

August 21, 2002

File: PIN-M 3.6

Liz Castaneda
Administrative Assistant
Northwest Territories Water Board
Box 1500, Goga Cho Building
Yellowknife, NT X1A 2R3

Dear Ms. Castaneda:

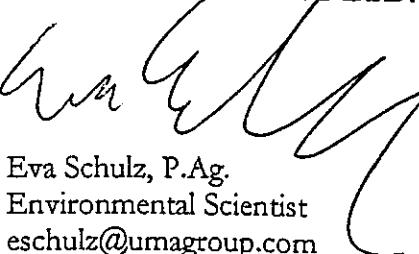
RE: Quality Assurance/Quality Control Plan for Licence N7L1-1784

The attached Quality Assurance/Quality Control (QA/QC) Plan is being submitted on behalf of Defence Construction Canada and the Department of National Defence to meet the requirements of the above noted water use license for the work at PIN-M, Cape Parry.

We trust the attached information meets your requirements. Please feel free to contact the undersigned if you have any questions or comments.

Sincerely,

UMA ENGINEERING LTD.


Eva Schulz, P.Ag.

Environmental Scientist
eschulz@umagroup.com

cc: Scott Hamilton, DCC
Daniela Loock, ESG
Barry Fedorak, UMA

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File-	1784

**Quality Assurance (QA)
and Quality Control (QC) Plan
for Collection of Water Samples
at the PIN-M (Cape Parry)
DEW Line Site**

Prepared for:
Defence Construction Canada

Prepared by:
Environmental Sciences Group
and
UMA Engineering Ltd.

August 2002

File: PIN-M 3.6



Quality Assurance (QA) and Quality Control (QC) Plan
for Collection of Water Samples
at the PIN-M (Cape Parry) DEW Line Site

Table of Contents

	Page No.
1. INTRODUCTION	1.1
2. SAMPLE COLLECTION	2.1
2.1 Location	2.1
2.2 Sampling Equipment.....	2.1
2.3 Sampling Methods.....	2.1
3. SAMPLE HANDLING	3.1
3.1 Preservation.....	3.1
3.2 Sample Identification	3.1
3.3 Transportation	3.1
4. LAB ANALYSIS.....	4.1
4.1 Lab Accreditation	4.1
4.2 Detection Limits.....	4.1
4.3 Methodology	4.1
4.4 Reporting Requirements.....	4.1

List of Appendices

Appendix 1	Laboratory Certificates and Methodologies - EnviroTest Laboratories
Appendix 2	Laboratory Certificates and Methodologies - Taiga Labs

**Quality Assurance (QA) and Quality Control (QC) Plan
for Collection of Water Samples
at the PIN-M (Cape Parry) DEW Line Site**

1. INTRODUCTION

During the clean-up of the PIN-M DEW Line site at Cape Parry, NWT, the collection of two types of water samples was undertaken as required by the Water Use License. Specifically, any washwater collected from the dewatering of contaminated soil areas and sewage effluent was sampled at PIN-M. The collection of wastewater samples is similar to the collection of other types of water samples.

As stated in the Water Use License, the required analytes are as follows:

1. For washwater collected from the dewatering of contaminated areas:
 - Oil and grease;
 - Inorganic elements (total arsenic, total and dissolved cadmium, dissolved cobalt, dissolved copper, dissolved lead, total mercury, dissolved nickel, and total zinc);
 - Phenols;
 - Benzene, ethylbenzene and toluene; and
 - pH.
2. For sewage effluent:
 - Biological oxygen demand (BOD_5);
 - Total suspended solids (TSS);
 - Faecal coliforms;
 - Oil and grease;
 - Ammonia; and
 - pH.

Quality Assurance (QA) and Quality Control (QC) Plan
for Collection of Water Samples
at the PIN-M (Cape Parry) DEW Line Site

2. SAMPLE COLLECTION

2.1 Location

Each sample location was assigned a distinct sample number. These sample numbers were recorded in a datasheet along with a description of the associated sample location.

2.2 Sampling Equipment

Table 2.1 summarizes the equipment and storage requirements for each water sample type collected. New bottles were used in all cases for the collection of the water samples.

Table 2.1: Summary of Equipment and Storage Requirements

Contaminant	Container	Amount	Rinse	Storage	Special Treatment
Inorganic elements, TSS, ammonia	1L Acidified Plastic Bottle	Full	No	Cool	Do not filter Acidify with HNO ₃ to pH<2*
TPH, BTE, BOD ₅ only	250 mL amber glass bottle	Full – no headspace	No	Cool	Do not filter Request TPH and BTEX analyses at same time
Hg	250 mL amber glass bottle	Full	No	Cool	
Phenols	100 mL amber glass bottle (Qorpak vial)	Full	No	Cool	Acidify with H ₂ PO ₄ to pH<4*
Bacteria and coliforms	Bacti bottles (Accutest)	Full	No	Cool	Analyze within 48 hours of collection

* Generally, it is not possible to acidify the samples in the field due to Transportation of Dangerous Goods Act (TDGA) regulations. Therefore, the samples are acidified immediately upon receipt in the laboratory, prior to extraction.

2.3 Sampling Methods

Sample bottles were filled completely at the time of sampling by submersing the container under the water surface. Bottles were not filled progressively over the course of days. If there was insufficient water, no water sample was collected. The bottles were filled with no headspace remaining to guard against volatilization of dissolved phases. Generally, the samples were collected immediately prior to departure from the site and submitted for analysis within 48 hours.

Quality Assurance (QA) and Quality Control (QC) Plan
for Collection of Water Samples
at the PIN-M (Cape Parry) DEW Line Site

3. SAMPLE HANDLING

3.1 Preservation

The water samples were kept cool (approximately 4°C) prior to and during shipping. In general, water samples were collected when transportation from the site will be available almost immediately after, as many types of the required analyses should be performed as quickly as possible after collection. Bacterial analyses, in particular, must be conducted within 48 hours of sample collection.

Ideally, samples collected for inorganic analyses should be acidified in the field, at the time of collection. However, regulations concerning the transportation of dangerous goods make supplying concentrated nitric acid in the field difficult. Where samples could be acidified in the field, it was requested that the samples are acidified immediately upon receipt in the lab, *prior* to decanting or sample extraction. When acidifying in the lab, the container was rinsed with 35% HNO₃, and included with the sample.

Samples were not filtered at any time. If samples contained excessive sediment, the samples were simply decanted in the laboratory (*following* acidification, for metal analyses) prior to analysis.

3.2 Sample Identification

Each water sample was given a blind number that was the only number provided on the labels of samples submitted for analysis. This sample number corresponded to the number assigned to that specific sample location which was recorded in the datasheet.

3.3 Transportation

Samples were shipped by guaranteed air freight in coolers from the site to their respective accredited laboratory for analysis. Chain-of-custody forms were filled out and checked for each sample before shipment from PIN-M, and the contents of shipments were verified upon receipt in the laboratory.

Quality Assurance (QA) and Quality Control (QC) Plan
for Collection of Water Samples
at the PIN-M (Cape Parry) DEW Line Site

4. LAB ANALYSIS

4.1 Lab Accreditation

All laboratory analysis is carried out at accredited laboratories. The following laboratories are the ones primarily responsible for the analysis of water samples collected at PIN-M (Cape Parry):

- 1) EnviroTest Laboratories, Edmonton, AB
- 2) Taiga Labs, Yellowknife, NWT

Certificates of accreditation are available in the laboratory information packages in Appendices 1 and 2.

4.2 Detection Limits

Detection limits are provided in the laboratory information packages in Appendices 1 and 2.

4.3 Methodology

Laboratory methodologies are included in the information packages in Appendices 1 and 2.

4.4 Reporting Requirements

Blanks and filed duplicate samples are collected. Analytical (or laboratory) replicate samples are included with each analysis performed. The analytical results of these samples are included with each of the data reports provided by the laboratories.

APPENDIX 1

Laboratory Certificates and Methodologies

EnviroTest Laboratories

nanton (Main)
3 - 67 Avenue
nanton, AB T6E 0P5
ne: (780) 413-5227
(780) 437-2311

ETL Enviro•Test

A DIVISION OF ETL CHEMSPEC ANALYTICAL LIMITED

GEN 1.18

nanton (Downtown)
ustrial Hygiene
Flr., 10158 - 103 Street
nanton, AB T5J 0X6
ne: (780) 413-5265
(780) 424-4602

gary
2, 1313 - 44 Ave. N.E.
ary, AB T2E 6L5
ne: (403) 291-9897
(403) 291-0298

ide Prairie
5 - 111 Street
ide Prairie, AB T8V 5W1
ne: (780) 539-5196
(780) 513-2191

skatoon
veterinary Road
skatoon, SK S7N 5E3
e: (306) 668-8370
(306) 668-8383
0-667-7645

ipeg
Logan Avenue
ipeg, MB R3E 3L5
e: (204) 945-3705
(204) 945-0763

nder Bay
Barton Street
nder Bay, ON P7B 5N3
ne: (807) 623-6463
(807) 623-7598

ura
os Laboratories Inc.
Colonnade Road
#13
ean, ON K2E 7L5
e: (613) 731-1005
(613) 736-1107

erloo
thurst Drive
#1
erloo, ON N2V 2C5
e: (519) 886-6910
(519) 886-9047

oming
West First Street
per, Wyoming 82601
e: (307) 235-5741
(307) 266-1676
0-666-0306

ada Wide Phone:
-668-9878

tern Canada Fax:
-286-7319

RECEIVED UMA CALGARY	
NAME: Schulz	
AUG 5 1992	

QA/ QC AND ACCREDITATION PACKAGES

DEW Line Clean-Up - Defence Construction Canada
Pricing Submitted to UMA Engineering
Attn: Graham Emmerson

ETL Project - 10482 DEW Line DCC

PARAMETER	MATRIX	METHOD/OLOGY	ELEMENT	DILUTION	UNITS
BOD (5 day)	Water	APHA 5210	5 DAYS INCUB. O2 ELECTRORE		2 mg/l CL
Total Suspended Solids	Water	APHA 2540 D	GRAVIMETRIC		3 mg/l CL
Ammonia	Water	APHA 4500	NH3F-COLORIMETRY		0.05 mg/l CL
Oil & Grease	Water	APHA 5520 B	HEXANE MTBE EXTR. GRAVIMETRIC		1 mg/l ED
Phenols (4-AAP)	Water	EPA 9066	COLORIMETRIC		0.001 mg/L CL
pH	Water	APHA 4500	ELECTRODE		0.1 pH CL
BTEx	Water	EPA 5030/8260B	P&T GC/MS	BENZENE ETHYLBENZENE TOLUENE XYLEMES	0.0005 mg/l CL 0.0005 mg/l CL 0.0005 mg/l CL 0.0005 mg/l CL
Total As, Cr, Hg, Zn (By ICP/MS)	Water	APHA 3125	ICP-MS	As Cr Hg Zn	0.001 mg/l ED 0.0008 mg/l ED 0.0002 mg/l ED 0.004 mg/l ED
Dissolved Cd, Co, Cu, Ni, Pb (ICP/MS)	Water	APHA 3125	ICP-MS	Cd Co Cu Ni Pb	0.0001 mg/l ED 0.0001 mg/l ED 0.0006 mg/l ED 0.0001 mg/l ED 0.0001 mg/l ED
BTEx,F1,F2,F3,F4	Water	EPA 5030/8015&8021B	P&T GC-PID & FID	BENZENE ETHYLBENZENE TOLUENE XYLEMES F1 F2 (C10-C60) F3 (C16-C34) F4 (C34-C50)	0.0005 mg/l CL 0.0005 mg/l CL 0.0005 mg/l CL 0.1 mg/l CL 0.05 mg/l CL 0.05 mg/l CL
		EPA 3510/8000	GC-FID		

CCME Total Metals (ICP/MS)	Water	EPA 6020	ICP/MS
Ag		0.0004 mg/l	ED
As		0.0004 mg/l	ED
Ba		0.0002 mg/l	ED
Be		0.001 mg/l	ED
Cd		0.0002 mg/l	ED
Co		0.0008 mg/l	ED
Cr		0.001 mg/l	ED
Cu		0.0002 mg/l	ED
Hg		0.0001 mg/l	ED
Mo		0.0001 mg/l	ED
Ni		0.0002 mg/l	ED
Pb		0.0004 mg/l	ED
Sb		0.0004 mg/l	ED
Se		0.0004 mg/l	ED
Sn		0.0001 mg/l	ED
Tl		0.0001 mg/l	ED
U		0.0001 mg/l	ED
V		0.0002 mg/l	ED
Zn		0.004 mg/l	ED
CCME PHCs (F1-F4G with BTEX)	Soil	CCME CWS-PHC Dec 2000	
BENZENE		0.01 mg/kg	CL
ETHYLBENZENE		0.01 mg/kg	CL
TOLUENE		0.01 mg/kg	CL
XYLENES		0.01 mg/kg	CL
TVH		5 mg/kg	CL
F1		5 mg/kg	CL
F2		5 mg/kg	CL
F3		5 mg/kg	CL
F4		5 mg/kg	CL
F4G (SILICA)		100 mg/kg	CL
TEH		5 mg/kg	CL
CCME PAHs	Soil	EPA 3540/8270	GC/MS
Mineral Oil & Grease	Soil	EPA 3550/APHA 5520 F	DCM SONICATION GRAVIM/HOG-LOW

CCME Metals	Soil	SW 846-3051/6020	ICPMS	Sb As Ba Be Cd Cr Co Cu Pb Hg Mo Ni Se Ag Tl Sn U V Zn	0.2 mg/kg ED 0.2 mg/kg ED 5 mg/kg ED 1 mg/kg ED 0.5 mg/kg ED 0.5 mg/kg ED 1 mg/kg ED 2 mg/kg ED 5 mg/kg ED 0.05 mg/kg ED 1 mg/kg ED 2 mg/kg ED 0.2 mg/kg ED 1 mg/kg ED 1 mg/kg ED 5 mg/kg ED 40 mg/kg ED 1 mg/kg ED 10 mg/kg ED
Detailed Salinity	Soil	APHA 4110 B	ION CHROMATOGRAPHY	Cl SO4 %SATURATION EC PH IN SAT PASTE Ca Mg K Na	1 mg/l CL 0.5 mg/l CL 0.1 % CL 0.01 dS m-1 CL 0.1 pH CL 0.5 mg/l CL 0.1 mg/l CL 0.1 mg/l CL 1 mg/l CL
			SSSS,Chp 18		

Standards Council
of Canada



Conseil canadien des normes

Certificate of accreditation

Enviro-Test Labs (Calgary)

ETL CHEMSPEC ANALYTICAL LTD.

1313 - 44th Avenue N.E., Calgary, Alberta

having been assessed by the Canadian Association for Environmental Analytical Laboratories (CAEAL) Inc., under the authority of the Standards Council of Canada (SCC), and found to comply with the requirements of ISO/IEC 17025, the conditions established by the SCC and the CAEAL proficiency testing program, is hereby recognized as an

ACCREDITED ENVIRONMENTAL LABORATORY

for specific tests or types of tests listed in the scope of accreditation approved by the Standards Council of Canada.



Assessment performed according to CAN/CGU-27/CS (IROTC-1020), Requirements for the Continuous Performance of Environmental Analytical Laboratories, and the conditions of the PELCAN-Harmon-D2X. Laboratory that comply with the requirements of IROTC-1020, have a Quality Management System for testing and calibration activities that meets the requirements of ISO 9001:2015, whereas laboratories that do not comply with the requirements of IROTC-1020 when other assessment methods are used. The scope of accreditation is available from the accredited laboratory or BCC. To verify the validity of the certificate, please see the listing of Accredited Laboratories on www.bcc.ca.

ayant été soumis à une évaluation par l'Association canadienne des laboratoires d'analyse environnementale (ACLAЕ) Inc., sous l'autorité du Conseil canadien des normes (CCN), et ayant été trouvé conforme aux prescriptions d'ISO/CEI 17025, ainsi qu'aux conditions établies par le CCN et par le programme d'essais d'aptitude de l'ACLAЕ, est de fait reconnu comme étant un

ayant été soumis à une évaluation par l'Association canadienne des laboratoires d'analyse environnementale (ACLAЕ) Inc., sous l'autorité du Conseil canadien des normes (CCN), et ayant été trouvé conformes aux prescriptions d'ISO/CEI 17025, ainsi qu'aux conditions établies par le CCN et par le programme d'essais d'aptitude de l'ACLAЕ, est de fait reconnu comme étant un

Accredited Laboratory No.
Numéro de laboratoire accrédité : 230
Issued on: 2002-01-30 **Expiry date:** 2004-02-15
Date d'accréditation : 1996-02-15

Chair (SCC)/Président (CCN)

Evaluation effectuée conformément au CCM-PM (OCDE/IEA) aux Étapes 1 et 2 des évaluations des laboratoires d'analyse de l'environnement (ECLAC/IEA-276) et aux conditions du Guide IAPCAL (OCDE). Pour donner du développement des méthodes individuelles et détailler les programmes d'assurance totale, les deux indicateurs doivent être déterminés et démontrés pour les méthodes individuelles et les méthodes collectives. Les méthodes collectives sont recommandées et non recommandées, mais les méthodes recommandées sont normatives. NORME : TRACI 1000, dans une zone de forte décharge, mesurer à un rythme de collectage de la qualité conforme aux exigences ECO 2001/1994, à une zone forte dans le bas, sur une distance normative. Pour donner la portée d'application, établir une liste des laboratoires autorisés, soit au CCM. Pour vérifier la validité du présent certificat, consultez la liste des laboratoires autorisés à l'adresse www.oecd.org

CERTIFICATE OF ACCREDITATION



ENVIRO-TEST LABORATORIES (EDMONTON)

9936 - 67th Avenue, Edmonton, Alberta

having been assessed by the Canadian Association for Environmental Analytical Laboratories (CAEAL) Inc., under the authority of the Standards Council of Canada (SCC), and found to comply with the requirements of the ISO/IEC Guide 25, the conditions established by the SCC and the CAEAL proficiency testing program, is hereby recognized as an

ACCREDITED ENVIRONMENTAL LABORATORY
for specific tests or types of tests listed in
the scope of accreditation approved by
the Standards Council of Canada.



LABORATOIRE DE L'ENVIRONNEMENT ACCRÉDITÉ

pour des essais ou types d'essais déterminés inscrits dans la portée d'accréditation approuvée par le Conseil canadien des normes.

Accredited Laboratory No.: 52
No de laboratoire accrédité: 52
Emis le: Date d'expiration:
Issued on: 1999-03-01 Expiry date: 2003-02-07

Chair (SCC) / Présidente (CCCN)

Evaluation performed according to the General Requirements for the Accreditation of Calibration and Testing Laboratories (ISO/IEC Guide 25); Requirements for the Competence of Environmental Analytical Laboratories, CCNP-1275; and the Conditions for the Accreditation of Calibration and Testing Laboratories, CCNP-1515.

The scope of accreditation is available from the Accredited Laboratory or SCC.

This certificate is the property of the Standards Council of Canada (SCC) and must be returned on request; reproduction is prohibited except in written approval from SCC.

Evaluation effectuée conformément aux Prescriptions générales concernant la compétence des laboratoires d'évaluation et d'essai (ISO/IEC Guide 25); Exigences relatives à la compétence des laboratoires d'environnement (CCNP-1275) et les Conditions pour l'accréditation des laboratoires d'évaluation et d'essai (CCNP-1515). Le champ d'accréditation est disponible à partir du laboratoire accrédité ou du CCH.

Canada



Standards Council of Canada
Conseil canadien des normes

200-270, rue Albert St.
Ottawa, ON (Canada)
K1P 6N7

Canada

Tel.: +1 613 238 3222

Fax.: +1 613 569 7808

E-mail/Courriel : info@scc.ca

Internet: http://www.scc.ca

SCOPE OF ACCREDITATION

Enviro-Test Labs (Calgary)
ETL CHEMSPEC ANALYTICAL LTD.
1313 - 44th Avenue N.E.
Calgary AB T2E 6L5

Accredited Laboratory No. 230
(Complies with requirements of ISO/IEC 17025)

CONTACT: Mr. Ron Minks TEL.: (403) 291-9897
FAX.: (403) 291-0298

CLIENTS SERVED: All interested parties.

FIELD OF TESTING: Chemical/Physical.

PROGRAM SPECIALTY AREA: Environmental

ISSUED ON: 2002-01-30 VALID TO: 2004-02-15

ENVIRONMENTAL AND OCCUPATIONAL HEALTH AND SAFETY

Environmental:

Air Filter

(Total Particulates - Air Filters Collected from High Volume Samplers)

IESOPC012; based on AB25050(M)

GRAVIMETRIC
Total Suspended Particulates

Air Impingers

(Acidic Stack Gases - Air Impinger Solutions from Stack Samplers)

OFFICIAL/NON-RESTRICTED

Somers

Standards Council of Canada Accredited Laboratory No. 230

IESOPC07/06/08; based on AB METHODS,
44546/47071/42525

IC
Hydrogen Chloride
Oxides of Nitrogen
Sulfur Dioxide

(Stack Particulates - Air Impinger Solutions from Stack Samplers)

IESOPC01; based on AB 45555

GRAVIMETRIC
Total Dissolved Solids
Total Solids
Total Suspended Solids

Soil/Sediment

(BTEX - Soil (Mobile Class A))

FSOPC04; based on EPA 8020A

GC/PID/FID - HEADSPACE
BTEX
TVH
VPH

(BTEX - Soil/MS)

MSOPC09; based on EPA 8240/5021/8015/
8260/5030/SW846

GC MSD/FID - METHANOL EXTRACTION
BTEX

(Conductivity - Soil)

ISOPC38/ ISOPC39; based on CARTER
18/EPA 9050

METER - SAT. PASTE ON 1:2 DL.
Conductivity

(Flashpoint - Soil)

MSOPC06; based on ASTM-D93

PENSKE-MARTINS CLOSED CUP
Flashpoint

(Hydrocarbons - Soil)

MSOPC17; based on ASTM D2887/D3710
AND EPA 3540/8000/SW846

GC/FID - EXTRACTION
Hydrocarbons (C11-C60)

Standards Council of Canada Accredited Laboratory No. 230

(Major Ions - Soil)

ISOPC27; based on APHA 4110 B

IC-EXTRACTION

Chloride

Sulphate

(Metals - Soil)

ISOPC26; based on EPA 6010 A

ICP - DIGESTION

Cadmium

Copper

Lead

Zinc

(PH - Soil)

ISOPC38/ ISOPC39; based on CARTER16/
EPA 9045B

METER - SAT. PASTE ON 1:2 DIL.
pH

(Petroleum Hydrocarbons - Soil)

MSOPC30; based on CCME TIER 1 METHOD
ANALYSIS OF PETROLEUM HYDROCARBONS
IN SOIL

GC/FID and GRAVIMETRIC

C>10-C16 HC

C>16-C34 HC

C>34-C50 HC

C>5-C10 HC

Gravimetric Heavy Hydrocarbons

Gravimetric Heavy Hydrocarbons - Silica

(Phenols - Soil)

ISOPC05; based on EPA May 1981 3-355

AUTO COLOR - EXTRACTION

Phenols

(Soluble Cations/SAR - Soil)

ISOPC26; based on EPA 6010 A

ICP - EXTRACTION

Calcium

Magnesium

Potassium

Standards Council of Canada Accredited Laboratory No. 230

SAR
Sodium

(TEH - Soil (Mobile Class A))

FSOPC03; based on EPA 8000A GC/FID - EXTRACTION
 HEPH
 LEPH
 Total Extractable Hydrocarbons

(Total Extractable Hydrocarbons - Soil)

MSOPC03; based on EPA 3550A/8000A/SW846 GC FID - EXTRACTION
 TEH

Waste

(Leachate - Waste)

MSOPC26; based on EPA 1311 TCLP - LEACHATE EXTRACTION
 Leachate Preparation

Water (Inorganic)

(Alkalinity - Water)

ISOPC03; based on APHA 2320 TITRIMETRIC
 Alkalinity (pH 4.5)
 CO₃
 HCO₃
 OH

(Anions - Water)

ISOPC27; based on SM 4500, APHA 4110B ION CHROMATOGRAPHY
 Chloride
 Fluoride
 Nitrate
 Nitrate plus Nitrite
 Sulfate

Standards Council of Canada Accredited Laboratory No. 230

(BOD - Water/Effluent)

ISOPC48; based on STANDARD METHODS
5210A and B

D.O. METER
BOD (5 day)

(Conductivity - Water)

ISOPC10; based on EPA 9050, APHA 2510B

CONDUCTIVITY METER
Conductivity (25 °C)

(Inorganic/Organic Carbon - Water)

ISOPC28; based on EPA 9060, APHA 5310B

IR - COMBUSTION
Dissolved Inorganic Carbon
DOC
Total Inorganic Carbon
Total Organic Carbon

(Mercury - Water)

ISOPC14; based on APHA 3112/ EPA 7470

COLD VAPOUR AA - DIGESTION
Mercury

(Metals - ICP)

ISOPC26; based on EPA 6010 A

ICP
Dissolved Aluminum
Dissolved Barium
Dissolved Beryllium
Dissolved Boron
Dissolved Cadmium
Dissolved Calcium
Dissolved Chromium
Dissolved Cobalt
Dissolved Copper
Dissolved Iron
Dissolved Lead
Dissolved Magnesium
Dissolved Manganese
Dissolved Molybdenum
Dissolved Nickel
Dissolved Phosphorus
Dissolved Silicon

Standards Council of Canada Accredited Laboratory No. 230

Dissolved Silver
Dissolved Strontium
Dissolved Thallium
Dissolved Tin
Dissolved Titanium
Dissolved Vanadium
Dissolved Zinc
Potassium
Sodium

(PH - Water)

ISOPC16; based on EPA 9040 A, APHA 4500H pH METER
pH

(Phenols - Water)

ISOPC04; based on EPA 9066 AUTO - COLOR
Phenols

(Solids - Water)

ISOPC12; based on SM 2540-C,D GRAVIMETRIC
Total Dissolved Solids
Total Suspended Solids

Water (Organic)

(BTEX - Water/PID)

MSOPC05; based on EPA 8020 A/5030/8015/SW846 GC/PID/FID - PURGE AND TRAP
Benzene
Ethylbenzene
m/p-xylene
o-xylene
Toluene
TVH

(Total Extractable Hydrocarbons - Water)

MSOPC02; based on EPA 8000/3510/SW846 GC/FID - EXTRACTION
TEH

Standards Council of Canada Accredited Laboratory No. 230

Footnote:

IESOPXXX; MESOPXXX; ISOPXXX: Enviro-Test Laboratories In-House Test Methods.

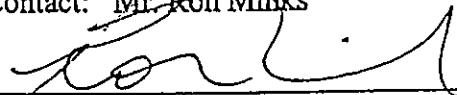


D.W. Wilson, Director, Conformity Assessment

Date: 2002-01-30

SCC 1003-15/301, CAEAL 2601
Partner: CAEAL

Contact: Mr. Ron Minks


Signature

LAB MANAGER

Title

05-FEB-02

Date



Standards Council of Canada
Conseil canadien des normes

200-270, rue Albert St.
Ottawa, ON (Canada)
K1P 6N7

Canadä

Tel.: +1 613 238 3222

Fax.: +1 613 569 7808

E-mail/Courriel : info@scc.ca

Internet: <http://www.scc.ca>

SCOPE OF ACCREDITATION

ENVIRO-TEST LABORATORIES (EDMONTON)

**9936 - 67th Avenue
Edmonton, Alberta T6E 0P5**

Accredited Laboratory No. 52

CONTACT: Ms. Beth Weitzel TEL.: (780) 413-5223
FAX.: (780) 435-7044
E-MAIL: beth@envirotest.com

CLIENTS SERVED: All interested parties.

FIELD(S) OF TESTING: Chemical/Physical.

PROGRAM SPECIALTY AREA: Environmental

ISSUED ON: 2002-05-31 VALID TO: 2003-02-07

ENVIRONMENTAL AND OCCUPATIONAL HEALTH AND SAFETY

Environmental:

Air Filter

(Metals - Air)

ISOP 32/96; based on EPA 3051/200.8

ICP/MS - DIGESTION

Aluminum
Barium
Beryllium
Boron
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead

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Magnesium
Manganese
Molybdenum
Nickel
Phosphorus
Potassium
Silicon
Silver
Sodium
Strontium
Thallium
Tin
Vanadium
Zinc

Biologicals

(Mercury - Biological)

ISOP 52/12; based on SM 2711/1599

COLD VAPOR AA - DIGESTION
Mercury

(Metals - Biologicals)

ISOP 77/96; based on EPA 3051/200.8

ICP/MS - DIGEST

Aluminum
Antimony
Arsenic
Barium
Beryllium
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead
Lithium
Magnesium
Manganese
Mercury
Molybdenum
Nickel
Potassium
Selenium
Silver

Standards Council of Canaua Accredited Laboratory No. 52

	Sodium Strontium Thallium Uranium Vanadium Zinc
Oil (Oil - PCB)	GC/ECD - EXTRACTION Total PCB
MSOP 8; based on EPA 8080, ASTM D4059	
Soil/Sediment (BTEX - Soil)	GC/PID - EXTRACTION Benzene Ethylbenzene m-Xylene o-Xylene p-Xylene Toluene
MSOP 9; based on EPA 3510/8020	
(Extractable HC - Soil)	
MSOP 23; based on EPA 3550/8000	GC/FID - EXTRACTION Total Extractable Hydrocarbons
(Grain Size - Soil)	
ISOP 68; based on ASTM D422-63	SIEVING Grain Size
(Hydride Metals - Soil)	
ISOP 52/53; based on SM 3114 C	HYDRIDE AA - DIGESTION Antimony Arsenic Selenium
(Mercury - Soil)	
ISOP 52/12; based on SM 3112 B, 2711, 1599	COLD VAPOUR AA - DIGESTION

Standards Council of Canada Accredited Laboratory No. 52

Mercury

(Metals - Soil/Dig)

ISOP 8/96; based on EPA 3051/200.8

ICP/MS - DIGESTION

Aluminum
Barium
Beryllium
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead
Magnesium
Manganese
Molybdenum
Nickel
Phosphorus
Potassium
Silver
Sodium
Strontium
Thallium
Tin
Titanium
Vanadium
Zinc

(Oil And Grease/Hydrocarbons - Soil)

ISOP 13; based on EPA 5520

GRAVIMETRIC - EXTRACTION

Oil and Grease

(PAH - Soil)

MSOP 70; based on EPA 8270/3540

GC/MS - EXTRACTION

1,3-Dimethylnaphthalene
1,3-Dimethylnaphthalene
2-Methylanthracene
2-Methylnaphthalene
3-Methylcholanthrene
Acenaphthene
Acenaphthylene

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Anthracene
Benzo (a) anthracene
Benzo (a) pyrene
Benzo (b) fluoranthene
Benzo (g,h,i) perylene
Benzo (k) fluoranthene
Carbazole
Chrysene
Dibenzo(a,h)anthracene
Dibenzofuran
Fluoranthene
Fluorene
Indeno (1,2,3 - cd) pyrene
Naphthalene
Phenanthrene
Pyrene

(SAR - Soil)

ISOP 49; based on CARTER CSSS 18.4

CALCULATION
Sodium Absorption Ratio

Waste

(Flashpoint - Waste)

ISOP 48; based on ASTM 93-D

PENSKE-MARTEN CLOSED CUP
Flashpoint

Water (Inorganic)

(Alkalinity (pH 4.5) - Water)

ISOP 76; based on SM 2320 B

TITRIMETRIC
Alkalinity (pH 4.5)

(Ammonia - Water)

ISOP 106; based on SM 4500-NH3

ION CHROMATOGRAPHY
Ammonia

(As/Se/Sb - Water)

ISOP 51/53; based on SM 3114 C

HYDRIDE AA - DIGESTION
Total Antimony

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	Total Arsenic
	Total Selenium
(BOD(5 Day) - Water)	
ISOP 28; based on SM 5210 B	D.O. METER BOD (5 day)
(COD - Water)	
ISOP 30; based on SM 5220 D	COLORIMETRIC - DIGESTION COD
(Chlorate/Chlorite - Water)	
ISOP 24; based on EPA 300.B	ION CHROMATOGRAPHY Chlorate Chlorite
(Chromium (Hexavalent) - Water)	
ISOP 108; based on SM 3500-CR,C	ION CHROMATOGRAPHY Chromium (Hexavalent)
(Color - Water)	
ISOP 35; based on CPP H.5P	COLORIMETRIC Color
(Conductivity (25 °C) - Water)	
ISOP 76; based on SM 2510 B	CONDUCTIVITY METER Conductivity (25°C)
(Dissolved Metals - Water)	
ISOP 100; based on EPA 6010, 3050A, 3051, 3052	ICP Dissolved Aluminum Dissolved Barium Dissolved Beryllium Dissolved Boron Dissolved Cadmium Dissolved Calcium Dissolved Chromium Dissolved Cobalt Dissolved Copper

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Dissolved Iron
Dissolved Lead
Dissolved Magnesium
Dissolved Manganese
Dissolved Molybdenum
Dissolved Nickel
Dissolved Phosphorus
Dissolved Silicon
Dissolved Silver
Dissolved Strontium
Dissolved Thallium
Dissolved Tin
Dissolved Vanadium
Dissolved Zinc
Potassium
Sodium

(Fluoride - Water)

ISOP 78; based on SM 4500-F,C

SELECTIVE ION ELECTRODE
Fluoride

(Major Ions - Water/IC)

ISOP 46; based on SM 4110 B

ION CHROMATOGRAPHY
Bromide
Chloride
Nitrate
o-Phosphate
Sulfate

(Mercury - Water)

ISOP 67/12; based on SM 3112 B

COLD VAPOUR AA - DIGESTION
Mercury

(Nitrate/Nitrite - Water)

ISOP 22/23; based on SM 4500-NO₂,B / SM 4500-NO₃,H COLOR
Nitrate plus Nitrite
Nitrite

(Oil and Grease/Hydrocarbons - Water/SPE)

ISOP 41; based on EPA 1664, SM 5520

GRAVIMETRIC
Oil and Grease

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(Oil and Grease/Hydrocarbons - Water/Shake)

ISOP 14; based on SM 5520 A,B,F

GRAVIMETRIC
Oil and Grease

(PH - Water)

ISOP 76; based on SM 4500-H,B

pH METER
pH

(Phosphorous - Water)

ISOP 99; based on SM 4500-P,B,E

COLOR - DIGESTION
Total Dissolved Phosphorus
Total Phosphorus

(Solids - Water)

ISOP 21; based on SM 2540 A,B,C,D,E

GRAVIMETRIC
Total Dissolved Solids

(Sulphide - Water)

ISOP 2; based on SM 4500-S2 A, D,E

COLORIMETRIC
Sulphide

(TIC/TOC/DOC/DIC - Water)

ISOP 6; based on SM 5310 B

IR - COMBUSTION
Dissolved Inorganic Carbon
DOC
Total Inorganic Carbon
Total Organic Carbon

(TKN - Water)

ISOP 79; based on AB ENVIR. 235

COLOR - DIGESTION
Total Kjeldahl Nitrogen

(Tannin and Lignin - Water)

ISOP 36; based on SM 5550 B

COLORIMETRIC
Tannin and Lignin

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(Ultra Trace Metals - Water)

ISOP 96; based on EPA 3015/6020

ICP/MS
Calcium
Dissolved Aluminum
Dissolved Barium
Dissolved Beryllium
Dissolved Boron
Dissolved Cadmium
Dissolved Chromium
Dissolved Cobalt
Dissolved Copper
Dissolved Iron
Dissolved Lead
Dissolved Manganese
Dissolved Molybdenum
Dissolved Nickel
Dissolved Silver
Dissolved Thallium
Dissolved Tin
Dissolved Vanadium
Dissolved Zinc
Magnesium
Mercury
Potassium
Sodium
Strontium
Total Antimony
Total Arsenic
Total Selenium
Uranium

Water (Organic)

(AOX - Water)

MSOP 73; based on SM 5320

MICROCOULOMETRIC - ADSORPTION
AOX

(BTEX - Water)

MSOP 14; based on EPA 5030/8020

GC/PID - PURGE AND TRAP
Benzene
Ethylbenzene
m-xylene
m/p-xylene

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o-xylene
Toluene

(Chlorophenols - Water)

MSOP 42; based on EPA 1653 AND
ALBERTA ENVIRONMENT 130.0

GC/MS - EXTRACTION

2,3,4,6-Tetrachlorophenol
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol
2,4-Dichlorophenol
2,6-Dichlorophenol
2,6-Dichlorosyringaldehyde
2-Chlorophenol
2-Chlorosyringaldehyde
3,4,5-Trichlorocatechol
3,4,5-Trichloroguaiacol
3,4,5-Trichloroveratrole
3,4,6-Trichlorocatechol
3,4,6-Trichloroguaiacol
3,4-Dichlorocatechol
3,4-Dichloroguaiacol
3,5-Dichlorocatechol
3,6-Dichlorocatechol
4,5,6-Trichloroguaiacol
4,5,6-Trichlorosyringol
4,5-Dichlorocatechol
4,5-Dichloroguaiacol
4,5-Dichloroveratrole
4,6-Dichloroguaiacol
4-Chlorocatechol
4-Chloroguaiacol
4-Chlorophenol
5,6-Dichlorovanillin
5-Chlorovanillin
6-Chlorovanillin
Pentachlorophenol
Tetrachlorocatechol
Tetrachloroguaiacol
Tetrachloroveratrole
Trichlorotrimethoxybenzene

Standards Council of Canada Accredited Laboratory No. 52

(Dioxins/Furans - Water)

MSOP 17; based on EPA 1613, EPS 1/RM/19

GC/HRMS - EXTRACTION

1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin
1,2,3,4,6,7,8-Heptachlorodibenzofuran
1,2,3,4,7,8,9-Heptachlorodibenzofuran
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin
1,2,3,4,7,8-Hexachlorodibenzofuran
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin
1,2,3,6,7,8-Hexachlorodibenzofuran
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin
1,2,3,7,8,9-Hexachlorodibenzofuran
1,2,3,7,8-Pentachlorodibenzo-p-dioxin
1,2,3,7,8-Pentachlorodibenzofuran
2,3,4,6,7,8-Hexachlorodibenzofuran
2,3,4,7,8-Pentachlorodibenzofuran
2,3,7,8-Tetrachlorodibenzo-p-dioxin
2,3,7,8-Tetrachlorodibenzofuran
Heptachlorodibenzo-p-dioxins (Total)
Heptachlorodibenzofurans (Total)
Hexachlorodibenzo-p-dioxins (Total)
Hexachlorodibenzofurans (Total)
Octachlorodibenzo-p-dioxin
Octachlorodibenzofuran
Pentachlorodibenzo-p-dioxins (Total)
Pentachlorodibenzofurans (Total)
Tetrachlorodibenzo-p-dioxins (Total)
Tetrachlorodibenzofurans (Total)

(Diquat, Paraquat - Water)

PSOP 100; based on J. AGRIC. FOOD CHEM, 1986,
VOL. 35

HPLC/UV - EXTRACTION

Diquat
Paraquat

(Extractable HC - Water)

MSOP 2; based on EPA 3510/8000

GC/FID - EXTRACTION

Total Extractable Hydrocarbons

(Glyphosate - Water)

PSOP 100; based on J. AGRIC. FOOD CHEM, 1986,

Standards Council of Canada Accredited Laboratory No. 52

VOL. 35

HPLC/FLUORESCENCE
Glyphosate

(PAH - Water)

MSOP 71; based on EPA 8270/3510

GC/MS - EXTRACTION
1,3-Dimethylnaphthalene
1-Methylnaphthalene
2-Methylnaphthalene
2-Methylnaphthalene
3-Methylcholanthrene
Acenaphthene
Acenaphthylene
Anthracene
Benzo (a) anthracene
Benzo (a) pyrene
Benzo (b) fluoranthene
Benzo (g,h,i) perylene
Benzo (k) fluoranthene
Carbazole
Chrysene
Dibenzo(a,h)anthracene
Dibenzofuran
Fluoranthene
Fluorene
Indeno (1,2,3 - cd) pyrene
Naphthalene
Phenanthrene
Pyrene

(Pesticides (Acids/Phenols) - Water)

PSOP 100; based on JOAC VOL. 74, #3, 1991

GC/MS - EXTRACTION/DERIV.
2,3,4,6-Tetrachlorophenol
2,4,5-T
2,4,6-Trichlorophenol
2,4-D
2,4-Dichlorophenol
Bromoxynil
Dicamba
Dinoseb
Pentachlorophenol
Picloram

Standards Council of Canada Accredited Laboratory No. 52

(Pesticides (Neutrals) - Water)

PSOP 100; based on JOAC VOL. 74, #3, 1991

GC/MS - EXTRACTION
Alachlor
Atrazine
Atrazine des-ethyl
Chlorpyrifos
Cyanazine
Diazinon
Diclofop-methyl
Dimethoate
Malathion
Metolachlor
Metribuzin
Parathion
Phorate
Prometryne
Simazine
Terbufos
Triallate
Trifluralin

(Pesticides/PCBs – Water)

PSOP 100; based on MONSANTO METHOD
PROTOCOL *RES-008-90

GC/EDC – EXTRACTION
Alpha-chlordane
Gamma-chlordane
Heptachlor Epoxide
Lindane
o,p' – DDT
oxychlordane
p,p' – DDD
p,p' – DDE
p,p' – DDT
p,p' Methoxychlor
Total PCB

(Pesticides - Water)

PSOP 100; based on EPA SW 846

LC/MS/MS - EXTRACTION
Aldicarb
Azinphos-Methyl
Bendiocarb
Carbaryl
Carbofuran

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Diuron
Temephos

(Pesticides/PCBs - Water)

PSOP 100; based on MONSANTO METHOD
PROTOCOL *RES-008-90

GC/ECD - EXTRACTION
Aldrin
Dieldrin
Heptachlor
Total Chlordane

(Phenol - Water)

MSOP 61; based on EPA 3510/8270

GC/MS - EXTRACTION
Phenol

(Resin and Fatty Acids - Water)

MSOP 26; based on ALBERTA ENVIRONMENT
129.0

GC/MS - EXTRACTION
12,14-Dichlorodehydroabietic Acid
12-Chlorodehydroabietic Acid
14-Chlorodehydroabietic Acid
9,10-Dichlorostearic Acid
Abietic Acid
Arachidic Acid
Dehydroabietic Acid
Isopimaric Acid
Levopimaric Acid
Linoleic Acid
Linolenic Acid
Myristic Acid
Neoabietic Acid
Oleic Acid
Palmitic Acid
Palustric Acid
Pimamic Acid
Sandaracopimaric Acid
Stearic Acid

(Volatiles - Water)

MSOP 12; based on EPA 8240/5030

GC/MS - PURGE & TRAP
1,1,1-Trichloroethane

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1,1,2,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1-Dichloroethane
1,1-Dichloroethene
1,2,3-Trichloropropane
1,2-dibromoethane
1,2-dichlorobenzene
1,2-dichloroethane
1,2-Dichloropropane
1,3-dichlorobenzene
1,4-Dichlorobenzene
2-butanone (MEK)
2-hexanone
4-methyl-2-pentanone (MIBK)
Acetone
Acrylonitrile
Benzene
Bromodichloromethane
Bromoform
Bromomethane
Carbon disulfide
Carbon Tetrachloride
Chlorobenzene
Chlorodibromomethane
Chloroethane
Chloroform
Chloromethane
cis-1,3-Dichloropropene
cis-1,4-dichloro-2-butene
Dibromomethane
Dichlorodifluoromethane
Ethyl alcohol
Ethyl methacrylate
Ethylbenzene
m-xylene
m/p-xylene
Methyl Iodide
Methylene chloride
o-xylene
Styrene
Tetrachloroethene
Toluene
trans-1,2-Dichloroethene
trans-1,3-Dichloropropene
trans-1,4-Dichloro-2-Butene
Trichloroethene

Standards Council of Canada Accredited Laboratory No. 52

Trichlorofluoromethane
Vinyl chloride

OECD PRINCIPLES OF GOOD LABORATORY PRACTICE

Areas of Expertise:

Please see the details in the areas of recognition document issued separately.

Footnotes: _____

ISOP, MSOP: EnviroTest Laboratories (Edmonton) in-house test methods.

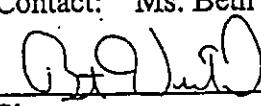


P. Paladino, P. Eng., Director Conformity Assessment

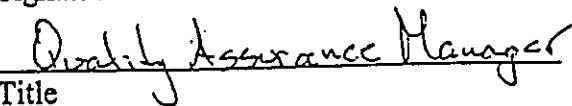
Date: 2002-05-31

SCC1003-15/91; CAEAL 1352
Partner: CAEAL-GLP

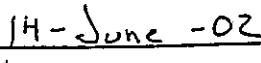
Contact: Ms. Beth Weitzel



Signature



Title



Date

Taiiga Labs

Laboratory Certificates and Methodologies

APPENDIX 2



Standards Council of Canada
Conseil canadien des normes

200-270, rue Albert St.
Ottawa, ON (Canada)
K1P 6N7

Canada

Tel.: +1 613 238 3222
Fax.: +1 613 569 7808
E-mail/Courriel : info@scc.ca
Internet: http://www.scc.ca

SCOPE OF ACCREDITATION

Indian & Northern Affairs Canada
TAIGA ENVIRONMENTAL LABORATORY
P.O. Box 1500, 4601 - 52nd Avenue
YELLOKNIFE NT X1A 2R3

Accredited Laboratory No. 187

CONTACT: Mr. William Coedy TEL.: (403) 920-8129
FAX.: (403) 873-9300

CLIENTS SERVED: All interested parties.

FIELD(S) OF TESTING: Biological, Chemical/Physical.

PROGRAM SPECIALTY AREA: Environmental

ISSUED ON: 2002-01-08 VALID TO: 2002-03-06

ENVIRONMENTAL AND OCCUPATIONAL HEALTH AND SAFETY

Environmental:

Soil/Sediment

(Arsenic - Soil)

TEL 032; based on EPA 3050 B

HYDRIDE AA - DIGESTION
Arsenic

(Mercury - Soil)

TEL 034 B; based on #2 JONASSON ET AL
(1973) GSC, #1 EPA 7471A

COLD VAPOUR AA - DIGESTION
Mercury

(Metals - Soil)

TEL 038; based on EPA 200.8

ICP/MS - DIGESTION

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Cadmium
Copper
Lead
Zinc

Water (Inorganic)

(Alkalinity (pH 4.5) - Water)

TEL003; APHA 2320B

TITRIMETRIC
Alkalinity (pH 4.5)

(BOD (5 Day) - Water)

TEL 019; APHA STD METHODS (1995) 5210 B

D.O. METER
BOD (5 day)

(CN (SAD) - Water)

TEL022; APHA 4500-CN/E, NAGASHIMA
ET AL (1981) ANAL. CHEM. VOL10 pp99-106

COLOR - DISTILLATION
CN (SAD)

(Chloride - Water)

TEL010; APHA 4500-CL/E

AUTOCOLOR
Chloride

(Conductivity (25°C) - Water)

TEL002; APHA 2510-B

CONDUCTIVITY METER
Conductivity (25 °C)

(Fluoride - Water)

TEL004; APHA 4500-CL/E

SELECTIVE ION ELECTRODE
Fluoride

(Iron - Water)

TEL031; ENVIRODAT 26004

AA FLAME
Dissolved Iron

(Major Ions - Water)

TEL026/027/029/030; EPA 200.7/APHA 3111B

AA FLAME
Dissolved Calcium

Standards Council of Canada Accredited Laboratory No. 187

Dissolved Magnesium
Potassium
Sodium

(Metals - Water/ICP)

TEL035; EPA 200.8

ICP/MS
Dissolved Cadmium
Dissolved Chromium
Dissolved Cobalt
Dissolved Copper
Dissolved Iron
Dissolved Lead
Dissolved Nickel
Dissolved Vanadium
Dissolved Zinc

(Nitrate plus Nitrite - Water)

TEL014; APHA 4500-NO3/F

AUTOCOLOR
Nitrate plus Nitrite

(PH - Water)

TEL001; APHA 4500-H, EPA 335.4 (1993)

pH METER
pH

(Phosphorus - Total - Water)

TEL015; US EPA 365.1

AUTO COLOR - DIGESTION
Total Phosphorus

(Silica - Reactive - Water)

TEL012; APHA 4500-Si/F

AUTOCOLOR
Reactive Silica

(Sulfate - Water)

TEL011; US EPA 375.2; APHA 4500.F

AUTOCOLOR
Sulfate

(Total Suspended Solids - Water)

TEL008; EPA 160.1/APHA 2540D

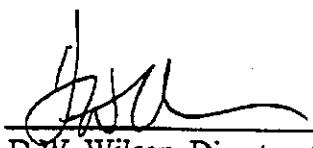
GRAVIMETRIC

Standards Council of Canada Accredited Laboratory No. 187**Total Suspended Solids****Water (Microbiology)****(Coliforms - Water)**

TEL017; APHA 9221-E/9222-C

MEMBRANE FILTRATION**Fecal Coliforms****Total Coliforms****Footnotes:**

TEL #Taiga Environmental Laboratory In-House
Test Methods

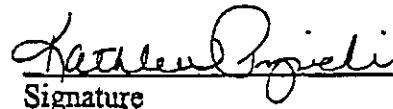

D.W. Wilson, Director, Conformity Assessment

Date: 2002-01-08

CAEAL 2635, SCC 1003-15/257
Partner: CAEAL

ms. Kathleen Puznicki

Contact: Mr. William Coedy


Signature

Environmental Chemist
Title

January 28, 2002
Date