	--	0.20	HDL?	--	--	--	0.3
8	9.5	--	0.20	--	--	0.20	HDL?	0.31	0.30	--	0.31
MEAN	9.5400	--	.2000	.3000	.1000	.2000	.3000	.2985	.2900	.2970	.2973
STD.	.4722	--	--	--	--	.1000	--	.0145	--	.3042	.0101
REL.	4.9	--	--	--	--	50.0	--	4.8	--	1.4	3.4
DES.	9.786	--	--	--	--	.980	--	--	--	--	.309

DATA SUMMARY

PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 4

STUDY NO. 024 DATE: 01/08/84
 SAMPLE = 4 SPIKED SAMPLE.

DISTRIBUTED: 03/07/84

MAJOR IONS 4 C.

LAB	07505 N NH3TOT AUTOAN MG/L	07506 N NH3TOT ION ELEC MG/L	07555 N NH3DIS PHE AUTO MG/L	07557 AMM DIS INPHENOL MG/L N	07562 AMMONIA AUT ECTA N MG/L	07590 NH3 METD COMBINED MG/L	07601 TOT. N UV AUTO MG/L	07602 TOT. N CALCD. MG/L N	07651 TOT N F UV. AUTAN MG/L	07690 TOT N COMBINED MG/L	09103 FLUORIDE DIS COLR MG/L F
1	--	--	--	--	0.004	0.004	--	--	--	--	--
2	0.005L	--	--	--	--	--	0.30	--	--	0.30	--
3	--	0.1 L	--	--	--	0.005L	--	--	--	--	--
4	--	--	--	--	--	0.1 L (HDL)	--	--	--	--	--
5	--	--	0.02	0.002L	--	0.002L	--	--	0.34	0.340	--
6	--	--	--	0.04	--	0.04	--	--	0.340	0.340	--
7	--	--	0.0200	--	0.0400	0.02 } HDL?	--	0.51	--	0.51	0.1 L
8	--	--	--	--	0.040	0.02	0.213	0.5100	--	0.3833	--
MEAN	--	--	--	--	--	0.02	0.180	0.5100	0.3400	0.1115	--
STD.	--	--	--	--	--	0.04	0.180	0.5100	0.0000	0.1115	--
REL.	--	--	--	--	--	0.04	0.180	0.5100	0.0000	0.1115	--
DES.	--	--	--	--	--	0.04	0.180	0.5100	0.0000	0.1115	--
DEV.	--	--	--	--	--	0.04	0.180	0.5100	0.0000	0.1115	--
VAL.	--	--	--	--	--	0.04	0.180	0.5100	0.0000	0.1115	--

LAB	09105 F DIS UF SPEC EL MG/L	09106 F DISS EL POT MG/L	09107 FLUCR F AUTO POT F MG/L	09190 F METHOD COMBINED MG/L	10101 CACO3 TO ALK TITR MG/L	10106 T ALK CA CO3 TR D MG/L	10109 T ALKLT POT TITN MG/L CC3	10190 TOT ALK COMBINED MG/L	10301 PH UNITS	10390 PH COMBINED UNITS	10602 T HARCOA CO3 CALC MG/L
1	--	--	0.05 L	0.05 L	44.	--	--	44.	7.7	7.7	41.
2	--	--	--	--	40.0	--	--	40.0	7.8	7.8	--
3	--	--	--	--	40.	45.1	--	45.1	--	--	--
4	--	0.05 L	--	0.05 L	37.0	--	--	40.	7.72	7.72	--
5	0.1 L	--	--	0.1 L	39.3	--	--	37.0	7.61	7.61	--
6	--	--	--	0.1 L	40.0600	--	43.	43.	7.4	7.4	--
7	--	--	--	--	2.5235	45.1000	40.	39.3	7.40	7.40	46.5
8	--	--	--	0.060	6.3	--	40.	40.	7.40	7.40	43.7500
MEAN	--	--	--	--	6.3	45.1000	41.5000	41.0500	7.5186	7.5186	3.8891
STD.	--	--	--	--	0.060	--	2.1213	2.7171	0.2763	0.2763	8.9
REL.	--	--	--	--	0.060	--	5.1	6.6	3.7	3.7	8.9
DES.	--	--	--	--	0.060	--	5.1	6.6	3.7	3.7	8.9
DEV.	--	--	--	--	0.060	--	5.1	6.6	3.7	3.7	8.9
VAL.	--	--	--	--	0.060	--	5.1	6.6	3.7	3.7	8.9

LAB	10603 TOT HARD TITR MG/L	10690 HAPONSS COMBINED MG/L	11102 NA DISS AAS MG/L NA	11103 NA DISS FL PHOTO MG/L	11105 NA DISS AAS D/A MG/L	11107 NA DISS FL PH UF MG/L	11190 SODIUM COMBINED MG/L	12101 MG DISS CALC MG/L	12102 MG FIL AAS DA MG/L	12106 MG DISS AA CA UF MG/L	12107 MG DISS AAS AUTO MG/L
1	--	41.	--	2.	--	--	2.	--	--	--	--
2	--	--	--	1.1	--	--	1.1	--	--	--	--
3	42.4	42.4	--	1.2	--	1.28	1.2	--	--	2.7	3.0
4	52.	52.	1. L	--	--	--	1.28	--	--	--	--
5	45.3	45.3	1.55	--	0.9	--	1.2	2.71	--	--	--
6	--	46.5	--	--	--	--	0.9 L	5. R	--	--	--
7	46.5667	45.4400	1.5500	1.4333	0.9000	1.2800	1.55	2.7100	2.7	2.7000	3.0000
8	4.9238	4.2759	--	1.4933	--	--	1.383	2.7100	2.7000	2.7000	3.0000
MEAN	10.6	9.4	1.5500	34.4	0.9000	1.2800	1.383	2.7100	2.7000	2.7000	3.0000
STD.	--	43.800	--	--	--	--	0.3894	--	--	--	--
REL.	--	43.800	--	--	--	--	29.0	--	--	--	--
DES.	--	43.800	--	--	--	--	1.267	--	--	--	--
DEV.	--	43.800	--	--	--	--	1.267	--	--	--	--
VAL.	--	43.800	--	--	--	--	1.267	--	--	--	--

DATA SUMMARY

PRAIRIE PROVINCES AND INTER REGIONAL QUALITY CONTROL PROGRAM

TABLE 5

STUDY NO. 024 DATE: 01/08/84 DISTRIBUTED: 03/07/84
 SAMPLE = 5 SPIKED SAMPLE. TRACE METALS D/A.

LAB	82101 PB DISS AAS DA MG/L	82301 PB EXTBL AAS DA MG/L	82302 PB EXTBL AAS SE MG/L	82999 LEAD COMBINED MG/L PB	
1	---	---	0.280	0.280	
2	---	0.31	---	0.31	
3	---	0.36	---	0.36	
6	---	---	---	0.28	
8	0.30	---	---	0.30	
MEAN	.3000	.3350	.2800	.3069	
STD. DEV.	---	.0354	---	.0329	
REL. STD. DEV.	---	10.6	---	10.7	
DES. VAL.	---	---	---	---	
DATES RECEIVED	1 84/08/23 5 84/09/10	2 84/09/07 6 84/08/14	3 84/09/28 7 84/09/19	3 84/10/02 8 84/09/04	4 84/08/28

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