

VOLUME II
ENVIRONMENTAL REGISTRATION
DOCUMENT
FOR THE PROPOSED
WHITE ROCK QUARTZ/KAOLIN
AND MICA MINE

Prepared for:

**The Nova Scotia Department
of the Environment**

By:

**MGI Limited on behalf
of Black Bull Resources Inc.**

October 2001

LIST OF APPENDICES

- Appendix A Environmental Screening - Nova Scotia Museum
- Appendix B Existing Approvals
- Appendix C Report on Spectrometer Survey – Nova Scotia Department of Natural Resources
- Appendix D Surface Water Quality Data
- Appendix E Biological Data Collection Reports - Dillon Consulting
- Appendix F Knowledge Study Report - Confederacy of Mainland Mi'kmaq
- Appendix G Archaeological and Cultural Resource Survey Report – Cultural Resource Management Group
- Appendix H A User's Guide to the "One Window" Process for Mine Development Approvals
- Appendix I Public Consultation Records

APPENDIX A

ENVIRONMENTAL SCREENING - NOVA SCOTIA MUSEUM

Nova Scotia Museum
Heritage Resource Services

Memorandum

File No. F:\2000-01\28000-55 Environmental Screenings\00-10-12 Yarmouth County\Response.wpd

TO: Peter Oram
MGI Limited

FROM: Robert Ogilvie
Nova Scotia Museum

DATE: November 2, 2000

RE: **Environmental Screening 00-10-12**
Yarmouth County

Staff of the Nova Scotia Museum have reviewed the documents related to the above screening request.

With respect to cultural resources, there are two recorded archaeological sites in the study area (BaDi-1 and BaDi-2), both on the Roseway River system. They were reported to the Nova Scotia Museum by an Archaeological Survey of Canada in 1973. We have no record of revisitation to these sites. We also have had unconfirmed anecdotal reports of more recent artifact finds in the Indian Fields area (BaDi-1).

It is highly likely that additional pre and post-contact First Nations archaeological sites are located within the study area, particularly with the extensive drainage for the Roseway and Clyde rivers. An historical background study will determine the potential for Euro-Canadian archaeological resources.

W.r.t. natural heritate components of interest, staff make the following observations.

The following plant species-at-risk are known from within the identified area of interest:

Alnus serrulata
Bartonia virginica
Galium obtusum
Spiranthes ochroleuca
Symplocarpus foetidus
Utricularia gibba (aquatic)

The following plant species-at-risk are known from adjacent squares. Those marked with asterisks should be highlighted as they have national recognition as being 'at risk'. Two asterisks signify those species with provincial legal protection:

Carex atlantica ssp. *capillacea* **Canadian Priority of 2
Cephalanthus occidentalis
Clethra alnifolia **
Coreopsis rosea **
Decodon verticillatus
Eleocharis flavescens
Eupatorium dubium
Euthamia galetorum
E. tenuifolia
Panicum rigidulum * Canadian Priority of 3
Platanthera flava, var. *flava* *
Rhexia virginica *
Sabatia kennedyana * Canadian Priority of 1
Spiranthes casei
Woodwardia areolata *

Many of these species belong to the coastal plain floral element and are at the northernmost station of their range in Yarmouth County. As many are not found elsewhere in Canada, their presence or absence should be ascertained during timely field inventories, i.e. when they are in flower or fruit.

Of this list, many are associated only with wetlands or lake shores. The nature of the undertaken was not provided so at this point we cannot give a narrower list of plant species. This list is based almost solely on geographical area. Those species known to be found only in brackish or estuarine conditions have been excluded.

It should also be noted that in the vicinity of Flintstone Rock, there are several regions of seeded Pitch Pine (*Pinus rigida*), from an aerial spray program (DLF, 1960s). This species has naturalized in the barrens, but is not native this far north.

Depending on which watersheds are to be affected, there are two significant fish species of concern. The first is in the Tusknet drainage, that is the Atlantic Whitefish (*Coregonus huntsmani*), which is COSEWIC-listed as endangered. There have been no recent records for the system, so the species may be seriously-imperiled in the watershed. Alternatively, the Clyde Drainage supports a fragile population of Atlantic Salmon (*Salmo salar*).

Although there are no records for the specific site, the site is within 25 km of the only Provincial records for both Blandings Turtles (*Emydoidea blandingii*) - COSEWIC-listed as threatened and the Northern Ribbon Snake (*Thamnophis sauritis*) - Provincially listed. We would recommend before development took place that the potential areas of impact be surveyed for these two species.

There are no records of breeding birds of note in the study area although we observe that the area was only reviewed in a cursory manner for the Maritime Breeding Bird Atlas.

Mr. Peter Oram
November 2, 2000
Page 3

The Museum has no records of significant palaeontological resources within the development area.

I have attached an invoice for the staff time spent reviewing museum records and compiling this response.

If you have any questions, please contact Robert Ogilvie at 424-6475.

APPENDIX B
EXISTING APPROVALS

June 21st 2001

Mr. W. G. Shaw, P. Geol., President
W. G. Shaw and Associates Ltd.
65 Beech Hill Road
Antigonish, Nova Scotia
B2G 2P9

Dear Mr. Shaw:

Subject: Letter of Authority to Bulk Sample Silica and Kaolin, Yarmouth County

Nova Industrial Minerals Inc. (formerly Black Bull Resources), through your office, has requested an extension of their Letters of Authority to Bulk Sample Silica and Kaolin from claim Q, Tract 52, Tract Map 21 A 4A (Exploration License #2429), Yarmouth County.

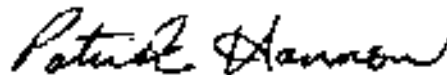
Specifically, the Company wishes to delay the reclamation of the property for a period of one year. Normally, excavations are to be filled within 30 days of the site work being completed.

Reclamation of the site, as stipulated in the Letters of Authority, to bulk sample silica and kaolin, may be delayed until May 24th, 2002, unless:

- garbage accumulates at the site;
- the site becomes a danger to the public or to wildlife; or
- the site is deemed by an officer of NSDEL to be harmful to the environment.

Should any of the above conditions occur, the site shall be reclaimed immediately.

Yours truly,



Patrick Hamon, MSASc, PEng.
Acting Director of Mines

/s/mam

cc: S. Swinden, Executive Director
Minerals and Energy Branch - NSDNR

D. Jones, Director
Mineral Management - NSDNR

J. Gannise
NSDEL - Yarmouth District Office

J. Campbell, Manager
Mineral Development and Policy-NSDNR

T. Lamb, Mining Engineer
Mineral Development and Policy - NSDNR

S. Marshall
NSDNR - Western Region

R. Ratcliffe, Registrar
Mineral and Petro. Titles-NSDNR

P. Francis
NSDNR - Lunenburg

June 26, 2001

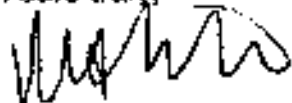
Mr. W.G. Shaw
Nova Industrial Minerals Inc.
c/o W.G. Shaw and Associates Ltd.
65 Beech Hill Road
Antigonish, Nova Scotia B2G 2P9

Dear Mr. Shaw:

RE: Excavation Permits Nos. E-146 and E-152 - Flintstone Rock

Further to your letter dated April 19, 2001 and Mr. Patrick Hannon's, Acting Director of Mines, letter to you dated June 21, 2001, I hereby extend the time to reclaim the site disturbed under the authority of Excavation Permit Nos. E-146 and E-152 to May 24, 2002, provided Nova Industrial Minerals Inc. remains compliant with the permits, letters and applicable legislation.

Yours truly,



R. Ratcliffe
Registrar
Mineral & Petroleum Titles

RR/jg

cc: Dr. D. Jones
Mr. J. Campbell
Mr. P. McCulloch
Ms. G. Marshall
Mr. P. Hannon
Mr. P. Woodland
Mr. B. Matlock
Mr. P. Francis

DEPARTMENT OF NATURAL RESOURCES
Province of Nova Scotia

PERMIT FOR MINERAL EXPLORATION ON CROWN LAND

AREA:

1. This Permit authorizes Nova Industrial Minerals Inc. (hereinafter referred to as the "Permit Holder") to enter upon Crown land for the purpose of mineral exploration, the said lands (hereinafter called the "Site") being situated at Flintstone Rock Area, in the County of Yarmouth, Province of Nova Scotia, in an area more particularly shown outlined in red on a plan marked Schedule "A".

TERM/RENEWAL:

2. The term of this Permit commences on the 27th day of June, A.D., 2001 and remains in effect for the duration of the exploration license held by the applicant 24th day of May, A.D., 2002. This permit may be renewed with renewal of the exploration license by forwarding a written request for renewal along with a copy of the renewed exploration license to the Regional Resource Manager (hereinafter referred to as the Manager), in the Regional office of the Department of Natural Resources where the major part of the site is located.

MINERAL PERMITS:

3. No Permit shall be issued unless the applicant holds a valid exploration license from the Nova Scotia Department of Natural Resources which shall be presented to the Manager upon his request. Should the exploration license be cancelled or terminated for any reason whatsoever, this Permit shall automatically be terminated.

CROWN LANDS:

4. This Permit applies to exploration on Crown land as determined by the Department of Natural Resources. This Permit does not authorize exploration work in whole or in part on privately owned land. Should the Manager or the Permit Holder determine there may be problems with the Crown's title to the land in question, this matter shall immediately be reported to the Deputy Minister, Department of Natural Resources or his designated agent and the Permit Holder shall cease exploration work on the Site until the matter is clarified. If the land is determined not to be Crown land, the Permit Holder shall be so notified and this permit will be terminated immediately without any claim, demand or recourse by the Permit Holder against the Crown.

CROWN LANDS UNDER LEASE OF LICENSE:

5. The Permit Holder understands that the Site or any portion thereof covered by the permit may be subject to a lease, license, agreement, letter of authority or otherwise issued by the Crown to another person or company before or after the signing of this Permit. The Permit Holder shall check from time to time with the Manager to identify such persons or companies and the Permit Holder shall respect their rights. Prior to the commencement of any exploration program, the Permit Holder shall contact the following Lessees or Licensees (or otherwise) and adhere to the general terms and conditions herein outlined and others which may be required by the Lessee or Licensee (or otherwise):
1. Campsite #3284 Louis Pothier
 2. _____
 3. _____
 4. _____
- 5.1 Trees which must be felled are to be cut and disposed of in accordance with the direction of the Lessee or Licensee (or otherwise). All merchantable wood cut remains the property of the Lessee or Licensee (or otherwise).
- 5.2 Roads belonging to and administered by the Lessee or Licensee (or otherwise) may not be used without appropriate permission from the same.
- 5.3 The cost of damage to properties, including roads, caused by the Permit Holder must be paid for in full to the Lessee or Licensee (or otherwise).

EXCLUSIVE USE:

6. This Permit does not give the Permit Holder exclusive use of the Crown land.

SECURITY DEPOSIT:

7. The Permit Holder shall pay, if necessary, a Security Deposit in the amount of Twelve Thousand Five Hundred _____ (\$ 12,500.00) Dollars which shall be refunded if the Site is restored to the satisfaction of the Manager and if the Permit Holder has complied with all the terms and conditions of this Permit. Security Deposits are required when work is being performed requiring some form of site reclamation work on sensitive or special areas.

FEES:

8. This Permit Holder shall pay to the Department of Natural Resources the following stumpage rates as charged by the Department from time to time:

Softwood Pulpwood	\$	<u>17.00 per cord</u>
Hardwood Pulpwood	\$	<u>- -</u>
Fuelwood	\$	<u>15.00 per cord</u>
Softwood Sawlogs	\$	<u>75.00 per MFBM</u>
Hardwood Sawlogs	\$	<u>74.00 per MFBM</u>
Oak Sawlogs	\$	<u>122.00 per MFBM</u>

EXTRA WORK:

9. Once this Permit is issued, the Permit Holder may apply to the Manager to perform extra work on the Site. The Manager shall review the request and may by means of a written memorandum authorize the Permit Holder to perform the extra work. The Manager may request an increase in/or a new Security Deposit to be paid by the Permit Holder. All terms and conditions of this Permit shall apply to extra work to be performed.

MERCHANTABLE TIMBER:

10. Where feasible and practicable all merchantable wood fibre shall be cut into appropriate lengths, whether for sawlogs, pulpwood, fuelwood or other products and shall be piled roadside. Where this is not feasible or practicable as determined by the Manager, approval must be identified in the Special Conditions clause #24. In all cases, the stumpage rates outlined in clause #8 above shall be required. If cutting rights to the site have been previously leased or licensed by the Crown to some other person or company, the merchantable wood fibre shall belong to that person or company unless directed otherwise by the Manager.

FIRE HAZARDS:

11. The Permit Holder shall not do and will not permit to be done anything which will or might increase the fire hazard on the Crown land. Burning of brush during the fire season shall not be carried out by the Permit Holder unless the Permit Holder has obtained a burning permit from the Department of Natural Resources.

WATERCOURSES:

12. Watercourses as defined under the Water Act, R.S.N.S. 1967, C.133, as amended, must be kept free from debris, refuse, or other material considered objectionable by the Department of Natural Resources and/or the Department of Environment. Watercourses shall not be disturbed by construction or otherwise without prior written approval from the Nova Scotia Department of Environment.

CROWN SURVEYS:

13. Crown survey posts and boundary lines are not to be damaged in any way and must be kept clear and free of debris. Exploratory survey lines, mining claim boundaries or grid lines may be marked only with flagging tapes or ribbons and are not to be blazed. Line cutting by the Permit Holder will only be permitted after he has presented documentation to the Manager supporting the necessity for doing the same. The Manager, in his discretion, may authorize this cutting by giving express authorization in the Special Conditions outlined below.

CONDITION OF SITE:

14. The Permit Holder must keep the Site clean and tidy at all times to the satisfaction of the Manager and will not cause or permit any nuisance or damage to the Crown land or to adjacent or adjoining properties, and at the expiration or earlier termination of this Permit, the Permit Holder shall at his or its own expense, leave the Crown land in a condition satisfactory to the Manager. The Permit Holder shall pay all costs incurred by the Department of Natural Resources to restore the Site should the Permit Holder fail to do this within a reasonable period of time after this Permit has expired.

STRUCTURES:

15. No structure shall be placed on the site without the prior written approval of the Manager and all authorized structures shall be removed within 30 days of the expiration of this Permit unless otherwise permitted by the Manager.

ASSIGNMENTS:

16. The Permit Holder shall not assign or sublet this Permit in whole or in part without the prior written consent of the Manager. This Permit cures to the benefit of and is binding upon the parties hereto and their respective successors and permitted assigns.

PERMITS:

17. This Permit does not release the Permit Holder from any requirement to obtain other permits or authorization required by law, whether federal, provincial or municipal

LIABILITY/INDEMNITY:

18. The Permit Holder will take all reasonable and necessary precautions to ensure that no person is injured and no property is damaged on the Site or in respect of the Site. The Permit Holder shall be liable for any injury or damage to the person or for any loss, damage or claim to the property of the Permit Holder and/or third parties based upon, occasioned by or in any way attributable to the Permit Holder's performance or non-performance under this Permit. The Permit Holder shall indemnify and save harmless the Crown from and against any and all damages, claims or losses in respect of any injury to persons or damage to property occasioned by the use or occupation of the Site, or directly or indirectly attributable to the issuance of this Permit.

LAWS:

19. This Permit shall be construed and interpreted in accordance with the laws of Nova Scotia.

TERMINATION/NOTICE:

20. This Permit may be terminated by the Minister of Natural Resources for breach of the terms and conditions contained herein by giving five (5) days written notice to the Permit Holder at the address stated herein. If the Permit Holder is not a resident in Nova Scotia, the name and address of some person resident in Nova Scotia, upon whom service may be made, must be given as follows:

Nova Industrial Minerals Inc.

c/o W.G. Shaw & Associates Ltd.

Highland Professional Centre

65 Beech Hill Road

Antigonish, NS B2G 2P9

ATTENTION: William G. Shaw, Agent

The Permit Holder may by written notice designate a new address for the receipt of notices.

INSPECTION:

21. Upon completion or earlier termination of the exploration program covered by this Permit, the Manager will normally conduct or have conducted an inspection of the Site to determine if the terms and conditions of this Permit have been met.

AMENDMENTS:

22. This Permit may only be altered by means of a written memorandum signed by both parties. The said memorandum shall be supplemental to and shall be deemed to form part of this Permit.

WAIVER:

23. No term, condition or provision hereof shall be or be deemed to have been waived by reason of any act, forbearance, indulgence, omission or event. Only an express written waiver signed by the Minister shall be conclusively deemed to be limited to the circumstance or right or remedy therein specified.

OTHER SPECIAL CONDITIONS:

24. 1. Fencing and/or rock berms must be maintained around the sides of the test pits.
2. Test pits are to be filled in and revegetated with native shrubs from the site if no further activity is to take place. These areas are not to be seeded with grasses;
3. Proper control structures must be maintained to prevent any silt or other contaminants from moving off-site;
4. Extreme care must be taken that no activity takes place near or inside the Tobeatic Protected Area. Gordon Wilson, the Area Supervisor, in the Tuskot office is to be contacted when working near the Protected Area so that the boundary line can be identified;
5. The Area Supervisor is to be notified whenever any work is to be carried out. This notification can be given to the Tuskot Office of DNR at 648-3540.

DATED the 13 day of July, A.D., 2001, at Lawrencetown,
in the County of Annapolis, Province of Nova Scotia.

Murray Brown
Witness

On Behalf of the Regional Resource Manager

Peter J. Francis
Peter J. Francis, P. Eng.
Regional Coordinator, Land Administration

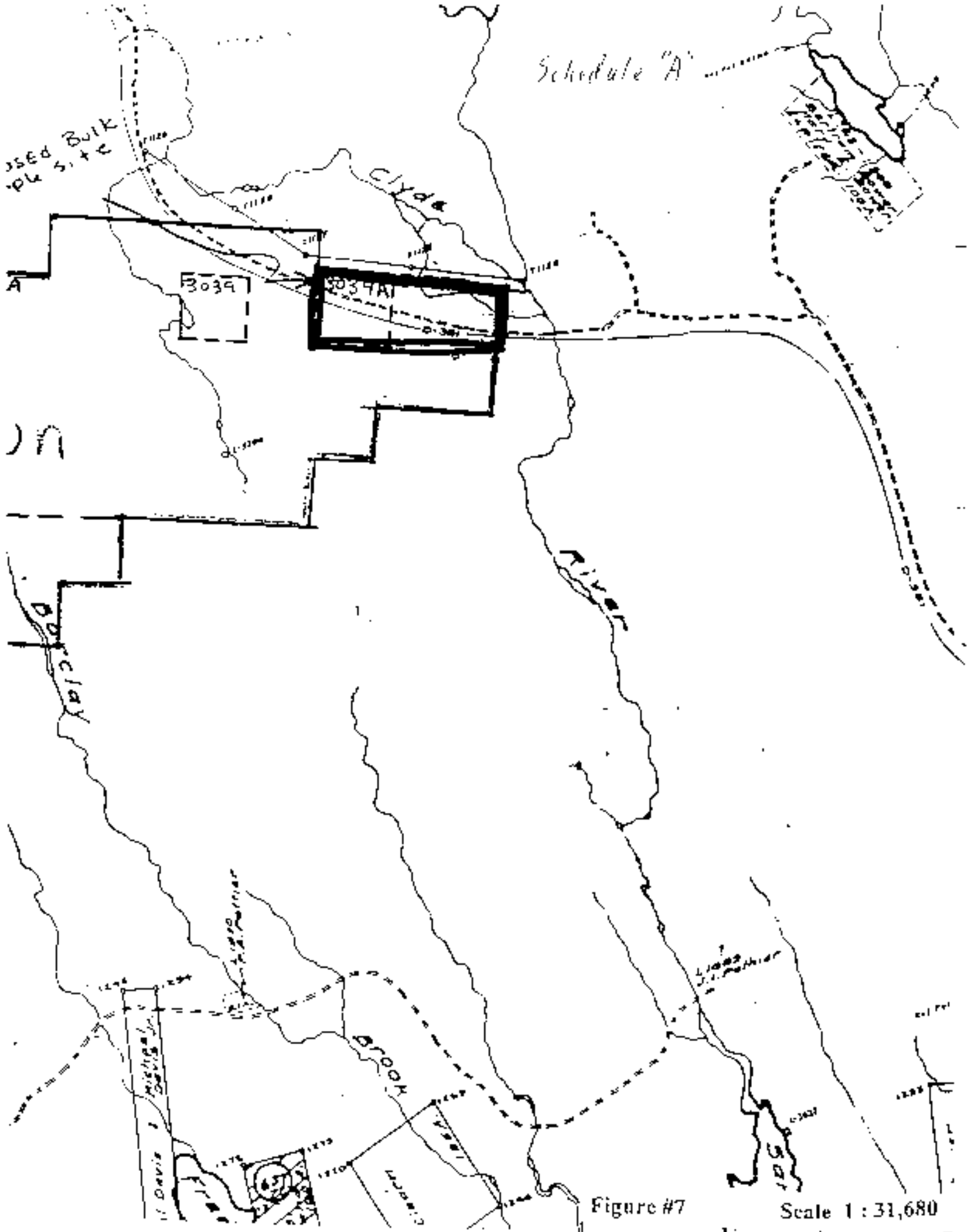
Nova Industrial Minerals Inc.
Permit Holder (if a company is involved, two
officers are to sign and the company seal affixed.
If the company has appointed an agent to make an
application on its behalf, the company must
present a letter to this effect to the Manager.)

Witness

per D. K. Wood PRESIDENT

Witness

per [Signature] VICE PRESIDENT



Regional Offices Division
Western Region

Unit file no.:
13-00-0067

Mark Farrell, Acting
District Manager, Yarmouth

July 20, 2000

C A G Enterprises Ltd.
C/O W. G. Shaw & Associates Ltd.
65 Beech Hill Road
Antigonish, Nova Scotia
B2G 2P9

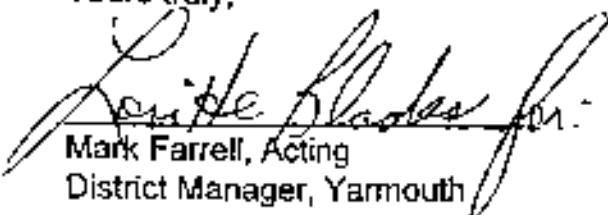
Attention: W.G. Shaw

Dear Mr. Shaw:

Enclosed is approval for Industrial approval for C A G Enterprises Ltd. to conduct a bulk sample at Flintrock, Yarmouth Municipality, Nova Scotia

Should you have any questions, or require further assistance, please contact Mr. Robert Rowe P. Eng., Middleton, at 825-2123.

Yours truly,


Mark Farrell, Acting
District Manager, Yarmouth

Enclosure

c.c. Robert Rowe, P. Eng.

DEPARTMENT OF THE ENVIRONMENT

Industrial Approval

Pursuant to the Environment Act and Regulations made pursuant thereto, and subject to the Terms and Conditions contained in the Approval, this Approval is granted to C A G Enterprises Ltd., to conduct a bulk sample at its site in Flintrock, in the Municipality of Yarmouth County, in the Province of Nova Scotia.

Granted at Yarmouth, in the County of Yarmouth, Province of Nova Scotia, this 19th day of July, A.D. 2000.

00-IAW-030

APPROVAL NUMBER

David J. Sholes
ADMINISTRATOR

TERMS AND CONDITIONS OF APPROVAL

NOVA SCOTIA DEPARTMENT OF THE ENVIRONMENT

Project: C A G Enterprises Ltd.
c/o W. G. Shaw & Associates Ltd.
65 Beech Hill Road
Antigonish, Nova Scotia
B2G 2P9

Bulk Sample (Silica)

Approval No: 00-IAW-030

File No: 11-00-0067

Conditions:

This application is recommended for approval subject to the following terms and conditions:

1. Scope of Approval

This approval relates to C. A. G. Enterprises Ltd., hereafter called the "proponent" and their request to excavate a 10,000 ton bulk sample as shown in their proposal dated June 14, 2000, and as amended by fax on July 11, 2000 to exclude pit B (Kaolin deposit) at this time.

2. General Terms and Conditions

a) The proponent shall conduct the silica bulk sample in accordance with provisions of the:

- i) Environment Act, SNS 1994-95 C.1;**
- ii) Regulations pursuant to the above Act;**
- iii) Local municipal environmental bylaws, zoning restrictions.**

b) The Minister reserves the right to modify, amend, or add terms and conditions to this Industrial Approval at any time provided that any modification, addition, or amendment is deemed necessary to ensure adequate environmental protection.

- c) This Industrial Approval is not transferrable without the written permission of the Minister.
- d) If the Minister determines that there has been non-compliance with any or all of the terms and conditions provided in this Approval issued pursuant to Section 56(1) of the Environment Act, the Minister may in accordance with Section 58 (2)(b) cancel or suspend, the approval until such time as the Minister is satisfied that all terms and conditions have been met.
- e) The proponent shall notify the Nova Scotia Department of the Environment prior to any process changes or waste disposal practices not approved under authorization of this approval.
- f) The proponent shall bear all expenses incurred in carrying out the environmental monitoring required under the terms and conditions of this approval.
- g) The proponent shall develop the site in such a manner as to expose only the areas that are currently being used/excavated.
- h) The proponent shall ensure that this approval or a copy is kept on-site at all times and that personnel directly involved in the project are made fully aware of the terms and conditions which pertain to this approval.
- i) The proponent will be required to register their project for Environmental Assessment under Part IV of the Environment Act should the bulk sample exceed 10,000 tonnes and/or a mining operation is proposed.
- j) The proponent shall submit a legal property boundary survey outlining the area of the site. This survey shall be submitted within two (2) calendar months from the date of issuances of the approval.

3. Particulate Emissions

- a) Particulate emissions shall not exceed the following limits at the site property boundaries:

Annual Geometric Mean	70ug/m ³
Daily Average (24 hrs)	120 ug/m ³

- b) The generation of fugitive dust from the site will be suppressed by the application of water sprays, or the application of other suitable dust suppressants approved by the Department.
- c) Site access road(s) shall be maintained to minimize dust generation. The use of waste oil is not permitted.

NOTE: Monitoring of Particulate Emissions shall be at the request of the Nova Scotia Department of the Environment District Office.

4. Sound Levels

Sound levels measured at the property boundaries shall not exceed the following equivalent sound levels (Leq):

Leq	65 dBA 0700-1900 hours (Days)
	60 dBA 1900-2300 hours (Evenings)
	55 dBA 2300-0700 hours (Night)

NOTE: Monitoring shall be at the request of the Nova Scotia Department of the Environment District Office.

5. Surface Water

- a) The site shall be maintained to prevent siltation of the surface water which is discharged from the property boundaries into the nearest watercourse. This includes the installation of soil erosion and sedimentation control designed to meet the specifications of this Department.
- b) All erosion and sedimentation control devices shall be installed prior to any excavation of material.
- c) If it becomes necessary to drain the excavated area, the wastewater shall be drained to settling ponds for appropriate water treatment to meet the suspended solids limits outlined in condition 5 (d).
- d) The proponent shall sample and ensure the following liquid effluent levels are

met:

Final Effluent Discharge Limits

Parameters	Maximum in a Grab Sample	Monthly Arithmetic Mean	Monitoring Frequency
Total suspended solids	25 mg/l	10 mg/l	weekly
pH	5-9	6-9	weekly

- e) **Non-compliance of the above final effluent discharge limits shall be immediately reported to the Nova Scotia Department of the Environment District Office.**
 - f) **Monitoring stations for liquid effluent shall be determined by the Nova Scotia Department of the Environment District Office following a final inspection of the site.**
 - g) **A monthly summary of results of monitoring shall be submitted to the Nova Scotia Department of the Environment District Office.**
 - h) **The proponent shall secure an approval amendment to conduct washing of aggregate on site.**
6. **Ground water**
- a) **The proponent shall replace, at their expense, any water supply which has been lost or damaged as a result of extracting aggregate.**
 - b) **The proponent shall secure from the Minister an approval amendment prior to excavating below the watertable.**
7. **Separation Distances**
- a) **The proponent shall maintain a 30 m (100 feet) separation distance from the**

excavation, to the road allowance of any common or public highway.

- b) The proponent shall not locate any buildings, product stockpiles, plant or structures within 30 m (100 feet) of the boundary of the pit/quarry property.
- c) The proponent shall maintain a 30 m (100 feet) separation distance from the pit or quarry excavation and associated works from the bank top or high water mark of any surface watercourse.
- d) The proponent shall maintain a 15 m (50 feet) separation distance from the pit/quarry excavation to any other property boundary.

8. Botanical Inventory

A botanical inventory shall be conducted on the site, by the proponent prior to any further ground disturbances.

9. Landowners Permission

The proponent shall obtain the permission of the landowner prior to any further work on the site. They should contact Peter Francis (Regional Co-Ordinator of Crown Land Administration) in the Department of Natural Resources Office in Lawrencetown. A copy of this permission shall be submitted to the attention of Mark Farrell to the Department of Environment office in Yarmouth, phone 902-742-8985, prior to further work on site.

10. Reclamation

- a) The site shall be progressively reclaimed and rehabilitated where possible by grading, contouring and revegetating the disturbed land. The site shall be revegetated with local native plant species found in the Shelburne Barrens type habitat.
- b) The proponent shall submit a rehabilitation plan to the Nova Scotia Department of the Environment for approval .
- c) The proponent shall rehabilitate the site within six (6) months of abandonment and in accordance with the approved rehabilitation plan or other terms as

specified by the department.

- d) The proponent shall post a security in a form acceptable to the Department of Environment for rehabilitation.
- e) The Nova Scotia Department of the Environment shall release the security to the proponent after rehabilitation of the active area has been completed to the satisfaction of the Minister of the Environment.
- f) The proponent shall ensure that any security posted for rehabilitation be kept valid for the term of the approval.
- g) All top soil and overburden shall remain on site to be used in rehabilitation of the pit.
- h) The Kaolin trench in the area of proposed Pit B should be filled in immediately and rehabilitated, as per approval from the Nova Scotia Department of Natural Resources.
- i) The proponent must prevent large animals, such as moose from gaining access to the excavated area and if such an event occurs, suitable means to exit the area must be available.

11. Blasting

A blasting design and plan shall be submitted to the Department of Environment for review and approval prior to any blasting being conducted. All blasting is to be conducted in accordance with good practices and the Nova Scotia Department of Environment Pit and Quarry Guidelines revised May 1999 or newer versions.

12. Duration of Approval

This approval will expire two years from the date of issue.

July 31, 2000

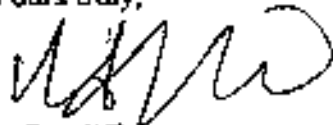
Mr. W.G. Shaw
CAG Enterprises Limited
65 Beech Hill Road
Antigonish, NS B2G 2P9

Dear Mr. Shaw:

RE: Excavation Permit No. E-146

Enclosed please find Excavation Permit No. E-146. This permit is valid until October 30, 2000. Be advised that in addition to the *Mineral Resources Act*, you are to comply with the *Occupational Health and Safety Act*, the *Environment Act*, and Regulations thereunder and the *Crown Lands Act* and, where applicable, the *Special Places Protection Act*, and any other relevant legislation. You are to advise the Registrar that the site disturbed under the authority of Excavation Permit No. 146 has been reclaimed on or before October 30, 2000, and are to abide by the terms of your Letter of Authority as granted on July 28, 2000.

Yours truly,



R. Ratcliffe
Registrar of Mineral
and Petroleum Titles

RR/mc

Enclosure

cc: D. Jones
J. Campbell
S. Marshall
P. McCulloch
J. Vance, Dept. of Labour
B. Matlock, Dept. of Environment

August 1, 2000

Mr. W.G. Shaw
W.G. Shaw & Associates
Highland Professional Centre
65 Beech Hill Road
Antigonish, NS B2G 2P9

To: Jim Mc Donald

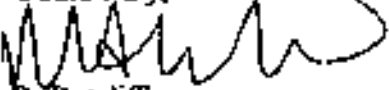
Dear Mr. Shaw:

RE: Excavation Permit No. E-143

Further to your request dated July 31, 2000, I note that Excavation Permit No. E-143 authorized the extraction of up to 50 tonnes of material from three (3) trenches. If your intended program of the collection of small samples of Kaolin in the order of seven tonnes each and the work already undertaken on this property does not exceed the maximum authorization (50 tonnes) and if the land owner is in agreement that the site disturbed under the authority of Excavation Permit No. E-143 may remain un-reclaimed to that date, then I have no objection to move the reclamation date ahead to October 30, 2000.

I note that the reclamation bond of \$4,000.00 formerly held in connection with Excavation Permit No. E-143 has been combined with a new bond of \$3,500.00 to support the issuance of Excavation Permit No. E-146. I will require a statement from the landowner that an additional bond is not required to support this request.

Yours truly,



R. Ratcliffe
Registrar of Mineral
and Petroleum Titles

RR/mc

cc: Dr. D. Jones
Mr. P. Hannon
Mr. P. Francis
Mr. P. McCulloch
Ms. S. Marshall
Mr. J. Vance
Mr. B. Matlock

APPENDIX C

REPORT ON SPECTROMETER SURVEY –
NOVA SCOTIA DEPARTMENT OF NATURAL RESOURCES

mculloch@north.nsis.com

May 3, 2001

Mr. Guy MacGillivray
13 Gilloy Road, RR#7
Antigonish, Nova Scotia
B2G 2L4

Dear Guy:

In response to your recent request regarding the results of the spectrometer survey that was carried out at the Flintstone Rock kaolin/silica property during my visit on September 21, 2000, please be advised that I did not detect any indications of anomalous radiation associated with potential uranium mineralization in the immediate vicinity of the property.

A Urtec Differential Gamma Ray Spectrometer, Model UGI35, was used to examine representative drill core samples, exposed bedrock in the area of the excavation work, and float in the general vicinity of the property for potential uranium mineralization. The unit was set to read total count (full spectrum radiation above 80 keV). No anomalous readings were encountered in either the drill core or any of the bedrock or float material examined on the property. The silica and kaolinite/quartz breccias had very low background values and the results for the locally derived granitic float examined on the property carried typical background values for intrusive rocks in the area.

Please contact me if you have any additional questions regarding the spectrometer survey carried out on the CAG Enterprises property.

Yours very truly,

Paul D. McCulloch
Exploration Monitor, Mineral and Petroleum Titles

cc. Rick Ratcliffe

APPENDIX D
SURFACE WATER QUALITY DATA

SW-1

General Chemistry -Analytical Results

Parameters	Units	23-Apr-00	28-May-00	28-Aug-00	25-Apr-01	01-Jun-01	28-Jun-01	26-Jul-01	28-Aug-01	12-Sep-01	CCME Guidelines 1999
Sodium	mg/L	3.2	3.1	7.3	3	3.2	3.9	4.5	5.3	4.7	
Potassium	mg/L	0.2	0.2	0.1	0.2	nd	0.4	0.2	0.3	0.4	
Calcium	mg/L	2.4	0.3	0.5	0.3	0.2	0.5	0.5	0.4	0.3	
Magnesium	mg/L	0.32	0.29	0.37	0.2	0.2	0.3	0.3	0.4	0.3	
Alkalinity (as CaCO3)	mg/L	3.2	nd	3	nd	nd	nd	nd	nd	nd	
Sulfate	mg/L	3.8	2.2	nd	nd	nd	nd	6	nd	25	
Chloride	mg/L	6.1	6.1	5.8	4.9	5.6	6	7.8	8.8	8.5	
Reactive Silica (as SiO2)	mg/L	2.8	1.9	4.3	1	2	1.3	1.5	2.2	1.4	
Phosphorus	mg/L	na	na	na	nd	nd	nd	nd	nd	0.1	
Ortho Phosphate (as P)	mg/L	nd	nd	nd	0.1	nd	0.1	nd	nd	nd	
Nitrite	mg/L	na	na	na	nd	0.01	nd	nd	nd	0.01	0.06
Nitrate + Nitrite (as N)	mg/L	nd	0.45	nd	nd	nd	nd	nd	nd	nd	
Nitrate (as N)	mg/L	na	na	na	nd	nd	nd	nd	nd	nd	
Ammonia (as N)	mg/L	nd	nd	0.04	nd	nd	nd	nd	nd	nd	1.37-2.20
Dissolved Organic Carbon	mg/L	10.2	13.7	30.8	8.8	14.9	15	9	19.8	16.8	
Color	TCU	154	186	334	89	110	100	180	220	100	
Turbidity	NTU	2.5	2.6	0.5	0.4	0.4	1.1	0.6	0.3	0.4	
Total Suspended Solids	mg/L	na	5	1	nd	nd	5	nd	0.5	nd	
Conductance (RCAp)	uS/cm	na	na	50.7	38	43	33	41	47	40	
pH	Units	6.3	4.2	4.2	4.7	4.8	4.8	4.4	4.4	4.8	6.5-9.0
Hardness (as CaCO3)	mg/L	7.4	1.9	2.8	1.6	1.3	2.5	2.5	2.6	2	
Bicarbonate (as CaCO3)	mg/L	3.2	0.4	3	nd	nd	nd	nd	nd	nd	
Carbonate (as CaCO3)	mg/L	nd	nd	nd	nd	nd	nd	nd	nd	nd	
TDS (Calculated)	mg/L	20.8	14.8	21.2	12	14	16	22	20	44	
Cation Sum	meq/L	na	na	na	0.19	0.19	0.26	0.29	0.33	0.27	
Anion Sum	meq/L	na	na	na	0.2	0.22	0.25	0.37	0.31	0.86	
Ion Balance	%	na	na	na	3.24	8.64	2.85	11.2	3.27	51.8	
Langlier Index @ 4C		na	na	na	-7.11	-7.01	-7.01	-7.41	-7.41	-6.32	
Langlier Index @ 20C		na	na	na	-6.71	-6.61	-6.61	-7.01	-7.01	-5.92	
Saturation pH @ 4C	Units	na	na	na	11.8	11.8	11.8	11.8	11.8	11.1	
Saturation pH @ 20C	Units	na	na	na	11.4	11.4	11.4	11.4	11.4	10.7	

Notes:

* varies with hardness

nd non-detect

na not analyzed

ns not sampled

CCME Freshwater Aquatic Life Guidelines 1999 - Canadian Council of the Ministers of Environment

SW-1

Metals -Analytical Results

Parameters	Units	23-Apr-00	28-May-00	28-Aug-00	25-Apr-01	01-Jun-01	28-Jun-01	26-Jul-01	28-Aug-01	12-Sep-01	CCME Guidelines 1999
Aluminum	mg/L	na	na	0.4	0.23	0.39	0.51	0.39	410	360	0.005-0.1 ¹
Antimony	mg/L	na	na	0.0005	nd	nd	nd	nd	nd	nd	
Arsenic	mg/L	na	na	0.0009	nd	nd	nd	nd	nd	nd	0.005
Barium	mg/L	na	na	0.0112	nd	nd	nd	nd	nd	nd	
Beryllium	mg/L	na	na	nd	nd	nd	nd	nd	nd	nd	
Bismuth	mg/L	na	na	na	nd	nd	nd	nd	nd	nd	
Boron	mg/L	na	na	0.01	nd	0.007	0.006	0.01	0.007	0.006	
Cadmium	mg/L	na	na	nd	nd	nd	nd	nd	nd	nd	0.000017
Chromium	mg/L	na	na	0.0012	nd	nd	nd	nd	nd	nd	0.0089
Cobalt	mg/L	na	na	nd	nd	nd	nd	nd	nd	nd	
Copper	mg/L	nd	nd	0.0051	nd	nd	nd	nd	nd	nd	0.002-0.004 ²
Iron	mg/L	na	na	na	0.07	0.13	0.31	0.37	0.33	0.36	0.3
Lead	mg/L	na	na	0.001	0.0006	0.0014	0.0018	0.0009	0.0007	0.0009	0.001-0.007 ²
Manganese	mg/L	na	na	na	0.008	0.008	0.01	0.009	0.009	0.007	
Molybdenum	mg/L	na	na	na	nd	nd	nd	nd	nd	nd	
Nickel	mg/L	na	na	nd	nd	nd	nd	nd	nd	nd	0.025-0.15 ²
Selenium	mg/L	na	na	nd	nd	nd	nd	nd	nd	nd	0.001
Silver	mg/L	na	na	nd	nd	nd	nd	nd	nd	nd	0.0001
Strontium	mg/L	na	na	0.0087	nd	nd	nd	nd	nd	nd	
Thallium	mg/L	na	na	nd	nd	nd	nd	nd	nd	nd	0.0008
Tin	mg/L	na	na	nd	nd	nd	nd	nd	nd	nd	
Titanium	mg/L	na	na	na	nd	0.002	0.003	0.06	0.002	0.003	
Uranium	mg/L	na	na	0.0004	0.0004	0.0006	0.0008	0.0005	0.0005	0.0009	
Vanadium	mg/L	na	na	0.0006	nd	nd	nd	nd	nd	nd	
Zinc	mg/L	nd	0.0018	0.007	0.003	0.004	0.01	0.018	0.006	0.01	0.03

Notes:

* varies with hardness

nd non-detect

na not analyzed

ns not sampled

CCME Freshwater Aquatic Life Guidelines 1999 - Canadian Council of the Ministers of Environment

1 0.005 at pH<6.5;0.1 at pH>6.5

SW-2

General Chemistry -Analytical Results

Parameters	Units	23-Apr-00	28-May-00	28-Aug-00	25-Apr-01	01-Jun-01	28-Jun-01	26-Jul-01	28-Aug-01	12-Sep-01	CCME Guidelines 1999
Sodium	mg/L	3.2	3.1	4.2	2.9	4.3	3.4	5.2	4.1	4.3	
Potassium	mg/L	0.3	0.3	0.5	0.1	1.2	0.3	0.5	0.3	0.3	
Calcium	mg/L	0.4	0.2	0.2	0.2	0.4	0.4	0.9	0.4	0.6	
Magnesium	mg/L	0.26	0.08	0.11	0.2	0.2	0.2	0.4	0.4	0.3	
Alkalinity (as CaCO ₃)	mg/L	nd	nd	nd	nd	nd	nd	nd	nd	nd	
Sulfate	mg/L	3.1	2.2	nd	nd	nd	22	7	nd	19	
Chloride	mg/L	3.8	5.6	4.6	4.9	6	5.8	8.8	6.2	7.3	
Reactive Silica (as SiO ₂)	mg/L	2.1	2.4	5.8	1.5	2.7	2.4	1.6	4.3	3	
Phosphorus	mg/L	na	na	na	nd	nd	nd	0.1	nd	nd	
Ortho Phosphate (as P)	mg/L	nd	nd	nd	0.1	nd	0.1	0.01	nd	nd	
Nitrite	mg/L	na	na	na	nd	nd	nd	nd	nd	nd	0.06
Nitrate + Nitrite (as N)	mg/L	nd	nd	nd	nd	nd	nd	nd	nd	nd	
Nitrate (as N)	mg/L	na	na	na	nd	nd	nd	nd	nd	nd	
Ammonia (as N)	mg/L	nd	nd	nd	nd	nd	nd	nd	nd	nd	1.37-2.20
Dissolved Organic Carbon	mg/L	10.3	13.9	13.7	8.6	14.5	14.9	9.6	16	12.3	
Color	TCU	13	17.6	152	100	100	96	150	140	69	
Turbidity	NTU	3.3	2.5	0.3	0.4	0.4	0.5	11.6	0.5	1.2	
Total Suspended Solids	mg/L	na	3	4	nd	nd	nd	11.9	1	nd	
Conductance (RCAp)	uS/cm	na	na	na	38	42	34	41	45	36	
pH	Units	4.4	4.1	4.5	4.4	4.4	4.5	4.6	4.4	4.7	6.5-9.0
Hardness (as CaCO ₃)	mg/L	2	1.5	1.8	1.3	1.8	1.8	3.9	2.6	2.7	
Bicarbonate (as CaCO ₃)	mg/L	0.4	0.4	0.4	nd	nd	nd	nd	nd	nd	
Carbonate (as CaCO ₃)	mg/L	nd	nd	nd	nd	nd	nd	nd	nd	nd	
TDS (Calculated)	mg/L	13.4	14.2	16.8	13	18	39	25	19	38	
Cation Sum	meq/L	na	na	na	0.2	0.3	0.24	0.35	0.28	0.27	
Anion Sum	meq/L	na	na	na	0.2	0.23	0.74	0.42	0.24	0.86	
Ion Balance	%	na	na	na	1.2	11.9	50.7	9.41	8.1	51.8	
Langlier Index @ 4C		na	na	na	-7.41	-7.41	-6.62	-7.22	-7.41	-6.32	
Langlier Index @ 20C		na	na	na	-7.01	-7.01	-6.22	-6.82	-7.01	-5.92	
Saturation pH @ 4C	Units	na	na	na	11.8	11.8	11.1	11.8	11.8	11.1	
Saturation pH @ 20C	Units	na	na	na	11.4	11.4	10.7	11.4	11.4	10.7	

Notes:

* varies with hardness

nd non-detect

na not analyzed

ns not sampled

CCME Freshwater Aquatic Life Guidelines 1999 - Canadian Council of the Ministers of Environment

SW-2 - Metals

Parameters	Units	23-Apr-00	28-May-00	28-Aug-00	25-Apr-01	01-Jun-01	28-Jun-01	26-Jul-01	28-Aug-01	12-Sep-01	CCME Guidelines 1999
Aluminum	mg/L	na	na	0.398	0.22	0.39	0.34	0.56	0.41	0.28	0.005-0.1 ¹
Antimony	mg/L	na	na	0.0005	nd	nd	nd	nd	nd	nd	
Arsenic	mg/L	na	na	0.0009	nd	nd	nd	nd	nd	nd	0.005
Barium	mg/L	na	na	0.0112	nd	nd	nd	nd	nd	nd	
Beryllium	mg/L	na	na	nd	nd	nd	nd	nd	nd	nd	
Bismuth	mg/L	na	na	nd	nd	nd	nd	nd	nd	nd	
Boron	mg/L	na	na	0.01	nd	0.02	0.006	0.013	0.008	0.006	
Cadmium	mg/L	na	na	nd	nd	0.0018	nd	nd	nd	nd	0.000017
Chromium	mg/L	na	na	0.0012	nd	nd	nd	nd	nd	nd	0.0089
Cobalt	mg/L	na	na	nd	nd	nd	nd	nd	nd	nd	
Copper	mg/L	nd	nd	0.0051	nd	0.006	nd	0.002	nd	nd	0.002-0.004 ²
Iron	mg/L	0.07	0.08	0.11	0.17	0.17	0.18	0.92	0.22	0.18	0.3
Lead	mg/L	na	na	0.001	0.0006	0.0013	0.0011	0.003	0.0008	0.0008	0.001-0.007 ²
Manganese	mg/L	nd	nd	nd	0.006	0.008	0.006	0.002	0.007	0.008	
Molybdenum	mg/L	na	na	na	nd	nd	nd	nd	nd	nd	
Nickel	mg/L	na	na	nd	nd	3	nd	nd	nd	nd	0.025-0.15 ²
Selenium	mg/L	na	na	na	nd	nd	nd	nd	nd	nd	0.001
Silver	mg/L	na	na	na	nd	nd	nd	nd	nd	nd	0.0001
Strontium	mg/L	na	na	0.0087	nd	nd	nd	nd	nd	nd	
Thallium	mg/L	na	na	na	nd	nd	nd	nd	nd	nd	0.0008
Tin	mg/L	na	na	na	nd	nd	nd	nd	nd	nd	
Titanium	mg/L	na	na	na	nd	0.002	0.002	0.057	0.002	nd	
Uranium	mg/L	na	na	0.0004	0.0004	0.0006	0.0006	0.0008	0.0005	0.0004	
Vanadium	mg/L	na	na	0.0006	nd	nd	nd	nd	nd	nd	
Zinc	mg/L	nd	0.0018	0.007	0.056	0.028	0.007	0.033	0.005	0.008	0.03

Notes: * varies with hardness

nd non-detect

na not analyzed

ns not sampled

CCME Freshwater Aquatic Life Guidelines 1999 - Canadian Council of the Ministers of Environment

1 0.005 at pH<6.5;0.1 at pH>6.5

2 varies with hardness

SW-3

General Chemistry -Analytical Results

Parameters	Units	23-Apr-00	28-May-00	28-Aug-00	25-Apr-01	01-Jun-01	28-Jun-01	26-Jul-01	28-Aug-01	12-Sep-01	CME Guidelines 1999
Sodium	mg/L	0.3	na	2.6	20.1	21.7	14.8	10.3	ns	ns	
Potassium	mg/L	0.2	na	0.1	1.6	0.2	0.4	0.5	ns	ns	
Calcium	mg/L	0.4	0.2	0.3	1	1.5	1.6	0.8	ns	ns	
Magnesium	mg/L	0.22	0.27	0.2	0.5	0.5	0.3	0.3	ns	ns	
Alkalinity (as CaCO3)	mg/L	nd	nd	nd	na	na	na	na	ns	ns	
Sulfate	mg/L	3.4	2.2	na	na	na	31	3	ns	ns	
Chloride	mg/L	3.4	5.6	1.6	29.7	36.4	20.5	14.4	ns	ns	
Reactive Silica (as SiO2)	mg/L	2.9	2.4	8.8	na	0.5	0.6	0.7	ns	ns	
Phosphorus	mg/L	na	na	na	0.02	na	na	0.4	ns	ns	
Ortho Phosphate (as P)	mg/L	nd	nd	nd	0.1	na	0.2	0.02	ns	ns	
Nitrite	mg/L	na	na	na	na	na	na	0.01	ns	ns	0.06
Nitrate + Nitrite (as N)	mg/L	nd	nd	nd	na	na	na	na	ns	ns	
Nitrate (as N)	mg/L	na	na	na	na	na	na	na	ns	ns	
Ammonia (as N)	mg/L	na	na	na	na	na	na	na	ns	ns	1.37-2.20
Dissolved Organic Carbon	mg/L	11.1	13.9	10.9	13.8	14.6	21.8	15.6	ns	ns	
Color	TCU	137	176	113	110	77	160	95	ns	ns	
Turbidity	NTU	2.5	2.5	0.3	0.6	3.5	1.8	15.2	ns	ns	
Total Suspended Solids	mg/L	na	7	14	96	22.8	22.3	116	ns	ns	
Conductance (RCAP)	uS/cm	nd	nd	nd	124	140	97	60	ns	ns	
pH	Units	4.5	4.1	4.7	4.2	4.6	5	4.7	ns	ns	6.5-9.0
Hardness (as CaCO3)	mg/L	1.9	1.5	1.5	4.6	5.8	5.2	3.2	ns	ns	
Bicarbonate (as CaCO3)	mg/L	0.4	0.4	3.8	na	na	na	na	ns	ns	
Carbonate (as CaCO3)	mg/L	na	na	na	na	na	na	na	ns	ns	
TDS (Calculated)	mg/L	13.2	14.2	16.8	56	64	74	31	ns	ns	
Cation Sum	meq/L	na	na	na	1.07	1.09	0.79	0.35	ns	ns	
Anion Sum	meq/L	na	na	na	0.9	1.09	1.34	0.42	ns	ns	
Ion Balance	%	na	na	na	8.62	0.1	26.1	9.41	ns	ns	
Langlier Inaex @ 4C		na	na	na	-7.63	-7.05	-5.93	-7.22	ns	ns	
Langlier Inaex @ 20C		na	na	na	-7.23	-6.65	-5.53	-6.82	ns	ns	
Saturation pH @ 4C	Units	na	na	na	11.8	11.7	10.9	11.8	ns	ns	
Saturation pH @ 20C	Units	na	na	na	11.4	11.3	10.5	11.4	ns	ns	

Notes:

* varies with hardness

nd non-detect

na not analyzed

ns not sampled

SW-3

Metals -Analytical Results

Parameters	Units	23-Apr-00	28-May-00	28-Aug-00	25-Apr-01	01-Jun-01	28-Jun-01	26-Jul-01	28-Aug-01	12-Sep-01	CCME Guidelines 1999
Aluminum	mg/L	na	na	0.21	0.25	0.26	0.46	0.5	ns	ns	0.005-0.1 ¹
Antimony	mg/L	na	na	0.0005	na	na	na	na	ns	ns	
Arsenic	mg/L	na	na	0.0008	na	na	na	0.002	ns	ns	0.005
Barium	mg/L	na	na	0.0003	na	na	0.008	0.005	ns	ns	
Beryllium	mg/L	na	na	nd	na	na	na	na	ns	ns	
Bismuth	mg/L	na	na	nd	na	na	na	na	ns	ns	
Boron	mg/L	na	na	0.01	0.03	0.014	0.007	0.008	ns	ns	
Cadmium	mg/L	na	na	nd	na	na	na	0.0004	ns	ns	0.000017
Chromium	mg/L	na	na	nd	na	na	na	na	ns	ns	0.0089
Cobalt	mg/L	na	na	nd	na	na	1	na	ns	ns	
Copper	mg/L	nd	nd	nd	na	na	0.003	0.002	ns	ns	0.002-0.004 ²
Iron	mg/L	0.04	0.08	0.02	0.24	0.72	1.7	1.1	ns	ns	0.3
Lead	mg/L	na	na	0.0004	0.0008	0.0008	0.0038	0.0012	ns	ns	0.001-0.007 ²
Manganese	mg/L	nd	nd	nd	0.022	0.052	0.039	0.029	ns	ns	
Molybdenum	mg/L	na	na	nd	na	na	na	na	ns	ns	
Nickel	mg/L	na	na	nd	na	na	na	0.002	ns	ns	0.025-0.15 ²
Selenium	mg/L	na	na	nd	na	na	na	na	ns	ns	0.001
Silver	mg/L	nd	nd	nd	na	na	na	na	ns	ns	0.0001
Strontium	mg/L	na	na	0.0028	0.006	0.008	0.007	0.005	ns	ns	
Thallium	mg/L	na	na	na	na	na	na	0.0001	ns	ns	0.0008
Tin	mg/L	na	na	na	na	na	na	na	ns	ns	
Titanium	mg/L	na	na	na	na	0.002	0.003	0.046	ns	ns	
Uranium	mg/L	na	na	0.0005	0.0001	0.0002	0.0002	0.0003	ns	ns	
Vanadium	mg/L	na	na	na	na	na	na	na	ns	ns	
Zinc	mg/L	nd	nd	0.007	0.021	0.013	0.016	0.021	ns	ns	0.03

Notes:

* varies with hardness

nd non-detect

na not analyzed

ns not sampled

CCME Freshwater Aquatic Life Guidelines 1999 - Canadian Council of the Ministers of Environment

1 0.005 at pH<6.5;0.1 at pH>6.5

2 varies with hardness

SW-4

General Chemistry -Analytical Results

Parameters	Units	23-Apr-00	28-May-00	28-Aug-00	25-Apr-01	01-Jun-01	28-Jun-01	26-Jul-01	28-Aug-01	12-Sep-01	DCME Guidelines 1999
Sodium	mg/L	2.8	3.6	3.7	4.5	3.9	3.3	4.1	4.9	5.1	
Potassium	mg/L	0.3	0.3	0.2	0.3	0.1	0.2	0.6	0.3	0.4	
Calcium	mg/L	0.3	0.3	0.3	0.3	0.6	0.6	0.3	0.4	0.4	
Magnesium	mg/L	0.16	0.22	0.21	0.2	0.2	0.2	0.3	0.3	0.3	
Alkalinity (as CaCO ₃)	mg/L	nd	nd	1	nd	nd	nd	nd	nd	nd	
Sulfate	mg/L	3.3	2.2	nd	nd	nd	28	5	nd	32	
Chloride	mg/L	3.2	5.7	5.4	7	6.4	5.3	6.3	7.3	7	
Reactive Silica (as SiO ₂)	mg/L	3.3	4.5	8	3.3	4.8	6	7.2	6.8	7.9	
Phosphorus	mg/L	na	na	na	0.01	nd	nd	nd	nd	nd	
Ortho Phosphate (as P)	mg/L	nd	nd	0.03	0.1	nd	nd	nd	0.01	nd	
Nitrite	mg/L	na	na	na	nd	nd	nd	nd	nd	0.01	0.06
Nitrate + Nitrite (as N)	mg/L	nd	nd	nd	nd	nd	nd	nd	nd	nd	
Nitrate (as N)	mg/L	na	na	na	nd	nd	nd	nd	nd	nd	
Ammonia (as N)	mg/L	nd	nd	nd	nd	nd	nd	nd	nd	nd	1.37-2.20
Dissolved Organic Carbon	mg/L	10.3	15.2	11.4	11.5	16.4	20.7	22.3	25.4	25.5	
Color	TCU	135	165	314	92	130	130	210	200	150	
Turbidity	NTU	2.6	2	0.4	0.3	0.3	0.3	0.3	0.4	0.6	
Total Suspended Solids	mg/L	na	4.1	5.3	6	nd	2	2.5	1.9	nd	
Conductance (RCAp)	uS/cm	na	na	na	43	44	35	37	49	40	
pH	Units	4.4	4.1	5.3	4.4	4.4	4.4	4.4	4.3	4.5	6.5-9.0
Hardness (as CaCO ₃)	mg/L	1.4	1.3	1.4	1.6	2.3	2.3	2	2.2	2.2	
Bicarbonate (as CaCO ₃)	mg/L	0.4	0.4	1	nd	nd	nd	nd	nd	nd	
Carbonate (as CaCO ₃)	mg/L	nd	nd	nd	nd	nd	nd	nd	nd	nd	
TDS (Calculated)	mg/L	13.3	17	19.4	18	19	48	25	23	56	
Cation Sum	meq/L	na	na	na	0.28	0.26	0.25	0.28	0.32	0.31	
Anion Sum	meq/L	na	na	na	0.26	0.25	0.85	0.31	0.27	0.97	
Ion Balance	%	na	na	na	2.9	3.22	54.2	4.89	8.16	51.2	
Langlier Index @ 4C		na	na	na	-7.41	-7.41	-6.73	-7.42	-7.51	-6.63	
Langlier Index @ 20C		na	na	na	-7.01	-7.01	-6.33	-7.42	-7.11	-6.23	
Saturation pH @ 4C	Units	na	na	na	11.8	11.8	11.1	11.8	11.8	11.1	
Saturation pH @ 20C	Units	na	na	na	11.4	11.4	10.7	11.4	11.4	10.7	

Notes:

* varies with hardness

nd non-detect

na not analyzed

ns not sampled

CCME Freshwater Aquatic Life Guidelines 1999 - Canadian Council of the Ministers of Environment

SW-4

Metals -Analytical Results

Parameters	Units	23-Apr-00	28-May-00	28-Aug-00	25-Apr-01	01-Jun-01	28-Jun-01	26-Jul-01	28-Aug-01	12-Sep-01	CCME Guidelines 1999
Aluminum	mg/L	na	na	0.192	0.27	0.45	0.51	0.48	0.54	0.54	0.005-0.1 ¹
Antimony	mg/L	na	na	0.0006	nd	nd	nd	nd	nd	nd	
Arsenic	mg/L	na	na	0.0006	nd	nd	nd	nd	nd	nd	0.005
Barium	mg/L	na	na	nd	nd	nd	nd	nd	nd	nd	
Beryllium	mg/L	na	na	nd	nd	nd	nd	nd	nd	nd	
Bismuth	mg/L	na	na	na	nd	nd	nd	nd	nd	nd	
Boron	mg/L	na	na	nd	0.006	0.007	0.005	0.005	0.009	nd	
Cadmium	mg/L	na	na	nd	nd	nd	nd	nd	nd	nd	0.000017
Chromium	mg/L	na	na	nd	nd	nd	nd	nd	nd	nd	0.0089
Cobalt	mg/L	na	na	nd	nd	nd	nd	nd	nd	nd	
Copper	mg/L	nd	nd	0.0009	nd	nd	0.003	nd	nd	nd	0.002-0.004 ²
Iron	mg/L	0.04	0.05	0.06	0.05	0.1	0.15	0.28	0.31	0.43	0.3
Lead	mg/L	na	na	0.0004	0.0008	0.0008	0.0012	0.0008	0.0009	0.0012	0.001-0.007 ²
Manganese	mg/L	na	na	nd	0.002	0.003	0.003	0.003	0.003	0.004	
Molybdenum	mg/L	na	na	nd	nd	nd	nd	0.008	nd	nd	
Nickel	mg/L	na	na	nd	nd	nd	nd	nd	nd	nd	0.025-0.15 ^a
Selenium	mg/L	na	na	nd	nd	nd	nd	nd	nd	nd	0.001
Silver	mg/L	na	na	nd	nd	nd	nd	nd	nd	nd	0.0001
Strontium	mg/L	na	na	0.0021	nd	nd	nd	nd	nd	nd	
Thallium	mg/L	na	na	nd	nd	nd	nd	nd	nd	nd	0.0008
Tin	mg/L	na	na	nd	nd	nd	nd	nd	nd	nd	
Titanium	mg/L	na	na	nd	nd	0.002	0.003	0.051	0.002	0.002	
Uranium	mg/L	na	na	0.0003	0.0004	0.0006	0.0008	0.0005	0.0004	0.0004	
Vanadium	mg/L	na	na	nd	nd	nd	nd	nd	nd	nd	
Zinc	mg/L	nd	0.0018	0.005	0.004	0.007	0.016	0.012	0.007	0.009	0.03

Notes:

* varies with hardness

nd non-detect

na not analyzed

ns not sampled

CCME Freshwater Aquatic Life Guidelines 1999 - Canadian Council of the Ministers of Environment

1 0.005 at pH<6.5;0.1 at pH>6.5

2 varies with hardness

SW-5

General Chemistry -Analytical Results

SW-5

Metals -Analy

Parameters	Units	23-Apr-00	28-May-00	28-Aug-00	25-Apr-01	#####	28-Jun-01	26-Jul-01	28-Aug-01	12-Sep-01	CCME Guidelines 1999	Parameters
Sodium	mg/L	ns	ns	3.3	4.6	2.6	3.8	3.2	3.3	3.2		Aluminum
Potassium	mg/L	ns	ns	nd	0.3	0.2	0.5	0.2	0.4	0.4		Antimony
Calcium	mg/L	ns	ns	0.4	0.2	0.2	0.3	0.3	0.4	0.4		Arsenic
Magnesium	mg/L	ns	ns	0.3	0.2	0.2	0.2	0.2	0.2	0.2		Barium
Alkalinity (as CaCO3)	mg/L	ns	ns	nd	nd	nd	nd	nd	nd	nd		Beryllium
Sulfate	mg/L	ns	ns	nd	nd	nd	29	3	nd	2		Bismuth
Chloride	mg/L	ns	ns	5.1	7.3	4.3	4.4	4.7	4.5	4.5		Boron
Reactive Silica (as SiO2)	mg/L	ns	ns	7.4	3.4	4.8	5.4	7.9	7.6	10.6		Cadmium
Phosphorus	mg/L	ns	ns	na	0.01	nd	0.05	nd	nd	0.1		Chromium
Ortho Phosphate (as P)	mg/L	ns	ns	nd	0.1	nd	0.1	0.01	nd	0.01		Cobalt
Nitrite	mg/L	ns	ns	na	nd	nd	nd	nd	nd	nd	0.06	Copper
Nitrate + Nitrite (as N)	mg/L	ns	ns	nd	nd	nd	nd	nd	nd	nd		Iron
Nitrate (as N)	mg/L	ns	ns	na	nd	nd	nd	nd	nd	nd		Lead
Ammonia (as N)	mg/L	ns	ns	nd	nd	nd	nd	nd	nd	nd	1.37-2.20	Manganese
Dissolved Organic Carbon	mg/L	ns	ns	29.2	10.8	17.4	20	20	20.7	11.7		Molybdenum
Color	TCU	ns	ns	267	130	140	130	120	200	69		Nickel
Turbidity	NTU	ns	ns	0.3	0.3	1.3	0.2	0.2	0.7	7.4		Selenium
Total Suspended Solids	mg/L	ns	ns	4	nd	nd	2	nd	13.5	17.4		Silver
Conductance (RCAp)	uS/cm	ns	ns	na	48	37	34	31	32	25		Strontium
pH	Units	ns	ns	4.3	4.4	4.3	4.4	4.4	4.4	4.8	6.5-9.0	Thallium
Hardness (as CaCO3)	mg/L	ns	ns	2.2	1.3	1.3	1.6	1.6	1.8	1.8		Tin
Bicarbonate (as CaCO3)	mg/L	ns	ns	0.4	nd	nd	nd	nd	nd	nd		Titanium
Carbonate (as CaCO3)	mg/L	ns	ns	nd	nd	nd	nd	nd	nd	nd		Uranium
TDS (Calculated)	mg/L	ns	ns	17.8	19	15	48	20	19	22		Vanadium
Cation Sum	meq/L	ns	ns	na	0.28	0.2	0.27	0.22	0.23	0.21		Zinc
Anion Sum	meq/L	ns	ns	na	0.27	0.19	0.85	0.22	0.19	0.19		
Ion Balance	%	ns	ns	na	1.2	3.1	5.2	0.14	9.75	3.32		Notes:
Langlier Index @ 4C		ns	ns	na	-7.41	-7.51	-6.73	-7.41	-7.41	-7.01		
Langlier Index @ 20C		ns	ns	na	-7.01	-7.11	-6.33	-7.01	-7.01	-6.61		
Saturation pH @ 4C	Units	ns	ns	na	11.8	11.8	11.1	11.8	11.8	11.8		
Saturation pH @ 20C	Units	ns	ns	na	11.4	11.4	10.7	11.4	11.4	11.4		

Notes:

* varies with hardness

nd non-detect

na not analyzed

ns not sampled

tical Results

Units	23-Apr-00	28-May-00	28-Aug-00	25-Apr-01	01-Jun-01	28-Jun-01	26-Jul-01	28-Aug-01	12-Sep-01	CCME Guidelines 1999
mg/L	ns	ns	0.347	0.27	0.42	0.49	0.38	0.45	0.32	0.005-0.1 ¹
mg/L	ns	ns	0.0005	nd	nd	nd	nd	nd	nd	
mg/L	ns	ns	0.0008	nd	nd	nd	nd	nd	nd	0.005
mg/L	ns	ns	0.001	nd	nd	nd	nd	nd	nd	
mg/L	ns	ns	nd	nd	nd	nd	nd	nd	nd	
mg/L	ns	ns	na	nd	nd	nd	nd	nd	nd	
mg/L	ns	ns	nd	0.007	0.026	0.005	0.005	0.009	nd	
mg/L	ns	ns	nd	nd	nd	nd	nd	nd	nd	0.000017
mg/L	ns	ns	nd	nd	nd	nd	nd	nd	nd	0.0089
mg/L	ns	ns	nd	nd	nd	nd	nd	nd	nd	
mg/L	ns	ns	na	nd	nd	0.002	nd	nd	nd	0.002-0.004 ²
mg/L	ns	ns	0.13	0.06	0.12	0.1	0.12	0.31	0.13	0.3
mg/L	ns	ns	0.001	0.0063	0.0009	0.0012	0.0009	0.0009	0.0012	0.001-0.007 ²
mg/L	ns	ns	nd	0.003	0.002	0.003	0.002	0.003	0.002	
mg/L	ns	ns	nd	nd	nd	nd	nd	nd	nd	
mg/L	ns	ns	nd	nd	nd	nd	nd	nd	nd	0.025-0.15 ^a
mg/L	ns	ns	nd	nd	nd	nd	nd	nd	nd	0.001
mg/L	ns	ns	nd	nd	nd	nd	nd	nd	nd	0.0001
mg/L	ns	ns	0.0029	nd	nd	nd	nd	nd	nd	
mg/L	ns	ns	nd	nd	nd	nd	nd	nd	nd	0.0008
mg/L	ns	ns	nd	nd	nd	nd	nd	nd	nd	
mg/L	ns	ns	nd	nd	0.002	0.002	0.048	0.002	0.002	
mg/L	ns	ns	0.0007	0.0004	0.0006	0.0008	0.0007	0.0006	0.0006	
mg/L	ns	ns	0.0005	nd	nd	nd	< 2	nd	nd	
mg/l	ns	ns	0.005	0.004	0.007	0.01	0.012	0.007	0.01	0.03

* varies with hardness

nd non-detect

na not analyzed

ns not sampled

CCME Freshwater Aquatic Life Guidelines 1999 - Canadian Council of the Ministers of Environment

1 0.005 at pH<6.5;0.1 at pH>6.5

2 varies with hardness

SW-6

General Chemistry - Analytical Results

Parameters	Units	23-Apr-00	28-May-00	28-Aug-00	25-Apr-01	01-Jun-01	28-Jun-01	26-Jul-01	28-Aug-01	12-Sep-01	CCME Guidelines 1999
Sodium	mg/L	ns	ns	3.2	4.4	2.4	3.1	3.2	3.5	3.2	
Potassium	mg/L	ns	ns	0.1	0.1	nd	0.1	0.3	0.1	0.3	
Calcium	mg/L	ns	ns	0.3	0.2	0.2	0.5	0.4	0.3	0.2	
Magnesium	mg/L	ns	ns	0.25	0.2	0.2	0.2	0.2	0.2	0.2	
Alkalinity (as CaCO ₃)	mg/L	ns	ns	nd	nd	nd	nd	nd	nd	nd	
Sulfate	mg/L	ns	ns	nd	nd	nd	30	7	nd	nd	
Chloride	mg/L	ns	ns	5.1	7.1	4.3	4.5	4.9	4.4	4.3	
Reactive Silica (as SiO ₂)	mg/L	ns	ns	7.8	3.3	4.9	5.5	7.9	8.5	10.3	
Phosphorus	mg/L	ns	ns	na	0.01	nd	0.06	nd	nd	0.1	
Ortho Phosphate (as P)	mg/L	ns	ns	nd	nd	nd	nd	nd	nd	0.01	
Nitrite	mg/L	ns	ns	na	nd	nd	nd	nd	nd	nd	0.06
Nitrate + Nitrite (as N)	mg/L	ns	ns	nd	nd	nd	nd	0.05	nd	nd	
Nitrate (as N)	mg/L	ns	ns	na	nd	nd	nd	0.05	nd	nd	
Ammonia (as N)	mg/L	ns	ns	0.04	nd	nd	nd	nd	nd	nd	1.37-2.20
Dissolved Organic Carbon	mg/L	ns	ns	23	10.7	18	22.5	20.8	18.7	12.7	
Color	TCU	ns	ns	130	120	140	130	130	150	75	
Turbidity	NTU	ns	ns	0.3	0.2	0.3	0.3	0.9	0.4	0.8	
Total Suspended Solids	mg/L	ns	ns	1	4.5	nd	nd	44	1	17.4	
Conductance (RCAp)	uS/cm	ns	ns	na	47	38	34	31	32	26	
pH	Units	ns	ns	4.3	4.3	4.3	4.4	4.5	4.4	4.8	6.5-9.0
Hardness (as CaCO ₃)	mg/L	ns	ns	1.7	1.3	1.3	2.1	1.8	1.6	1.3	
Bicarbonate (as CaCO ₃)	mg/L	ns	ns	0.4	nd	nd	nd	nd	nd	nd	
Carbonate (as CaCO ₃)	mg/L	ns	ns	nd	nd	nd	nd	nd	nd	nd	
TDS (Calculated)	mg/L	ns	ns	18	18	15	48	25	20	24	
Cation Sum	meq/L	ns	ns	na	0.27	0.19	0.24	0.22	0.23	0.21	
Anion Sum	meq/L	ns	ns	na	0.27	0.19	0.87	0.31	0.19	0.19	
Ion Balance	%	ns	ns	na	1.61	0.18	57.2	16.9	9.64	3.32	
Langlier Index @ 4C		ns	ns	na	-7.51	-7.51	-6.73	-7.32	-7.41	-7.01	
Langlier Index @ 20C		ns	ns	na	-7.11	-7.11	-6.33	-6.92	-7.01	-6.61	
Saturation pH @ 4C	Units	ns	ns	na	11.8	11.8	11.1	11.8	11.8	11.8	
Saturation pH @ 20C	Units	ns	ns	na	11.4	11.4	10.7	11.4	11.4	11.4	

Notes:

* varies with hardness

nd non-detect

na not analyzed

ns not sampled

CCME Freshwater Aquatic Life Guidelines 1999 - Canadian Council of the Ministers of Environment

SW-6

Metals -Analytical Results

Parameters	Units	23-Apr-00	28-May-00	28-Aug-00	25-Apr-01	01-Jun-01	28-Jun-01	26-Jul-01	28-Aug-01	12-Sep-01	CCME Guidelines 1999
Aluminum	mg/L	ns	ns	0.43	0.31	0.42	0.53	0.39	0.44	0.3	0.005-0.1 ¹
Antimony	mg/L	ns	ns	0.0005	nd	nd	nd	nd	nd	nd	
Arsenic	mg/L	ns	ns	0.0009	nd	nd	nd	nd	nd	nd	0.005
Barium	mg/L	ns	ns	0.0005	nd	nd	nd	nd	nd	nd	
Beryllium	mg/L	ns	ns	nd	nd	nd	nd	nd	nd	nd	
Bismuth	mg/L	ns	ns	na	nd	nd	nd	nd	nd	nd	
Boron	mg/L	ns	ns	nd	nd	0.006	0.005	nd	0.006	0.005	
Cadmium	mg/L	ns	ns	0.00004	nd	nd	nd	nd	nd	nd	0.000017
Chromium	mg/L	ns	ns	nd	nd	nd	nd	nd	nd	nd	0.0089
Cobalt	mg/L	ns	ns	nd	nd	nd	nd	nd	nd	nd	
Copper	mg/L	ns	ns	0.0013	nd	nd	0.002	nd	nd	nd	0.002-0.004 ²
Iron	mg/L	ns	ns	0.11	0.04	0.13	0.13	0.12	0.11	0.09	0.3
Lead	mg/L	ns	ns	0.0008	0.0006	0.0008	0.0012	0.0007	0.0007	0.0007	0.001-0.007 ²
Manganese	mg/L	ns	ns	nd	nd	0.003	0.002	0.002	nd	0.003	
Molybdenum	mg/L	ns	ns	nd	nd	nd	nd	nd	nd	nd	
Nickel	mg/L	ns	ns	nd	nd	nd	nd	nd	nd	nd	0.025-0.15 ²
Selenium	mg/L	ns	ns	nd	nd	nd	nd	nd	nd	nd	0.001
Silver	mg/L	ns	ns	nd	nd	nd	nd	nd	nd	nd	0.0001
Strontium	mg/L	ns	ns	0.0023	nd	nd	nd	nd	nd	nd	
Thallium	mg/L	ns	ns	nd	nd	nd	nd	nd	nd	nd	0.0008
Tin	mg/L	ns	ns	nd	nd	nd	nd	nd	nd	nd	
Titanium	mg/L	ns	ns	nd	nd	0.002	0.003	0.048	0.002	nd	
Uranium	mg/L	ns	ns	0.0007	0.0004	0.0006	0.0009	0.0007	0.0007	0.0006	
Vanadium	mg/L	ns	ns	0.005	nd	nd	nd	nd	nd	nd	
Zinc	mg/L	ns	ns	0.006	0.003	0.004	0.006	0.01	0.004	0.005	0.03

Notes:

* varies with hardness

nd non-detect

na not analyzed

ns not sampled

CCME Freshwater Aquatic Life Guidelines 1999 - Canadian Council of the Ministers of Environment

1 0.005 at pH<6.5;0.1 at pH>6.5

2 varies with hardness

Pit Pond General Chemistry -Analytical Results

Parameters	Units	25-Apr-01	01-Jun-01	28-Jun-01	26-Jul-01	28-Aug-01	12-Sep-01	CCME Guidelines 1999
Sodium	mg/L	2.1	1.8	2	2.1	1.7	1.7	
Potassium	mg/L	0.3	0.3	0.4	0.5	0.6	0.7	
Calcium	mg/L	0.5	0.5	0.6	0.6	0.5	0.5	
Magnesium	mg/L	0.3	0.2	0.2	0.2	0.2	0.2	
Alkalinity (as CaCO ₃)	mg/L	nd	nd	nd	nd	nd	nd	
Sulfate	mg/L	nd	6	5	nd	3	9	
Chloride	mg/L	3.3	3	2.8	2.6	2.6	2.8	
Reactive Silica (as SiO ₂)	mg/L	nd	nd	nd	nd	0.5	0.6	
Phosphorus	mg/L	nd	0.02	0.02	nd	nd	0.1	
Ortho Phosphate (as P)	mg/L	0.1	nd	nd	nd	nd	0.04	
Nitrite	mg/L	nd	nd	nd	nd	nd	0.01	0.06
Nitrate + Nitrite (as N)	mg/L	nd	nd	nd	nd	nd	nd	
Nitrate (as N)	mg/L	nd	nd	nd	nd	nd	nd	
Ammonia (as N)	mg/L	nd	nd	nd	nd	nd	nd	1.37-2.20
Dissolved Organic Carbon	mg/L	nd	nd	1.2	1.7	2.4	2.4	
Color	TCU	8	14	8	9	nd	22	
Turbidity	NTU	2.9	9.1	2.1	2.1	6.1	3.9	
Total Suspended Solids	mg/L	7	11.2	5	10.9	10.8	16.3	
Conductance (RCap)	uS/cm	19	17	16	15	14	15	
pH	Units	5.8	6.1	5.8	5.8	5.5	6.6	6.5-9.0
Hardness (as CaCO ₃)	mg/L	2.5	2.1	2.3	2.3	2.1	2.1	
Bicarbonate (as CaCO ₃)	mg/L	nd	nd	nd	nd	nd	nd	
Carbonate (as CaCO ₃)	mg/L	nd	nd	nd	nd	nd	nd	
TDS (Calculated)	mg/L	9	15	14	9	10	19	
Cation Sum	meq/L	0.15	0.13	0.15	0.16	0.14	0.14	
Anion Sum	meq/L	0.16	0.31	0.29	0.14	0.16	0.37	
Ion Balance	%	1.41	40.7	31.6	5.85	7.36	45.9	
Langlier Index @ 4C		-6.01	-5.01	-5.31	-6.01	-6.31	-4.51	
Langlier Index @ 20C		-5.61	-4.61	-4.91	-5.61	-5.91	-4.11	
Saturation pH @ 4C	Units	11.8	11.1	11.1	11.8	11.8	11.1	
Saturation pH @ 20C	Units	11.4	10.7	10.7	11.4	11.4	10.7	

Notes:

* varies with hardness

nd non-detect

na not analyzed

ns not sampled

CCME Freshwater Aquatic Life Guidelines 1999 - Canadian Council of the Ministers of Environment

Pit Pond Metals -Analytical Results

Parameters	Units	25-Apr-01	01-Jun-01	28-Jun-01	26-Jul-01	28-Aug-01	12-Sep-01	CCME Guidelines 1999
Aluminum	mg/L	0.14	0.21	0.39	0.2	0.23	0.19	0.005-0.1 ¹
Antimony	mg/L	nd	nd	nd	nd	nd	nd	
Arsenic	mg/L	nd	nd	nd	nd	nd	nd	0.005
Barium	mg/L	nd	nd	nd	nd	nd	nd	
Beryllium	mg/L	nd	nd	nd	nd	nd	nd	
Bismuth	mg/L	nd	nd	nd	nd	nd	nd	
Boron	mg/L	0.006	0.005	0.009	0.006	0.006	0.007	
Cadmium	mg/L	nd	nd	nd	nd	nd	nd	0.000017
Chromium	mg/L	nd	nd	nd	nd	nd	nd	0.0089
Cobalt	mg/L	nd	nd	nd	nd	nd	nd	
Copper	mg/L	nd	nd	nd	nd	nd	0.002	0.002-0.004 ²
Iron	mg/L	0.04	0.06	0.07	0.06	0.07	0.11	0.3
Lead	mg/L	nd	nd	0.0005	nd	nd	0.0074	0.001-0.007 ²
Manganese	mg/L	0.023	0.005	nd	0.007	0.01	0.008	
Molybdenum	mg/L	nd	nd	nd	nd	nd	nd	
Nickel	mg/L	nd	nd	nd	nd	nd	nd	0.025-0.15 ²
Selenium	mg/L	nd	nd	nd	nd	nd	nd	0.001
Silver	mg/L	nd	nd	nd	nd	nd	nd	0.0001
Strontium	mg/L	nd	nd	nd	nd	nd	nd	
Thallium	mg/L	nd	nd	nd	nd	0.0001	nd	0.0008
Tin	mg/L	nd	nd	nd	nd	nd	nd	
Titanium	mg/L	nd	0.002	0.002	0.044	0.003	0.003	
Uranium	mg/L	0.0004	0.0006	0	0.007	0.0008	0.0009	
Vanadium	mg/L	nd	nd	nd	nd	nd	nd	
Zinc	mg/L	0.004	0.004	0.003	0.01	0.003	0.01	0.03

Notes:

* varies with hardness

nd non-detect

na not analyzed

ns not sampled

CCME Freshwater Aquatic Life Guidelines 1999 - Canadian Council of the Ministers of Environment

1 0.005 at pH<6.5;0.1 at pH>6.5

2 varies with hardness

Frog Pond

General Chemistry -Analytical Results

Parameters	Units	25-Apr-01	01-Jun-01	28-Jun-01	26-Jul-01	28-Aug-01	12-Sep-01	CCME Guidelines 1999
Sodium	mg/L	ns	2.7	3.1	ns	3.2	ns	
Potassium	mg/L	ns	0.1	0.2	ns	0.2	ns	
Calcium	mg/L	ns	0.3	0.5	ns	0.2	ns	
Magnesium	mg/L	ns	0.2	0.2	ns	0.2	ns	
Alkalinity (as CaCO3)	mg/L	ns	nd	nd	ns	nd	ns	
Sulfate	mg/L	ns	nd	25	ns	nd	ns	
Chloride	mg/L	ns	4.3	5.1	ns	4.2	ns	
Reactive Silica (as SiO2)	mg/L	ns	7.4	8.6	ns	8.4	ns	
Phosphorus	mg/L	ns	nd	0.02	ns	nd	ns	
Ortho Phosphate (as P)	mg/L	ns	nd	nd	ns	nd	ns	
Nitrite	mg/L	ns	nd	nd	ns	nd	ns	0.06
Nitrate + Nitrite (as N)	mg/L	ns	nd	nd	ns	nd	ns	
Nitrate (as N)	mg/L	ns	nd	nd	ns	nd	ns	
Ammonia (as N)	mg/L	ns	nd	nd	ns	nd	ns	1.37-2.20
Dissolved Organic Carbon	mg/L	ns	12.4	15.2	ns	10.9	ns	
Color	TCU	ns	93	100	ns	73	ns	
Total Suspended Solids	mg/L	ns	0.2	1.1	ns	1.5	ns	
Turbidity	NTU	ns	nd	nd	ns	0.2	ns	
Conductance (RCAp)	uS/cm	ns	32	30	ns	25	ns	
pH	Units	ns	4.5	4.7	ns	4.8	ns	6.5-9.0
Hardness (as CaCO3)	mg/L	ns	1.6	2.1	ns	1.3	ns	
Bicarbonate (as CaCO3)	mg/L	ns	nd	nd	ns	nd	ns	
Carbonate (as CaCO3)	mg/L	ns	nd	nd	ns	nd	ns	
TDS (Calculated)	mg/L	ns	18	46	ns	19	ns	
Cation Sum	meq/L	ns	0.19	0.2	ns	0.19	ns	
Anion Sum	meq/L	ns	0.19	0.77	ns	0.18	ns	
Ion Balance	%	ns	0.05	57.9	ns	1.76	ns	
Langlier Index @ 4C		ns	-7.31	-6.42	ns	-7.01	ns	
Langlier Index @ 20C		ns	-6.91	-6.02	ns	-6.61	ns	
Saturation pH @ 4C	Units	ns	11.8	11.1	ns	11.8	ns	
Saturation pH @ 20C	Units	ns	11.4	10.7	ns	11.4	ns	

Notes:

* varies with hardness

nd non-detect

na not analyzed

ns not sampled

Frog Pond

Metals -Analytical Results

Parameters	Units	25-Apr-01	01-Jun-01	28-Jun-01	26-Jul-01	28-Aug-01	12-Sep-01	CCME Guidelines 1999
Aluminum	mg/L	ns	0.39	0.44	ns	0.34	ns	0.005-0.1 ¹
Antimony	mg/L	ns	nd	nd	ns	nd	ns	
Arsenic	mg/L	ns	nd	nd	ns	nd	ns	0.005
Barium	mg/L	ns	nd	nd	ns	nd	ns	
Beryllium	mg/L	ns	nd	nd	ns	nd	ns	
Bismuth	mg/L	ns	nd	nd	ns	nd	ns	
Boron	mg/L	ns	0.009	0.005	ns	0.006	ns	
Cadmium	mg/L	ns	nd	nd	ns	nd	ns	0.000017
Chromium	mg/L	ns	nd	nd	ns	nd	ns	0.0089
Cobalt	mg/L	ns	nd	nd	ns	nd	ns	
Copper	mg/L	ns	nd	nd	ns	nd	ns	0.002-0.004 ²
Iron	mg/L	ns	0.07	0.09	ns	0.08	ns	0.3
Lead	mg/L	ns	0.0005	0.0008	ns	0.0005	ns	0.001-0.007 ²
Manganese	mg/L	ns	nd	nd	ns	nd	ns	
Molybdenum	mg/L	ns	nd	nd	ns	nd	ns	
Nickel	mg/L	ns	nd	nd	ns	nd	ns	0.025-0.15 ²
Selenium	mg/L	ns	nd	nd	ns	nd	ns	0.001
Silver	mg/L	ns	nd	nd	ns	nd	ns	0.0001
Strontium	mg/L	ns	nd	nd	ns	nd	ns	
Thallium	mg/L	ns	nd	nd	ns	nd	ns	0.0008
Tin	mg/L	ns	nd	nd	ns	nd	ns	
Titanium	mg/L	ns	0.002	0.002	ns	nd	ns	
Uranium	mg/L	ns	0.0008	0.0009	ns	0.0007	ns	
Vanadium	mg/L	ns	nd	nd	ns	nd	ns	
Zinc	mg/L	ns	0.003	0.006	ns	0.004	ns	0.03

Notes:

* varies with hardness

nd non-detect

na not analyzed

ns not sampled

CCME Freshwater Aquatic Life Guidelines 1999 - Canadian Council of the Ministers of Environment

1 0.005 at pH<6.5;0.1 at pH>6.5

2 varies with hardness

SW-8**General Chemistry -Analytical Results**

Parameters	Units	06-Jun-01	CCME Guidelines 1999
Sodium	mg/L	2.2	
Potassium	mg/L	nd	
Calcium	mg/L	0.3	
Magnesium	mg/L	0.2	
Alkalinity (as CaCO3)	mg/L	nd	
Sulfate	mg/L	nd	
Chloride	mg/L	3.2	
Reactive Silica (as SiO2)	mg/L	2.5	
Phosphorus	mg/L	nd	
Ortho Phosphate (as P)	mg/L	nd	
Nitrite	mg/L	nd	0.06
Nitrate + Nitrite (as N)	mg/L	nd	
Nitrate (as N)	mg/L	nd	
Ammonia (as N)	mg/L	nd	1.37-2.20
Dissolved Organic Carbon	mg/L	19.7	
Color	TCU	130	
Total Suspended Solids	mg/L	nd	
Turbidity	NTU	0.4	
Conductance (RCAp)	uS/cm	29	
pH	Units	4.9	6.5-9.0
Hardness (as CaCO3)	mg/L	1.6	
Bicarbonate (as CaCO3)	mg/L	nd	
Carbonate (as CaCO3)	mg/L	nd	
TDS (Calculated)	mg/L	11	
Cation Sum	meq/L	0.15	
Anion Sum	meq/L	0.16	
Ion Balance	%	3.17	
Langlier Index @ 4C		-6.91	
Langlier Index @ 20C		-6.51	
Saturation pH @ 4C	Units	11.8	
Saturation pH @ 20C	Units	11.4	

Notes:

* varies with hardness

nd non-detect

na not analyzed

ns not sampled

CCME Freshwater Aquatic Life Guidelines 1999 - Canadian Council of the Ministers of Environment

SW-8

Metals -Analytical Results

Parameters	Units	06-Jun-01	CCME Guidelines 1999
Aluminum	mg/L	0.5	0.005-0.1 ¹
Antimony	mg/L	nd	
Arsenic	mg/L	nd	0.005
Barium	mg/L	nd	
Beryllium	mg/L	nd	
Bismuth	mg/L	nd	
Boron	mg/L	0.007	
Cadmium	mg/L	nd	0.000017
Chromium	mg/L	nd	0.0089
Cobalt	mg/L	nd	
Copper	mg/L	nd	0.002-0.004 ²
Iron	mg/L	0.1	0.3
Lead	mg/L	0.0009	0.001-0.007 ²
Manganese	mg/L	nd	
Molybdenum	mg/L	nd	
Nickel	mg/L	nd	0.025-0.15 ²
Selenium	mg/L	nd	0.001
Silver	mg/L	nd	0.0001
Strontium	mg/L	nd	
Thallium	mg/L	nd	0.0008
Tin	mg/L	nd	
Titanium	mg/L	0.002	
Uranium	mg/L	0.001	
Vanadium	mg/L	nd	
Zinc	mg/L	0.006	0.03

Notes:

* varies with hardness

nd non-detect

na not analyzed

ns not sampled

CCME Freshwater Aquatic Life Guidelines 1999 - Canadian Council of the Ministers of Environment

1 0.005 at pH<6.5;0.1 at pH>6.5

2 varies with hardness

SW-9**General Chemistry -Analytical Results**

Parameters	Units	06-Jun-01	CCME Guidelines 1999
Sodium	mg/L	2.6	
Potassium	mg/L	nd	
Calcium	mg/L	0.3	
Magnesium	mg/L	0.2	
Alkalinity (as CaCO ₃)	mg/L	nd	
Sulfate	mg/L	nd	
Chloride	mg/L	3.6	
Reactive Silica (as SiO ₂)	mg/L	3.1	
Phosphorus	mg/L	nd	
Ortho Phosphate (as P)	mg/L	0.01	
Nitrite	mg/L	nd	0.06
Nitrate + Nitrite (as N)	mg/L	nd	
Nitrate (as N)	mg/L	nd	
Ammonia (as N)	mg/L	nd	1.37-2.20
Dissolved Organic Carbon	mg/L	20.8	
Color	TCU	140	
Total Suspended Solids	mg/L	nd	
Turbidity	NTU	0.3	
Conductance (RCap)	uS/cm	33	
pH	Units	4.3	6.5-9.0
Hardness (as CaCO ₃)	mg/L	1.6	
Bicarbonate (as CaCO ₃)	mg/L	nd	
Carbonate (as CaCO ₃)	mg/L	nd	
TDS (Calculated)	mg/L	13	
Cation Sum	meq/L	0.2	
Anion Sum	meq/L	0.17	
Ion Balance	%	9.28	
Langlier Index @ 4C		-7.51	
Langlier Index @ 20C		-7.11	
Saturation pH @ 4C	Units	11.8	
Saturation pH @ 20C	Units	11.4	

Notes:

* varies with hardness

nd non-detect

na not analyzed

ns not sampled

CCME Freshwater Aquatic Life Guidelines 1999 - Canadian Council of the Ministers of Environment

SW-9

Metals -Analytical Results

Parameters	Units	06-Jun-01	CCME Guidelines 1999
Aluminum	mg/L	0.44	0.005-0.1 ¹
Antimony	mg/L	nd	
Arsenic	mg/L	nd	0.005
Barium	mg/L	nd	
Beryllium	mg/L	nd	
Bismuth	mg/L	nd	
Boron	mg/L	0.005	
Cadmium	mg/L	nd	0.000017
Chromium	mg/L	nd	0.0089
Cobalt	mg/L	nd	
Copper	mg/L	0.002	0.002-0.004 ²
Iron	mg/L	0.11	0.3
Lead	mg/L	0.0013	0.001-0.007 ²
Manganese	mg/L	0.002	
Molybdenum	mg/L	nd	
Nickel	mg/L	nd	0.025-0.15 ²
Selenium	mg/L	nd	0.001
Silver	mg/L	nd	0.0001
Strontium	mg/L	nd	
Thallium	mg/L	nd	0.0008
Tin	mg/L	nd	
Titanium	mg/L	0.002	
Uranium	mg/L	0.0008	
Vanadium	mg/L	nd	
Zinc	mg/L	0.014	0.03

Notes:

* varies with hardness

nd non-detect

na not analyzed

ns not sampled

CCME Freshwater Aquatic Life Guidelines 1999 - Canadian Council of the Ministers of Environment

1 0.005 at pH<6.5;0.1 at pH>6.5

2 varies with hardness