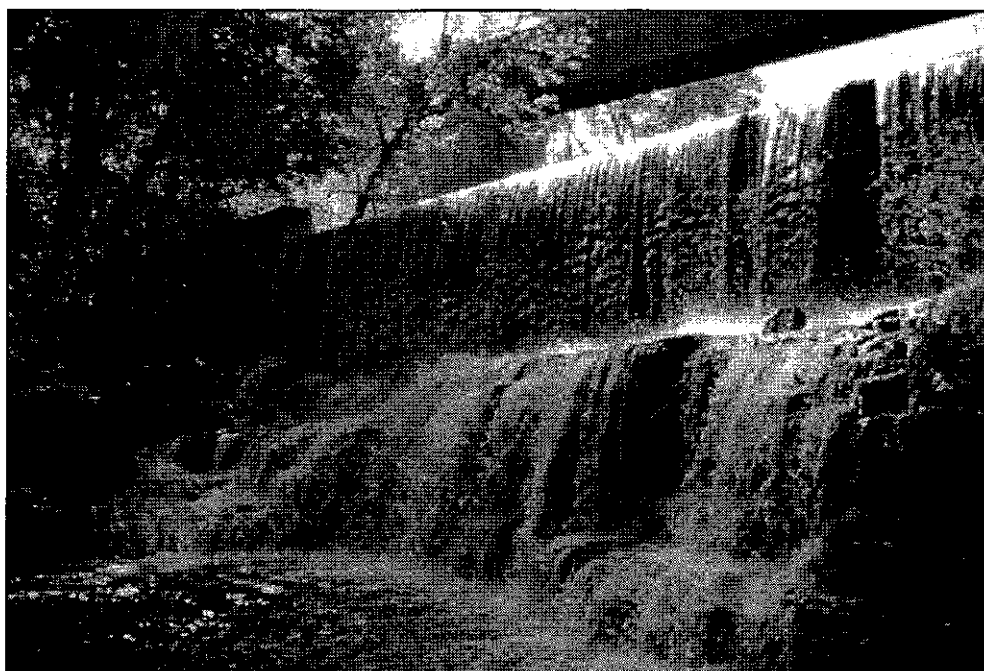


BRONTE CREEK WATERSHED STUDY

Appendix 5

Water Quality Report

By: David Gale
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Progreston Dam, Bronte Creek

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Chapter 1: SUMMARY

An assessment of surface water quality was carried out as part of the Bronte Creek Watershed Study. Historical data from all sources were reviewed and a limited sampling program was undertaken from 1999 to 2001 to help quantify water quality throughout the watershed. For most water quality parameters, Ministry of Environment (MOE) objectives for the protection of the fresh water aquatic environment are used. In the case of bacteria, the MOE objective for recreational use is applied. Where applicable, federal guidelines are also considered.

Results of historical data, related studies and the Bronte Creek Water Quality Monitoring Program (BCWQMP) indicate that while most water quality parameters measured meet MOE objectives, several are a source of concern. Based on all available data, total phosphorus and bacteria concentrations are elevated throughout the watershed. While none are toxic by themselves, all can lead to degradation of the aquatic environment. High concentrations of phosphorus can result in excess plant growth and ultimately, in eutrophication and oxygen depletion. There is a close relationship among phosphorus, solids and erosion; areas with increased levels of erosion usually have increased suspended sediments and phosphorus concentrations. Elevated levels of sediments can adversely affect fish habitat. Finally, high bacteria concentrations can adversely affect human and animal health and have a negative impact on agricultural produce. Runoff from land, the major source of sediments, phosphorus and bacteria has increased in the watershed due to agriculture, urban development and other land use practices.

Based on the MOE Provincial Water Quality Monitoring Network (PWQMN) data, over

51% of total phosphorus concentrations sampled since 1965 exceed the PWQO (Provincial Water Quality Objective) of less than 0.030 mg/l. Maximum concentrations exceed 5.2 mg/l in Limestone Creek at Derry Road and almost 2.0 mg/l at Zimmerman and Highway 2. The average concentration in Indian Creek is approximately 0.05 mg/l and the average concentration at Highway 2 is approximately 0.04 mg/l. The high concentrations recorded in Indian Creek are thought to be due to erosion, agricultural activities and livestock access. Concentrations monitored during the BCWQMP were consistent with those of historical records and other studies. The mean concentration throughout the watershed is about 0.04 mg/l. The highest total phosphorus concentrations monitored are found in Strabane Creek, Limestone Creek and Indian Creek.

High concentrations of *E. coli* and other fecal coliform bacteria are found throughout the watershed. Concentrations monitored since 1964 have consistently exceeded provincial objectives (100 *Ec.*/100ml) and federal guidelines (200 *Ec.*/100ml) for recreational use. Maximum concentrations of more than 16,000 *Ec.*/100ml have been recorded. Trend analysis indicates little change in bacterial concentrations over time. A limited number of bacteria samples were taken as part of the BCWQMP. Concentrations monitored during the BCWQMP were consistent with those of historical records. Runoff from watershed communities and livestock operations is believed to contribute to the elevated bacteria concentrations.

Concentrations of metals are normally found to meet provincial objectives. However, aluminum, iron and zinc concentrations sometimes exceed MOE objectives at several

ECOLOGICAL AND CULTURAL HERITAGE

points in the watershed. Elevated concentrations of these metals appear to be naturally occurring, in most cases due to soil and substrate types and are not thought to pose a threat to the aquatic environment

Do to limitations of resources, no sampling for pesticides or Polycyclic Aromatic Hydrocarbons (PAH) was conducted.

The results of historical data and the Bronte Creek Water Quality Monitoring Program

provide a general picture of water quality that is consistent with the results of the Aquatic Habitat Inventory and Assessment (Appendix 3).

Buffer strips, conservation tillage, modified land management practices, upgrades to private sewage treatment systems, stormwater BMPs and public education can all be used to reduce the potential for and mitigate the impact of pollutants in the watershed.



Bronte Creek at Appleby Line (Zimmerman)

Chapter 2: *INTRODUCTION*

The Bronte Creek Water Quality Report (Appendix 5) is one of the technical appendices that have been compiled to support the Bronte Creek Watershed Study. The Bronte Creek Watershed Study is a watershed plan that summarizes the biotic and abiotic resources along with the cultural uses of the watershed and their interrelationships. The Study describes a "watershed vision" that promotes a "healthy creek in a healthy watershed." Stewardship initiatives and carefully planned development will help support "a rich diversity of plants and animals" and care for nature, community, agriculture and recreation.

"Adequate surface and ground water quality is essential in order to sustain and promote the diversity of wildlife and fish populations, to support vegetation and to ensure potable water supplies for human consumption, agriculture and recreation. Degradation of water quality will diminish the aesthetic value of water resources and adversely affect indigenous wildlife and fisheries species, while presenting health hazards to man."(CLOCA, 1979)

Although taken from another resource document, this statement accurately reflects the situation in the Bronte Creek watershed.

The Bronte Creek Water Quality Report provides an in-depth description and assessment of surface water quality within the Bronte Creek watershed in four sections. Section 1 is a summary of the entire report.

Section 2 serves as an introduction and includes an outline of the objectives of the study, and a background to the report. There is a description of the watershed and an outline of the methodology for the report,

including a review of the available literature and any related studies and a description of the Bronte Creek Water Quality Monitoring Program (BCWQMP) carried out during 1999, 2000 and 2001.

Section 3 provides the results and a discussion of the literature review, historic water quality monitoring data, related studies and the BCWQMP. It includes a brief summary of each sampling station and a description of the potential for water quality impairment.

Section 4 provides general guidelines for water quality protection and enhancement the watershed and concludes with specific recommendations aimed at improving water quality within the watershed.

2.1 Study Objectives

The following objectives were developed for the Bronte Creek Water Quality Study:

1. Assemble all available background data and information on water quality parameters and related issues for Bronte Creek.
2. Conduct water quality sampling at selected locations within Bronte Creek to permit spatial water quality comparisons within the watershed and to establish baseline data for comparison with past and future studies.
3. Analyze all available data and form reasonable inferences from this data.
4. Provide general guidelines and specific recommendations for water quality improvement, land stewardship practices and further studies.

2.2 Surface Water Quality

The term "water quality" refers to the physical, biological and/or chemical constituents of waters. The quality of water directly affects its suitability for specific usage. "Polluted water" is a general term commonly used to indicate that the water is unsuitable for fish and other aquatic life, recreation, municipal and/or industrial use, or aesthetic enjoyment.

In this report, pollution is related to human activity, including municipal and/or industrial effluent, urban and agricultural runoff, etc. Water pollution can therefore be divided into one or more of the following types depending upon the nature of the pollution:

1. Toxic pollution, such as caused by heavy metals, other inorganic elements, pesticides and compounds in industrial wastes which may be toxic to humans as well as aquatic life.
2. Organic pollution, such as caused by oxygen demanding organic compounds in domestic sewage that may severely affect fish and aquatic life.
3. Nutrient pollution, such as that caused by phosphorus and nitrogen runoff. This type of pollution is responsible for excessive plant growth that can rapidly deplete oxygen supplies in the water.
4. Pathogenic or disease-carrying pollution, such as caused by the presence of bacteria and viruses in domestic sewage which may transmit infectious diseases from one person to another.
5. Thermal pollution, such as caused by heated discharges from impoundments or industrial plants which may be damaging to aquatic flora and fauna.

6. Sediment pollution, such as caused by runoff in rural areas, areas devoid of vegetation and urban runoff from construction sites. This can inhibit fish reproduction.

7. Aesthetic pollution, which is associated with floating objects and unsightly accumulations of trash along stream banks and lakeshores, as well as any combination of the above types of pollution.

All of the above types of pollution regularly occur in surface waters, whereas ground water pollution is normally limited to chemical and pathogenic pollution sources.

Unfortunately, most of these types of pollution can be found in the Bronte Creek watershed. The determination of whether or not a certain water resource is polluted is related to the intended use of the water resource. Waters may be polluted for one use but not for others. Consequently, water pollution is a relative term, depending on the uses or needs that the water is to satisfy and the quality of the water is relative to the minimum requirements established for those uses or needs.

Decisions were made, therefore, as to what criteria should be applied to judge water quality in the Bronte Creek watershed. In general, the standards that could be applied were those of drinking water, recreational use, for the protection of the fresh water aquatic environment or various agricultural or industrial standards. It was decided to apply the water quality standards that relate to the protection of the fresh water aquatic environment since these standards would cover most other criteria except for those of drinking water quality. Potable water supplies in the Bronte Creek watershed come from groundwater or municipal supplies;

therefore, drinking water standards need not be applied to surface waters. In those cases where there is no appropriate standard for protection of the fresh water aquatic environment for a parameter such as bacteria, then the next most stringent standard is applied, i.e. recreational use. Provincial water quality objectives established by the Ontario Ministry of Environment (MOE) are used although federal guidelines are referred to where appropriate.

2.3 Location and General Description of the Bronte Creek Watershed

The Bronte Creek watershed is located at the western end of Lake Ontario within the Regional Municipality of Halton, the City of Hamilton and Wellington County (Township of Puslinch). Its area is approximately 304 square kilometres (Figure 2.1).

The Niagara Escarpment is the dominant physical feature of the watershed. With a local elevation of over 290m, it divides the watercourse into upper and lower reaches. The Escarpment was formed from the differential erosion of sedimentary rocks. It was also shaped by glacial, fluvial and post-glacial activity. Valleys formed from the erosive action of pre-glacial streams and glaciers heavily dissected the Escarpment face. These valleys acted as conduits, channeling tributaries from above the Escarpment to the main branch.

In the western reaches of the Bronte Creek watershed resistant cap rocks form a gently rolling plateau. Thin veneers of coarse Halton Till cover portions of the limestone plain. Closer to the Escarpment, the Waterdown Moraine system forms hummocky terrain, with drumlins and swales. Significant areas of muck and marsh occupy the low-lying areas, particularly between drumlins.

Below the Escarpment the bedrock is composed of more-erodible Queenston shale that is well exposed in a broad plain running parallel to the Lake Ontario shoreline. Clay loam soils are predominant. Numerous valleys have been incised into the bedrock by postglacial and fluvial erosion.

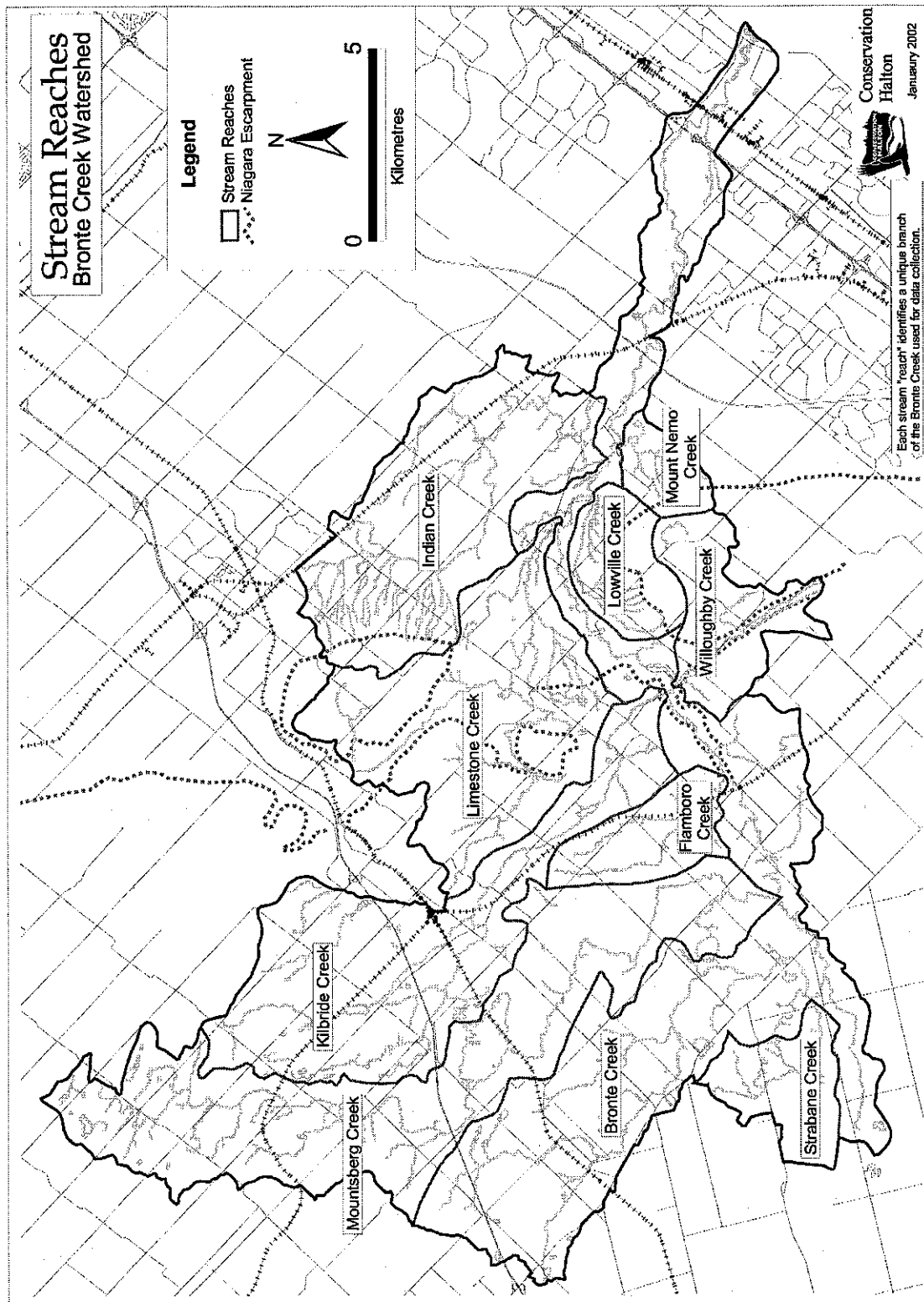
Thick spillway deposits of sand and gravel bury the shale closest to the Escarpment, forming part of an important aquifer system. To the east, there is a thin till plain. About twelve kilometres from the Lake Ontario shoreline, a narrow band of hummocky till moraine forms a local watershed divide diverting the lower tributaries of the Bronte Creek into a single main channel. The lower reach of the creek is constrained within a deep, narrow shale bedrock valley.

The soils of the Bronte Creek watershed are largely derived from glacial and glaciofluvial deposits that in turn have acquired their matrix from the local dolostone and shale bedrock. The action of wind and water has reworked these deposits to produce local concentrations of silt, clay and muck. They can vary locally throughout the watershed with the effects of drainage, the presence of vegetation and the time available for soil development. The streambeds are characterized by soil-less gravel and boulder beds accompanied by the accumulation of muck in local floodplains.

Wetlands and natural areas are essential to the maintenance of base flows and water quality and provide important aquatic habitat features. The Bronte Creek watershed has twenty-three wetlands, of which eleven are provincially significant. Most of the natural areas have been designated as ANSI's and/or ESA's. There are fourteen provincially significant and seven regionally significant ANSIs and twenty-three ESA's in the watershed.

The majority of the watershed is classified as rural and/or natural. About 64% is classified

FIGURE 2.1



as agriculture/rural, approximately 27% natural and about 5% designated for quarries and /or recreational. About 4% of the Bronte Creek watershed is developed.

The watershed has suffered losses from human activities. Over 60% of the forest cover and approximately 50% of the wetlands have been lost since the beginning of the 19th century, although there has been some recovery of these natural areas in the last 60 years. Numerous farm and recreational ponds have been created along the watercourse resulting in thermal impacts and obstructions to fish movement. Most of the ponds and many reaches are used for water-taking purposes.

Deterioration in the aquatic habitat and water quality in Bronte Creek can be related to channel alteration, barriers, a reduction in base flows, a reduction in instream, overhead and riparian cover, increased temperature regimes, peak flow events, nutrient loading, erosion, siltation and sedimentation, as well as anthropogenic inputs.

The following is a description of the sub-watersheds or stream reaches (Figure 2.1).

Bronte Creek

The headwaters of the main branch of Bronte Creek are found near Morriston. From Morriston downstream to its confluence with Strabane Creek, Bronte Creek meanders through a series of wetlands associated with the Beverly Swamp complex. Downstream through Carlisle, the creek flows through agricultural fields and disturbed flood plain areas associated with the former Courtcliff Park and the Carlisle Conservation Area. Stream gradient is relatively low. Through this reach, groundwater inputs and watercourse shading, particularly upstream of Strabane Creek, provide a temperature regime suitable for resident brook trout. Mountsberg Creek, a major tributary, enters Bronte Creek at Courtcliff Park (village of Carlisle) within this reach.

At Progreston, Bronte Creek plunges over the Niagara Escarpment and flows through a re-entrant valley feature that extends downstream to Lowville. With the exception of the Cedar Springs Community, the valley is characterized by a mosaic of mature, vegetated communities. This moderate-to-high gradient reach is fed by groundwater inputs that emanate along the valley walls, providing suitable habitat for resident brown trout; however, the Dakota Mills Dam and Lowville Dam represent barriers to fish passage through this section. Flamboro Creek, Kilbride Creek and Willoughby Creek enter Bronte Creek within this reach.

Downstream of Lowville, Bronte Creek flows within a well-defined valley feature downstream to Lake Ontario. Adjacent lands represent a mosaic of agricultural land uses and natural areas. South of the Queen Elizabeth Way, the watershed becomes predominantly urban to Lake Ontario.

Migratory salmonids such as chinook salmon and rainbow trout utilize this reach; however, coldwater habitat is marginal and is limited to the section of the creek immediately downstream of Lowville. Smallmouth bass and a variety of warmwater forage fish are also present. Limestone Creek, Lowville Creek, Mount Nemo Creek and Indian Creek discharge into this section of Bronte Creek.

Downstream of the Rebecca Street bridge, Bronte Creek enters an estuary marsh that extends to Bronte Harbour. This marsh provides habitat for a variety of wetland wildlife, as well as a staging area for migratory fish species. A number of resident warmwater fish species are also found within the estuary.

Indian Creek

Indian Creek arises as a number of small tributaries that emerge along the face of the Niagara Escarpment in the vicinity of Rattlesnake Point. Agricultural and settlement activities (woodland clearing,

irrigation, cattle grazing) within this subwatershed have resulted in degradation of the aquatic habitat. Although historically characterized as permanently flowing over much of its length, the recent drought (1998 and 1999) has resulted in intermittent flow conditions through the middle and lower reaches during the summer months. Water quality is poor and the fish community is characterized by tolerant warmwater species. Indian Creek enters Bronte Creek downstream of No. 2 Sideroad.

Mount Nemo Creek

Similar to Indian Creek, Mount Nemo Creek arises as a series of small tributaries that emanate from the base of the Niagara Escarpment (Mount Nemo). This relatively small subwatershed is characterized by an intermittent flow regime. Tolerant fish species utilize the lower reaches on a seasonal basis. Mount Nemo Creek discharges to Bronte Creek immediately downstream of No. 2 Sideroad.

Lowville Creek

Lowville Creek originates as a series of tributaries that arise along the Niagara Escarpment in the vicinity of the Conservation Halton administration office. These tributaries coalesce downstream of Guelph Line and the main branch flows through agricultural fields and the Indian Wells Golf Course before discharging to Bronte Creek downstream of No. 4 Sideroad. Most of the tributaries are intermittent; however, one spring-fed tributary that flows through the Lowville Golf Course does support permanent flow. While historically characterized as permanently flowing, recent changes to the flow regime of this spring-fed tributary (water taking combined with the recent drought) have led to intermittent flow conditions on its main branch downstream to Bronte Creek. Although anecdotal records of brook trout have been reported from this tributary, the present fish community consists only of tolerant warmwater forage

fish. There is a potential for nursery habitat for rainbow trout in its lower reaches. Lowville Creek enters Bronte Creek immediately downstream of No. 4 Sideroad.

Limestone Creek

The upstream branches of Limestone Creek arise from the Crawford Lake/Calcium Pits wetland complex above the Niagara Escarpment and from the Nassagaweya Canyon that cuts through the Escarpment between Crawford Lake and Rattlesnake Point. Groundwater discharge and extensive forest cover help support populations of resident brook trout upstream of Derry Road. Downstream of Derry Road, forest cover dissipates and extensive agricultural land use predominates. The downstream reaches below Walkers Line provide marginal coldwater habitat for rainbow trout and brown trout. Limestone Creek enters Bronte Creek upstream of No. 4 Sideroad.

Willoughby Creek (Cedar Springs Creek)

Fed by extensive groundwater discharge through the Medad Valley and the Bronte Creek Escarpment Valley, this relatively small subwatershed supports a highly productive resident brook trout population. A dam located approximately 100 m upstream of the Bronte Creek confluence represents a barrier to fish passage for species entering Willoughby Creek from Bronte Creek. Although much of the watershed remains in a natural, wooded state, barriers to fish passage and thermal impacts appear to be associated with a number of on-line ponds adjacent to Cedar Springs Road. The creek flows into Bronte Creek within the Cedar Springs Community.

Kilbride Creek

Kilbride Creek originates above the Niagara Escarpment within the Guelph Junction wetland complex. Fed by groundwater discharge, the headwaters support a healthy

population of resident brook trout. Immediately upstream of Kilbride, flows may become intermittent during drought conditions; however, groundwater inputs through the hamlet quickly restore flows through this reach. Downstream of a natural barrier associated with the Escarpment, Kilbride Creek provides coldwater habitat that supports brook trout and rainbow trout. The creek discharges to Bronte Creek just upstream of the Dakota Mills Dam.

Flamboro Creek

Flamboro Creek arises from a series of wetlands associated with the Lower Mountsberg Creek complex and the North Progreston Swamp. A large on-line pond found within the Carlisle Golf and Country Club property is located at the downstream boundary of the swamp, between the CNR tracks and Carlisle Road. Below the pond, the creek re-enters a wetland system that gives way to a deeply incised valley (Bronte Creek Escarpment Valley) extending downstream to Bronte Creek. Extensive spring activity along the incised valley slopes provides coldwater conditions suitable for resident brook trout, juvenile brown trout and juvenile rainbow trout. Flamboro Creek enters Bronte Creek downstream of the Progreston Dam.

Mountsberg Creek (Badenoch Creek)

The headwaters of Mountsberg Creek originate within the Badenoch-Moffat Swamp complex. Groundwater discharge emanating from the wetland complex provides coldwater conditions that support resident brook trout downstream to Mountsberg Reservoir. This reservoir is an open marsh that supports a wide variety of fish and wildlife. Historical records indicate that the Mountsberg Creek supported coldwater habitat downstream to its confluence with Bronte Creek. However, warmwater discharged from the reservoir during the summer results in significant

degradation to the coldwater habitat in the downstream portions of this reach. Near its confluence with Bronte Creek, Mountsberg Creek has been highly altered through Courtcliff Park.

Strabane Creek

Strabane Creek arises within Beverly Swamp and flows through the hamlet of Strabane before discharging to Bronte Creek downstream of Brock Road. Very little historical information is available for this tributary; however, recent investigations indicate that significant groundwater inputs downstream of Brock Road provide conditions suitable for resident brook trout and assist in maintaining coldwater conditions within Bronte Creek.

2.4 Water Quality Parameters

The freshwater ecosystem is composed of the biotic community (biological producers, consumers, and decomposers), its abiotic constituents (physical and chemical components) and their interactions. Diverse aquatic ecosystems exist within the Bronte Creek watershed and are influenced by numerous factors.

Within the aquatic ecosystem a complex interaction of physical and biochemical cycles exists and changes do not occur in isolation. For example, there are diurnal cycles that are measured in hours, seasonal cycles that are measured in months, and long-term cycles that are measured in years. As a result, aquatic systems undergo constant change. However, an ecosystem has evolved over a long period of time and the organisms have become adapted to their environment. The system may be unbalanced by drastic natural factors such as drastic fire, flood, climatic variations or disease, or by factors due to human activity. Any changes, especially rapid ones, can have detrimental or disastrous effects on the aquatic ecosystem.

Adverse effects due to human activities, such as the presence of toxic chemicals in any industrial or agricultural effluent, will affect many components of the aquatic biota. The magnitude of these effects will depend on both biotic and abiotic site-specific characteristics. In order to obtain a relative picture of water quality and apply site-specific objectives to the local water quality resident biotic species, local water demands, and other factors should be considered. In some cases, natural concentration of a substance may exceed an objective without any apparent affect on the biota. Usually this is because the substance is not biologically available. It may also indicate that modifying factors are present at that location and the substance is not toxic under those conditions. Such considerations should form part of the rationale for site-specific water quality criteria and interpretation. The natural concentrations of parameters and their ranges must also be taken into account in the interpretation of the resulting data. Finally, the aquatic ecosystem should be viewed as a whole, not as isolated organisms affected by one (or a few) pollutant(s).

There are many hundreds of parameters with which to measure water quality as almost every element and many compounds can determine the relative quality of the water. Normally, though, only the most important parameters are tested. These include physical, chemical and organic parameters.

A description of the most important water quality parameters is presented in Appendix A. Each description is based on McNeely *et al.*, (1979) unless otherwise noted. Although not a complete list, it discusses the objectives used by the Ministry of Environment (MOE) based on the publication *Policies, Guidelines, Provincial Water Quality Objectives* (1994). Reference is also made to Environment Canada's *Canadian Water Quality Guidelines* (1991).

2.5 Methodology

2.5.1 Background Literature Review

A thorough review of available literature, scientific papers, and related studies was undertaken as part of the water quality report. Particular emphasis was placed on those studies that relate to the pathways and impacts of phosphorus and bacteria in the aquatic environment. Reports and studies relating to agricultural practices, including land drainage, irrigation, fertilizer, pesticide use and general land management were also reviewed.

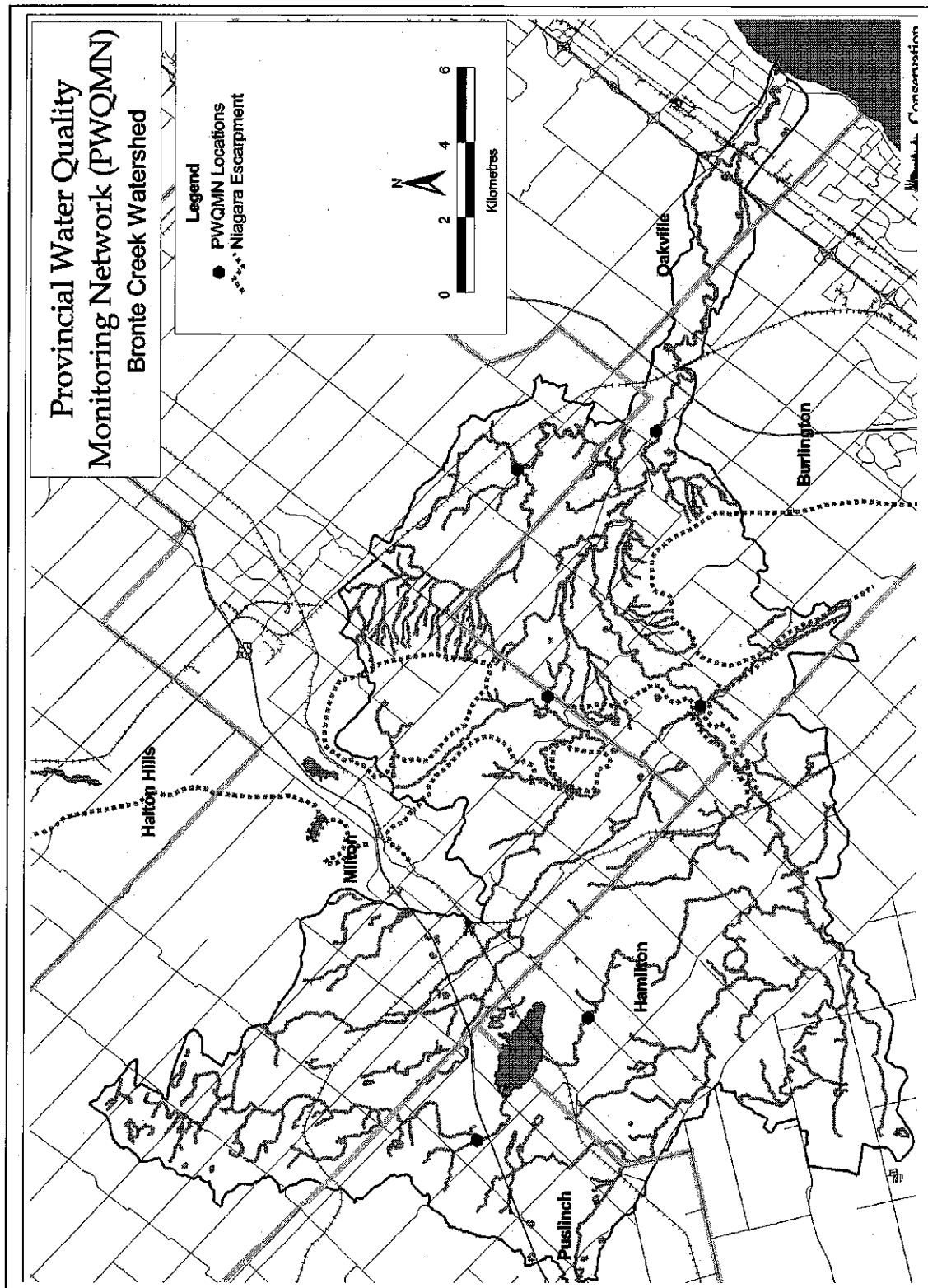
2.5.2 Historical Water Quality Sampling Data and Related Studies

Considerable water quality data exists for the Bronte Creek watershed. A number of potential data sources were accessed to collect aquatic habitat information for Bronte Creek. Records, information and data were obtained from the Conservation Halton files and from a number of other sources. As part of the water quality report, a thorough review of all available historic water quality data was undertaken.

A number of different sources were accessed in order to provide as complete a picture of water quality throughout the watershed as is available. The most important source of data was collected as part of the MOE Provincial Water Quality Monitoring Network (PWQMN). The data had been collected by staff of Conservation Halton for more than 30 years at the same sampling sites, analyzed at the MOE central lab, covered the same parameters, and was therefore considered to be highly indicative of water quality in the watershed. Data collected on a single occasion with inconsistent analysis were of limited value. Accordingly, the value of such data was considered limited. The

FIGURE 2.2

PWQMN Sampling Stations



analysis of PWQMN data permits the identification of areas of concern and suggests reaches requiring water quality improvement and riparian remediation.

The location of the monitoring stations utilized for PWQMN is shown on Figure 2.2.

2.5.3 1999-2001 Bronte Creek Water Quality Monitoring Program

In order to provide water quality data from a number of locations that would provide spatial and temporal comparisons of water quality throughout the watershed, the Bronte Creek Water Quality Monitoring Program (BCWQMP) was undertaken from July 1999 until November 2001. The program is designed to compliment and enhance data obtained from other sampling programs and related studies described in Section 3.2.

There are three primary methods of characterizing instream water quality. These include water column sampling during wet and dry events, sediment sampling, and benthic invertebrate sampling/surveys. Each of these methods provides an indication of the quality of the aquatic environment.

Sampling of the water column via grab samples provides a direct measure of water quality parameters. However, since such samples are only an indication of water quality at a specific moment in time, results can vary according to circumstances (i.e. time of day, season, flow conditions, or wet/dry event). Hence, it is most useful to determine water quality parameters during a variety of conditions over time in order to provide the most complete picture possible. Accordingly, water column samples were taken on a number of different occasions during both wet and dry conditions. Wet conditions or storm events are defined as those in which more than 2 mm of precipitation has occurred within 24 hours prior to sampling. Dry conditions or base flow events are defined as those in which no

precipitation has occurred 48 hours prior to sampling.

Due to limitations of time and resources, no sediment sampling was undertaken. Results of the benthic sampling/survey are presented in the "Aquatic Habitat Inventory and Assessment" (Appendix 3).

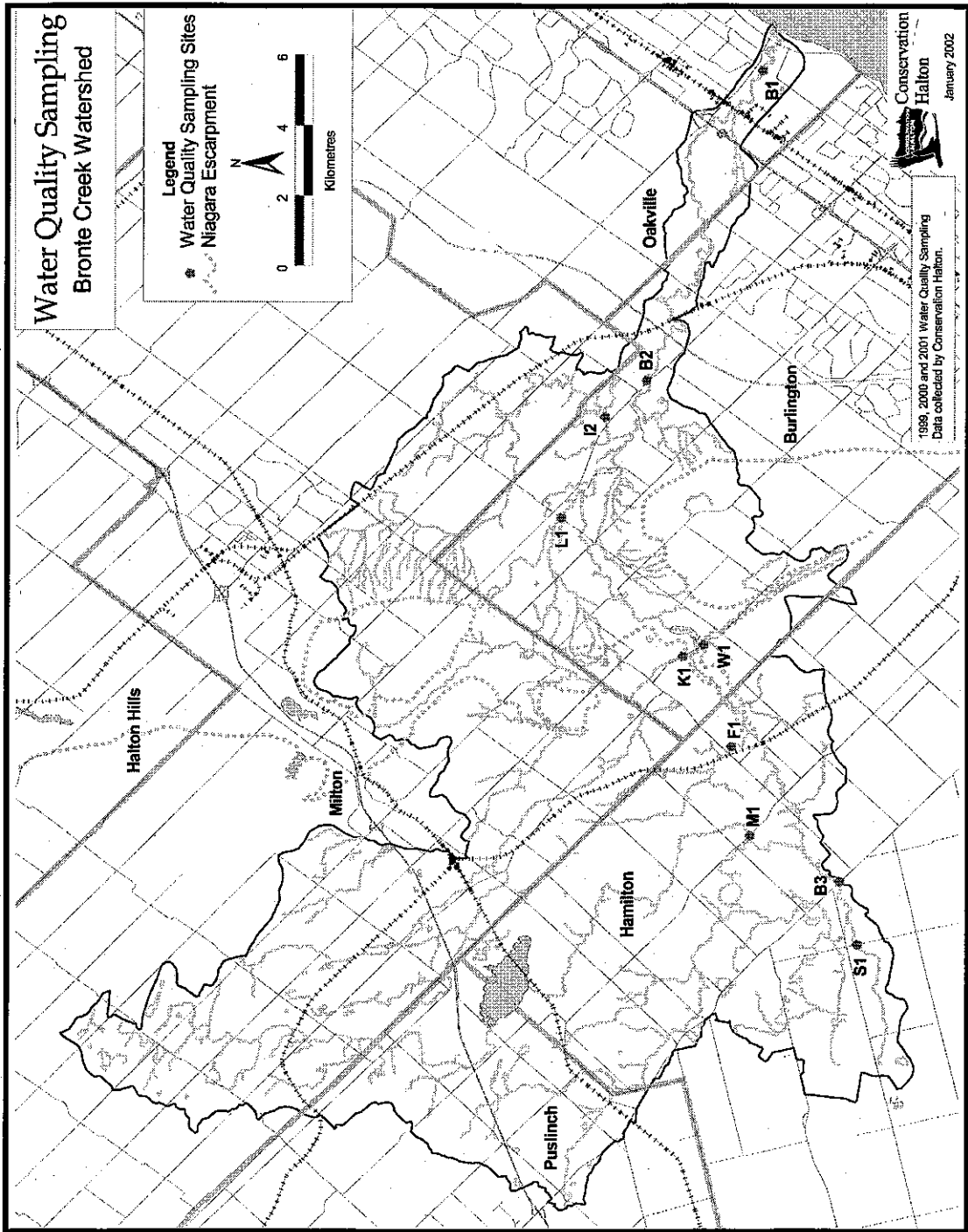
In order to compliment data from existing sources, a total of ten sites were selected for the BCWQMP. The sampling stations were selected at suitable sites throughout the watershed. The location of the monitoring stations utilized for PWQMN is shown on Figure 2.3.

Sampling sites were chosen based on accessibility to the watercourse and suitability of the site. Some sites were selected to compliment or to further refine the existing data. One site monitored as part of the PWQMN (Bronte Creek at Appleby line/Zimmerman) was selected to provide continuity with historic data. Other stations were chosen based on relative location within the watershed and suitability with regard to sampling requirements. These sites were selected to provide water quality parameters for specific tributaries (e.g. S-1), to provide parameters at possible erosion sites (e.g. I-1) or to help quantify possible anthropogenic inputs (e.g. C-1).

Water quality parameters sampled as part of BCWQMP were chosen based on those analyzed as part of the PWQMN. The parameters selected included solids (suspended, total and dissolved), conductivity, pH and alkalinity, temperature, turbidity, nutrients and metals. Nutrient, physical, chemical and metals samples were collected from the watercourse in 500 ml sterile bottles provided by the Ministry of Environment. The sample bottle was placed in a telescoping retriever and immersed in the center of the watercourse at approximately half depth. All samples were immediately put on ice and transported to

FIGURE 2.3

BCWQMP Sampling Stations

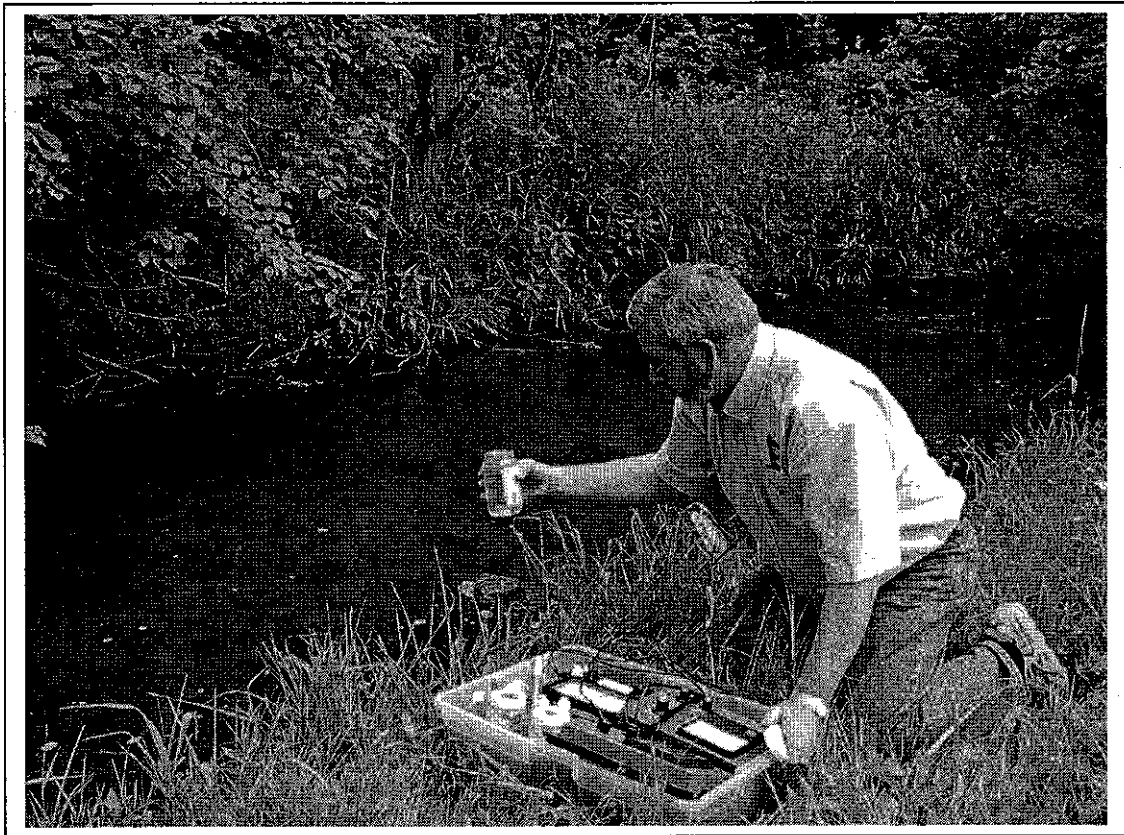


the Ministry of Environment lab, Rexdale, within four hours. Samples and field notes were taken by staff of Conservation Halton. Analysis of the samples was provided by the MOE and results forwarded to Conservation Halton.

Temperature, conductivity, pH and dissolved oxygen readings were taken in the field by staff of Conservation Halton using a YSI Model 33 S-C-T meter, YSI Model 54 Oxygen meter and a pH meter provided by

the MOE. Water samples for these parameters were collected in a three-litre stainless steel pail and the readings were recorded at the sampling sites. Other pertinent data was noted at each station.

The timing of sampling was random. Dates were selected in an effort to sample both wet and dry conditions. Ten samples were representative of dry events or base flows, while 5 were representative of wet events or storm events.



Water sampling in Limestone Creek

Chapter 3: *RESULTS AND DISCUSSION*

3.1 Background Literature Review

The review of available literature, scientific papers, and related studies undertaken as part of the water quality report provided useful background information for the preparation of this report. The information on phosphorus, its pathways and possible impacts were particularly informative. Reports and studies relating to agricultural practices, including land drainage, irrigation, fertilizer and pesticide use, and general land management were also helpful.

3.2 Historical Water Quality Sampling Data and Related Studies

The following is a summary of the important reports or studies utilized to describe water quality in the Bronte Creek watershed. The reader is referred to the individual reports for more details. A list of all related reports and studies may be found in the References.

3.2.1 *Provincial Water Quality Monitoring Network Data; Ontario Ministry of Environment;*

The Provincial Water Quality Monitoring Network (PWQMN) program, sponsored by the Ministry of Environment, provides approximately 30 years of surface water quality data from five sites in the Bronte Creek watershed covering all major water quality parameters. The PWQMN stations are as follows:

- Station 102 (Bronte Creek at Highway 2, Bronte) is located at the mouth of the creek and Highway #2 (Lakeshore Road, Bronte).
- Station 202 (Bronte Creek at Appleby Line, Zimmerman) located between No. 1 Sideroad and No. 2 Sideroad.
- Station 302 (Mountsberg Creek at Highway 401, upstream of Mounts-

berg Reservoir) is located east of Watson Road, between Highway 401 and Wellington County Road 36 (Calfrass Road).

- Station 402 (Mountsberg Creek at County Road 18) is located on Campbellville Road between the Milborough Line and Centre Road.
- Station 602 (Indian Creek at Tremaine Road) is located between Britannia Road and Lower Base Line.

Most water quality parameters were sampled monthly from July 1965 until December 1996.

Two additional stations were monitored in the Bronte Creek watershed for a period of time as part of the PWQMN. Bronte Creek at Cedar Springs Road (at the Cedar Springs Community) was sampled from December 1989 until December 1996 while Limestone Creek at Derry Road (between Guelph Line and Walkers Line) was sampled from December 1992 until December 1996.

The data were collected by staff of Conservation Halton and analyzed by the MOE, Central Lab, Rexdale Ontario. Due to the consistency, scope and period of time this data represented, they are considered the most important source from the watershed. This data provides the base-line for all analysis and interpretation. Figure 2.2 illustrates the location of the PWQMN monitoring stations in the Bronte Creek watershed.

The data collected from 1965 to 1996 for the PWQMN at each station have been analyzed and a summary of the results is given in Table 3.1.

In general, results from this program indicate that most parameters meet provincial

Table 3.1: Summary of PWQMN Results

Parameter	Units	Station	Max	3rd Quart	Mean	1st Quart	Min	N	Exceedances
Alkalinity	mg/L	M.C. @ HWY 401	388.2	266.4	251.1	225.0	92.8	175	No PWQ Objective
		M.C. @ Cnty Rd. 18	456.5	207.0	179.9	135.3	88.7	178	
		B.C.@Cedar Springs	283.4	242.6	228.7	213.4	171.9	31	
		L.C.@ Derry Rd.	299.6	283.3	264.1	260.6	100.0	32	
		I.C. @ Tremaine Rd.	312.0	299.8	202.5	168.6	4.8	182	
		B.C. @Appleby Ln.	298.7	244.2	227.6	205.7	123.0	205	
		B.C. @ HWY 2	408.0	231.8	209.5	188.0	75.5	198	
Aluminum	mg/L	M.C. @ HWY 401	260	41	46	20	10	21	2 > 75 mg/l (10%)
		M.C. @ Cnty Rd. 18	287	40	47	21	10	22	2 > 75 mg/l (9%)
		B.C.@Cedar Springs							
		L.C.@ Derry Rd.	380	61	69	34	10	15	2 > 75 mg/l (13%)
		I.C. @ Tremaine Rd.	5900	420	578	99	57	19	17 > 75 mg/l (89%)
		B.C. @Appleby Ln.	1000	150	168	36	30	20	7 > 75 mg/l (35%)
		B.C. @ HWY 2	830	196	183	78	46	19	14 > 75 mg/l (74%)
E.coli	Ec/100mL	M.C. @ HWY 401	5500	536	135	36	4	25	13 > 100 EC (52%)
		M.C. @ Cnty Rd. 18	3600	168	63	12	4	26	11 > 100 EC (42%)
		B.C.@Cedar Springs							
		L.C.@ Derry Rd.	660	216	55	20	4	17	7 > 100 EC (41%)
		I.C. @ Tremaine Rd.	6700	995	291	135	8	24	18 > 100 EC (75%)
		B.C. @Appleby Ln.	16000	170	64	20	4	25	9 > 100 EC(36%)
		B.C. @ HWY 2	2300	430	213	124	4	22	17 > 100 EC (77%)
Fecal Coliform	FC/100mL	M.C. @ HWY 401	29000	220	50	10	1	207	No PWQ Objective (See E.coli)
		M.C. @ Cnty Rd. 18	22000	196	42	10	1	231	
		B.C.@Cedar Springs	1900	61	111	16	2	28	
		L.C.@ Derry Rd.	40000	133	74	18	4	14	
		I.C. @ Tremaine Rd.	390000	553	161	41	2	170	
		B.C. @Appleby Ln.	24000	170	61	20	1	257	
		B.C. @ HWY 2	52000	353	89	20	1	260	
Chloride	mg/L	M.C. @ HWY 401	89.9	22.6	18.0	13.6	0.3	242	No PWQ Objective
		M.C. @ Cnty Rd. 18	205.0	25.4	19.5	16.1	9.0	268	
		B.C.@Cedar Springs	49.4	38.9	35.7	34.5	0.2	31	
		L.C.@ Derry Rd.	62.9	43.4	37.7	28.4	22.8	32	
		I.C. @ Tremaine Rd.	224.0	70.9	60.1	48.0	0.2	196	
		B.C. @Appleby Ln.	93.0	34.0	24.5	18.0	9.0	425	
		B.C. @ HWY 2	275.0	37.5	28.6	22.0	1.0	420	
Conductivity	umhos/cm	M.C. @ HWY 401	866	593	550	517	245	242	No PWQ Objective
		M.C. @ Cnty Rd. 18	815	510	450	375	246	267	
		B.C.@Cedar Springs	749	627	592	539	468	31	
		L.C.@ Derry Rd.	768	695	626	589	308	32	
		I.C. @ Tremaine Rd.	1275	742	645	577	300	197	
		B.C. @Appleby Ln.	1190	600	552	508	265	421	
		B.C. @ HWY 2	1220	601	543	497	266	410	

Table 3.1: Summary of PWQMN Results

Parameter	Units	Station	Max	3rd Quart	Mean	1st Quart	Min	N	Exceedances
Copper	mg/L	M.C. @ HWY 401	607	3	2	1	0	171	10 > 5 mg/l (6%)
		M.C. @ Cnty Rd. 18	42	2	1	2	2	175	8 > 5 mg/l (5%)
		B.C.@Cedar Springs	5	2	1	1	1	31	0 > 5 mg/l (0%)
		L.C.@ Derry Rd.	35	3	2	1	0	32	1 > 5 mg/l (3%)
		I.C. @ Tremaine Rd.	70	3	3	2	1	171	30 > 5 mg/l (18%)
		B.C. @Appleby Ln.	30	2	2	1	1	173	20 > 5 mg/l (12%)
		B.C. @ HWY 2	43	4	4	2	0	168	21 > 5 mg/l (13%)
Iron	mg/L	M.C. @ HWY 401	700	220	165	60	20	21	3 > 300 mg/l (14%)
		M.C. @ Cnty Rd. 18	1300	140	168	85	40	22	1 > 300 mg/l (5%)
		B.C.@Cedar Springs	1500	145	153	63	30	31	1 > 300 mg/l (3%)
		L.C.@ Derry Rd.	780	150	144	59	20	30	4 > 300 mg/l (13%)
		I.C. @ Tremaine Rd.	4800	475	561	165	20	27	11 > 300 mg/l(41%)
		B.C. @Appleby Ln.	7850	550	639	97	28	189	103 > 300 mg/l (54.5%)
		B.C. @ HWY 2	37000	790	1056	160	0	189	103 > 300 mg/l (54.5%)
Lead	mg/L	M.C. @ HWY 401	13	5	4	3	1	171	11 > 5 mg/l (6%)
		M.C. @ Cnty Rd. 18	46	5	5	3	1	174	12 > 5 mg/l (7%)
		B.C.@Cedar Springs	5	5	5	5	5	31	1 > 5 mg/l (3%)
		L.C.@ Derry Rd.	32	5	6	5	1	31	0 > 5 mg/l (0%)
		I.C. @ Tremaine Rd.	2490	5	26	3	1	171	11 > 5 mg/l (6%)
		B.C. @Appleby Ln.	20	5	4	3	1	173	14 > 5 mg/l (8%)
		B.C. @ HWY 2	50	5	5	3	1	168	23 > 5 mg/l (14%)
Ammonium	mg/L	M.C. @ HWY 401	0.390	0.028	0.012	0.004	0.001	221	0 > 0.020 mg/l
		M.C. @ Cnty Rd. 18	0.440	0.040	0.022	0.010	0.002	247	0 > 0.020 mg/l
		B.C.@Cedar Springs	0.460	0.010	0.009	0.002	0.002	31	0 > 0.020 mg/l
		L.C.@ Derry Rd.	0.114	0.009	0.003	0.002	0.002	32	0 > 0.020 mg/l
		I.C. @ Tremaine Rd.	0.574	0.062	0.034	0.012	0.002	177	0 > 0.020 mg/l
		B.C. @Appleby Ln.	0.420	0.013	0.080	0.002	0.002	407	1 > 0.020 mg/l (0.2%)
		B.C. @ HWY 2	0.580	0.080	0.047	0.020	0.002	410	0 > 0.020 mg/l
Nitrates	mg/L	M.C. @ HWY 401	4.200	0.534	0.328	0.165	0.020	243	No PWQ Objective
		M.C. @ Cnty Rd. 18	1.870	0.349	0.145	0.090	0.010	270	
		B.C.@Cedar Springs	2.160	1.640	1.340	1.010	0.400	30	
		L.C.@ Derry Rd.	2.860	2.190	1.310	1.010	0.010	32	
		I.C. @ Tremaine Rd.	21.400	3.325	2.270	0.554	0.005	197	
		B.C. @Appleby Ln.	7.500	1.490	1.010	0.750	0.010	407	
		B.C. @ HWY 2	4.900	1.400	1.020	0.745	0.175	407	
Nitrites	mg/L	M.C. @ HWY 401	0.070	0.305	0.005	0.004	0.001	242	No PWQ Objective
		M.C. @ Cnty Rd. 18	0.185	0.016	0.007	0.004	0.001	269	
		B.C.@Cedar Springs	0.012	0.009	0.007	0.005	0.002	30	
		L.C.@ Derry Rd.	1.300	0.011	0.008	0.005	0.001	32	
		I.C. @ Tremaine Rd.	0.458	0.036	0.021	0.012	0.001	196	
		B.C. @Appleby Ln.	0.100	0.012	0.008	0.006	0.001	406	
		B.C. @ HWY 2	0.120	0.015	0.010	0.007	0.001	406	

WATER QUALITY REPORT

Table 3.1: Summary of PWQMN Results

Parameter	Units	Station	Max	3rd Quart	Mean	1st Quart	Min	N	Exceedances
Total Kjehldahl Nitrogen	mg/L	M.C. @ HWY 401	3.20	0.65	0.52	0.42	0.18	242	No PWQ Objective
		M.C. @ Cnty Rd. 18	5.70	0.08	0.65	0.54	0.31	269	
		B.C.@Cedar Springs	1.43	0.66	0.62	0.52	0.36	31	
		L.C.@ Derry Rd.	15.00	0.47	0.38	0.35	0.24	32	
		I.C. @ Tremaine Rd.	3.10	0.87	0.66	0.52	0.16	197	
		B.C. @Appleby Ln.	4.00	0.69	0.54	0.46	0.13	441	
		B.C. @ HWY 2	3.50	0.74	0.60	0.49	0.03	446	
B.O.D.	mg/L	M.C. @ HWY 401	6.8	1.1	0.8	0.6	0.0	233	No PWQ Objective
		M.C. @ Cnty Rd. 18	8.0	1.6	1.0	5.0	0.1	262	
		B.C.@Cedar Springs	2.4	1.2	0.8	0.4	0.2	31	
		L.C.@ Derry Rd.	6.6	1.4	1.1	0.5	0.2	32	
		I.C. @ Tremaine Rd.	9.3	1.8	1.2	0.8	0.1	190	
		B.C. @Appleby Ln.	7.2	1.8	1.0	0.6	0.1	45	
		B.C. @ HWY 2	14.0	2.0	1.3	0.8	0.1	431	
Dissolved Oxygen	mg/L	M.C. @ HWY 401	16.0	10.0	8.8	7.6	2.6	192	2 < 4.0 mg/l (1%)
		M.C. @ Cnty Rd. 18	17.2	11.0	9.3	7.7	2.6	214	3 < 4.0 mg/l (1%)
		B.C.@Cedar Springs	14.0	11.4	9.8	9.0	2.1	22	1 < 4.0 mg/l (5%)
		L.C.@ Derry Rd.	12.2	11.4	10.0	9.2	8.0	11	0 < 4.0 mg/l
		I.C. @ Tremaine Rd.	19.0	12.1	10.2	8.1	1.8	150	2 < 4.0 mg/l (1%)
		B.C. @Appleby Ln.	17.1	12.2	11.0	9.6	0.9	377	1 < 4.0 mg/l (0.3%)
		B.C. @ HWY 2	18.6	12.0	10.0	8.0	2.2	381	3 < 4.0 mg/l (1%)
pH		M.C. @ HWY 401	9.39	8.31	8.20	8.05	7.05	192	0 < 6.5 6 > 8.5(3%)
		M.C. @ Cnty Rd. 18	9.21	8.36	8.25	8.11	7.65	195	0 < 6.5 20 > 8.5(10%)
		B.C.@Cedar Springs	8.63	8.51	8.44	8.37	8.18	31	0 < 6.5 2 > 8.5(6%)
		L.C.@ Derry Rd.	8.52	8.41	8.36	8.30	7.80	32	0 < 6.5 3 > 8.5(10%)
		I.C. @ Tremaine Rd.	8.76	8.33	8.23	8.08	5.71	197	1 < 6.5 5 > 8.5 (3%)
		B.C. @Appleby Ln.	8.90	8.52	8.43	8.34	7.69	224	0 < 6.5 63 > 8.5(28%)
		B.C. @ HWY 2	8.70	8.41	8.36	8.16	7.59	313	0 < 6.5 9 > 8.5(3%)
Phosphate	mg/L	M.C. @ HWY 401	0.2600	0.0200	0.0085	0.0040	0.0005	241	No PWQ Objective
		M.C. @ Cnty Rd. 18	0.3200	0.0100	0.0035	0.0020	0.0005	269	
		B.C.@Cedar Springs	0.0430	0.0020	0.0033	0.0010	0.0005	30	
		L.C.@ Derry Rd.	0.7350	0.0080	0.0304	0.0020	0.0005	31	
		I.C. @ Tremaine Rd.	0.3500	0.0270	0.0085	0.0035	0.0005	197	
		B.C. @Appleby Ln.	1.6990	0.0100	0.0040	0.0020	0.0005	427	
		B.C. @ HWY 2	0.3140	0.0140	0.0078	0.0030	0.0005	432	
Total Phosphorus	mg/L	M.C. @ HWY 401	0.322	0.048	0.027	0.018	0.007	242	105 > 0.030 mg/l (43%)
		M.C. @ Cnty Rd. 18	1.000	0.046	0.032	0.022	0.005	269	121 > 0.030 mg/l (45%)
		B.C.@Cedar Springs	0.275	0.028	0.031	0.012	0.006	31	7 > 0.030 mg/l (22%)
		L.C.@ Derry Rd.	5.200	0.034	0.027	0.016	0.010	32	11 > 0.030 mg/l (34%)
		I.C. @ Tremaine Rd.	0.930	0.090	0.050	0.030	0.010	197	134 > 0.030mg/l (68%)
		B.C. @Appleby Ln.	1.928	0.047	0.025	0.016	0.003	440	174 > 0.030 mg/l (40%)
		B.C. @ HWY 2	1.550	0.065	0.040	0.025	0.007	436	297 > 0.030 mg/l (68%)

Table 3.1: Summary of PWQMN Results

Parameter	Units	Station	Max	3rd Quart	Mean	1st Quart	Min	N	Exceedances
Sodium	mg/L	M.C. @ HWY 401	53.6	14.4	12.5	6.6	4.9	21	No PWQ Objective
		M.C. @ Cnty Rd. 18	16.0	15.3	14.2	13.2	12.3	22	
		B.C.@Cedar Springs							
		L.C.@ Derry Rd.	26.8	20.6	17.4	13.8	12.4	15	
		I.C. @ Tremaine Rd.	43.5	36.7	33.0	28.0	13.5	19	
		B.C. @Appleby Ln.	27.4	23.4	22.4	20.5	18.7	20	
		B.C. @ HWY 2	67.9	26.9	22.7	21.6	20.2	17	
Solids; Suspended	mg/L	M.C. @ HWY 401	91.0		3.0		0.5	232	No PWQ Objective
		M.C. @ Cnty Rd. 18	48.0		5.8		0.2	247	
		B.C.@Cedar Springs	75.2	7.1	8.5	3.3	1.1	30	
		L.C.@ Derry Rd.	2960.0	15.5	5.9	3.1	1.3	28	
		I.C. @ Tremaine Rd.	565.0		10.0		2.0	194	
		B.C. @Appleby Ln.	270.0		10.0		0.1	438	
		B.C. @ HWY 2	1116.0		16.0		0.6	413	
Temperature	°C	M.C. @ HWY 401	24.0	17.0	11.0	2.0	0.5	184	No PWQ Objective
		M.C. @ Cnty Rd. 18	26.0	18.5	11.0	2.0	0.0	212	
		B.C.@Cedar Springs	22.0	15.0	9.0	1.8	0.0	28	
		L.C.@ Derry Rd.	16.5	14.0	10.5	3.6	0.0	30	
		I.C. @ Tremaine Rd.	29.0	19.5	13.0	3.5	0.5	143	
		B.C. @Appleby Ln.	28.0	17.8	9.0	2.0	0.0	374	
		B.C. @ HWY 2	28.0	18.5	10.0	2.0	0.0	382	
Turbidity	FTU	M.C. @ HWY 401	42.00	2.46	1.58	0.98	0.28	227	0 > 50.00 FTU
		M.C. @ Cnty Rd. 18	32.00	3.90	2.40	1.63	0.30	253	0 > 50.00 FTU
		B.C.@Cedar Springs	59.00	4.20	5.30	2.10	0.60	311	1 > 50.00 FTU (3 %)
		L.C.@ Derry Rd.	17.70	4.33	2.37	1.13	0.31	31	0 > 50.00 FTU
		I.C. @ Tremaine Rd.	830.00	24.00	12.25	5.80	0.42	196	0 > 50.00 FTU
		B.C. @Appleby Ln.	418.00	8.85	4.30	3.10	0.58	418	18 > 50.00 FTU (4%)
		B.C. @ HWY 2	630.00	25.00	11.50	6.50	0.15	428	0 > 50.00 FTU
Zinc	mg/L	M.C. @ HWY 401	380	31	25	12	2	171	82 > 20 mg/l (48%)
		M.C. @ Cnty Rd. 18	210	15	14	6	1	175	20 > 20 mg/l (11%)
		B.C.@Cedar Springs	90	14	14	6	2	31	4 > 20 mg/l (13%)
		L.C.@ Derry Rd.	140	2	6	1	1	31	1 > 20 mg/l (3%)
		I.C. @ Tremaine Rd.	100	6	7	2	1	171	8 > 171 mg/l (5%)
		B.C. @Appleby Ln.	110	11	10	3	1	173	21 > 173 mg/l (12%)
		B.C. @ HWY 2	70	10	18	5	1	168	14 > 174 mg/l (8%)

objectives most of the time. Physical parameters such as temperature, dissolved oxygen and suspended solids, inorganic parameters such as pH and total alkalinity and organic parameters such as biochemical oxygen demand, generally meet applicable provincial objectives most of the time. Less

than 1% of ammonia readings exceeded the provincial objective of less than 0.020 mg/l. Only 2% of dissolved oxygen readings are below the provincial objective of 4 mg/l. The mean dissolved oxygen (DO) concentration at each station was approximately 10 mg/l. Temperatures range

from 0°C to approximately 29°C. As expected, water quality in the headwater tributaries is generally better than downstream.

The poorest water quality is found in the Indian Creek watershed. Of those parameters with MOE objectives, the greatest number of exceedances is found in Indian Creek. This correlates with the results of "Aquatic Habitat and Inventory Assessment" (Appendix 3).

The one area of concern throughout the Bronte Creek watershed is elevated concentrations of total phosphorus. Phosphorus concentrations measured throughout the watershed usually exceed provincial objectives. Concentrations at the mouth (Highway #2) and in Indian Creek exceed the provincial objective 68% of the time. The mean total phosphorus concentration in Indian Creek is 0.050 mg/l, with maximums reaching 0.930 mg/l, well in excess of the desirable concentration of 0.030 mg/l. Other maximums ranged from 5.20 mg/l Limestone Creek to 0.322 mg/l in Mountsberg Creek above Mountsberg Reservoir. Unpublished trend analysis data suggests that concentrations of total phosphorus throughout the watershed have shown a very slight decline over the period of data collection.

The main sources of the elevated concentrations of phosphorus throughout the watershed are believed to be agricultural runoff and upstream erosion. Studies in other watersheds have shown that up to 90% of the phosphorus in surface waters results from the activities of man.

Aluminum concentrations exceed the provincial objective of 75 µg/l 42% of the time in portions of the watershed. Indian Creek has the highest concentrations. The mean concentration for aluminum in Indian Creek is about 578 µg/l with a maximum concentration of 5900 µg/l. Downstream, the

mean concentration at Appleby Line is about 168 µg/l with a maximum concentration of 1000 µg/l. The mean concentration at the mouth (Highway 2) is about 196 µg/l with a maximum concentration of 830 µg/l. The elevated concentrations at the two stations (Appleby Line and Highway 2) downstream of Indian Creek are thought to result from the influence of Indian Creek. The mean aluminum concentrations in Limestone Creek and Mountsberg Creek are less than the provincial objective.

While the means recorded at the three stations exceed provincial objectives, caution should be exercised in interpreting these results. Sampling protocol calls for the samples to be clay-free. However, it is believed, that the sampling procedures used do not produce clay-free samples. As well, the MOE objective is intended to protect northern shield lakes where acidification may be a threat to the aquatic habitat. Staff consulted at the MOE feel that the objective of 75 µg/l is probably more stringent than necessary for surface waters in southern Ontario watersheds. And finally, the concentrations of aluminum probably reflect natural, background levels. Other water quality studies conducted on adjacent Lake Ontario watersheds also have generally shown aluminum concentrations that exceed the provincial objective. The source of aluminum is thought to be the soils.

The results for iron concentrations are similar to those for aluminum. The mean concentration for iron in Indian Creek is about 561 µg/l with a maximum concentration of 4800 µg/l. Downstream, the mean concentration at Appleby Line is about 639 µg/l with a maximum concentration of 7850 µg/l. The mean concentration at the mouth (Highway 2) is about 1056 µg/l with a maximum concentration of 37000 µg/l. Iron concentrations exceed provincial objectives more than fifty percent of the time at the two stations downstream of Indian Creek.

As is the case for aluminum concentrations, caution needs to be exercised in interpreting the data. It is believed that the elevated concentrations of iron are naturally occurring reflecting the soils and substrates in the watershed. Again, other similar watershed studies conducted in the Lake Ontario basin often recorded elevated iron levels, believed to be naturally occurring.

Bacteria levels are generally elevated throughout the watershed. For example, in Indian Creek the geometric mean of fecal coliform bacterial concentrations recorded from 1966 until 1994 is approximately 161 FC/100ml. The maximum concentration is approximately 360,000 FC/100ml. Since 1995 the indicator organism for bacterial contamination has been *E. coli*. The

geometric mean of *E. coli* concentrations in Indian Creek measured since 1995 is approximately 261 EC/100ml, considerably above the provincial objective of 100 EC/100ml for recreational use. The maximum concentration is 6700 EC/100ml in Indian Creek. Downstream at Appleby Line, a maximum bacterial concentration of 16,000 EC/100ml was recorded. The primary source of contamination is thought to be runoff from livestock operations, with some input from failing septic systems.

Bacterial concentrations recorded at the monitoring stations do not appear to have changed during the thirty year monitoring period. More than fifty percent of all *E. coli* concentrations surpass the objective of 100 EC/100ml.

Table 3.2: Summary of Summer Water Quality Parameters

Parameter	Units	Station	Max	3rd Quart	Mean	1st Quart	Min	N	Exceedances
Ammonium (unionized)	mg/L	M.C. @ HWY 401	0.017	0.001	0.000	0.000	0.000	40	0 > 0.020 mg/l (0%)
		M.C. @ Cnty Rd.18	0.013	0.003	0.002	0.001	0.000	39	0 > 0.020 mg/l (0%)
		I.C. @ Tremaine Rd.	0.021	0.003	0.002	0.001	0.000	43	1 > 0.020 mg/l (2%)
		B.C. @ Appleby Line	0.042	0.005	0.002	0.000	0.000	49	1 > 0.020 mg/l (2%)
		B.C. @ HWY 2	0.007	0.002	0.002	0.001	0.000	30	0 > 0.020 mg/l (0%)
Total Phosphorus	mg/L	M.C. @ HWY 401	0.100	0.058	0.050	0.036	0.021	67	54 > 0.030 mg/l (81%)
		M.C. @ Cnty Rd.18	1.000	0.060	0.046	0.035	0.015	73	65 > 0.030 mg/l (89%)
		I.C. @ Tremaine Rd.	0.930	0.072	0.056	0.037	0.021	54	48 > 0.030 mg/l (89%)
		B.C. @ Appleby Line	1.928	0.047	0.027	0.018	0.007	121	52 > 0.030 mg/l (43%)
		B.C. @ HWY 2	0.580	0.066	0.048	0.037	0.008	123	106 > 0.030 mg/l (86%)
Dissolved Oxygen	mg/L	M.C. @ HWY 401	13.8	9.2	8.0	7.2	3.4	52	1 < 4.0 mg/L (2%)
		M.C. @ Cnty Rd.18	15.4	8.8	7.1	6.2	3.4	57	2 < 4.0 mg/l (4%)
		I.C. @ Tremaine Rd.	15.8	9.9	8.0	6.8	4.0	41	0 < 4.0 mg/l
		B.C. @ Appleby Line	12.0	10.9	9.8	9.0	0.9	101	1 < 4.0 mg/L (1%)
		B.C. @ HWY 2	16.0	9.0	8.0	7.0	2.2	105	1 < 4.0 mg/L (1%)
Temperature	°C	M.C. @ HWY 401	24.0	20.4	18.3	17.0	14.0	54	No PWQ Objective
		M.C. @ Cnty Rd.18	26.0	22.0	20.0	19.0	11.5	60	
		I.C. @ Tremaine Rd.	29.0	24.0	21.5	19.6	10.0	42	
		B.C. @ Appleby Line	28.0	22.0	20.0	18.0	13.5	103	
		B.C. @ HWY 2	28.0	22.0	20.0	19.0	7.0	106	

In order to refine the data available from the PWQMN, the data were qualified according to several key parameters that serve as indicators of stress to the aquatic environment during summer low flows. An analysis of the data was conducted to demonstrate water quality parameters during June, July and August, reflecting summer baseflow conditions. Ammonium (un-ionized), total phosphorus, dissolved oxygen and temperature data were summarized. The results are shown in Table 3.2 (above).

In general, the results indicate that water quality during summer baseflow conditions remains good. Only twice (less than one percent) did ammonium concentrations exceed the provincial objective of less than 0.020 mg/l for the protection of the freshwater aquatic environment. On only five occasions (approximately one percent) did dissolved oxygen readings fall below the provincial objective of 4 mg/l. The mean summer DO concentration at each station was approximately 8 mg/l. Summer temperatures averaged approximately 20°C. Only total phosphorus concentrations generally exceeded recommended objectives. Approximately 75% of all phosphorus readings exceeded the objectives with a mean concentration of approximately 0.030 mg/l.

Based on the analysis during baseflow conditions, Indian Creek tends to have poorer water quality than other reaches of the watershed during the summer months.

3.2.2 Water Pollution Survey of Twelve Mile Cr. Ontario Water Resources Commission

This report is very brief survey of water quality in Bronte Creek at Courtcliffe Park. It is based on 4 bacterial samples taken in July and August 1970 to determine whether Bronte Creek was suitable for recreational use. All the bacterial concentrations exceeded provincial objectives for recreational use. Based on the test results, it

was recommended that swimming not be permitted in the creek. The report is another indication of elevated bacterial concentrations in Bronte Creek.

3.3 Bronte Creek Water Quality Monitoring Program

The results of the 1999-2000 Bronte Creek Water Quality Monitoring Program (BCWQMP) were consistent with the results of other sampling programs and studies discussed in Section 3.2. The results are also consistent with the results of "Aquatic Habitat Inventory and Assessment" (Appendix 3).

Water quality in the watershed was found to be generally good, with most water quality parameters meeting MOE objectives. Physical parameters such as temperature, dissolved and suspended solids, inorganic parameters such as pH and total alkalinity and organic parameters such as biochemical oxygen demand, generally meet applicable provincial objectives on most occasions.

None of the ammonium readings exceed the provincial objective of less than 0.020 mg/l. Four individual dissolved oxygen readings were below the 4 mg/l objective during the 2001 sampling season. Most stations had dissolved oxygen concentrations of approximately 7 mg/l. Temperatures ranged from approximately 9°C to approximately 22°C. The results are consistent with the Instream Temperature Survey conducted as part of the "Aquatic Habitat Inventory and Assessment." (Appendix 3)

All metals monitored as part of the sampling program generally meet provincial objectives. However, as was noted in 3.2.1 (above) aluminum and iron concentrations often exceeded provincial objectives at various stations throughout the watershed. These exceedences will be noted below. The same caution in interpreting the results of some metals concentrations applies to this section as well. Figure 2.3 shows the

location of the sampling sites. All available results of the BCWQMP are shown in Appendix B.

Total phosphorus concentrations measured throughout the watershed were often in excess of provincial objectives. Approximately 34% of all readings exceed MOE objectives. The mean total phosphorus concentration for the watershed was approximately 0.070 mg/l, with a maximum reading of 0.234 mg/l recorded at Station S1, in Strabane Creek. Several other stations including Flamboro Creek, Indian Creek and Limestone Creek recorded concentrations in excess of 0.100 mg/l on a regular basis. Elevated concentrations of total phosphorus are related to erosion sites found throughout the watershed. There is a strong correlation between stations with elevated total phosphorus concentrations and stations with elevated suspended solids concentrations. Other sources include runoff from developed areas and agricultural operations.

The following is a brief summary of the result of the BCWQMP for the monitoring stations in the Bronte Creek watershed.

Lower Bronte Creek

The results from the station at Petro Canada Park (Station B1) indicate the accumulation of upstream sources as well as the influence of an urbanized watershed. Concentrations of aluminum, iron and total phosphorus often exceed provincial objectives. In addition, concentrations of *E.coli* exceed provincial objectives. During one rain event the bacterial concentration was approximately 22,000 *Ec*/100ml., well in excess of the recreational objective of 100 *Ec*/100ml.

Mid Bronte Creek

In this reach, Bronte Creek flows within a well-defined valley feature toward Lake Ontario. Adjacent lands are a mosaic of

agricultural land uses and natural areas. Based on the results from the station at Appleby Line, Zimmerman (Station B2) water quality remains quite good. Concentrations of aluminum and total phosphorus occasionally exceed provincial objectives. The comments for elevated aluminum and total phosphorus concentrations noted in Section 3.2.1 (above) apply here as well

Upper Bronte Creek

In the upper reaches of Bronte Creek, water quality was monitored at Highway 6 (Station B3). Overall the results at this station indicate water quality is good. Only concentrations of zinc occasionally exceeded provincial objectives at this station. It is believed that Strabane Creek (see below) may contribute to the elevated zinc concentrations. As noted in Section 3.2.1 (above) caution should be exercised in interpreting these results. Sampling protocol may not meet MOE standards.

Indian Creek

Indian Creek arises as a number of small tributaries that emerge along the face of the Niagara Escarpment in the vicinity of Rattlesnake Point. Agricultural and settlement activities (woodland clearing, irrigation, cattle grazing) within this subwatershed have resulted in degradation of the aquatic habitat. Although historically characterized as permanently flowing over much of its length, the recent drought (1998, 1999 and 2001) has resulted in intermittent flow conditions through the middle and lower reaches during the summer months.

Water quality is generally the most degraded in this watershed. Concentrations of aluminum, iron and total phosphorus often exceed provincial objectives. In addition, concentrations of *E.coli* exceed provincial objectives. During one rain event the bacterial concentration was

approximately 38,000 *Ec*/100ml., well in excess of the objective of 100 *Ec*/100ml.

Limestone Creek

The upstream branches of Limestone Creek arise from the Crawford Lake/Calcium Pits wetland and from the Nassagaweya Canyon. Groundwater discharge and extensive forest cover help support a coldwater fishery. Downstream of Derry Road, agricultural land use predominates. Based on the results of Station L1 at Britannia Road, water quality in Limestone Creek is good. Only concentrations of aluminum and total phosphorus occasionally exceed provincial objectives.

Willoughby Creek (Cedar Springs Creek)

Fed by extensive groundwater discharge much of this watershed remains in a natural, wooded state. Thermal impacts that appear to be associated with a number of on-line ponds adjacent to Cedar Springs Road impact water quality. In addition, concentrations of *E.coli* exceed provincial objectives during rain events. During two such events bacterial concentrations of 2300 *Ec*/100ml. and 1000 *Ec*/100ml were noted.

Kilbride Creek

Fed by groundwater discharge, the headwaters of Kilbride Creek support a healthy cold water fishery. Immediately upstream of Kilbride, flows may become intermittent during drought conditions; however, groundwater inputs through the hamlet quickly restore flows through this reach. No water quality problems were detected at the station on Kilbride Creek at Cedar Springs Road (Station K1).

Flamboro Creek

Flamboro Creek arises from a series of wetlands associated with the Lower Mountsberg Creek complex and the North

Progreton Swamp. A large on-line pond found within the Carlisle Golf and Country Club property is located at the downstream boundary of the swamp. The pond adversely affects water temperatures downstream. Elevated concentrations of aluminum, total phosphorus and general nutrient enrichment were also detected at the station downstream of the Carlisle Golf and Country Club (Station F1).

Mountsberg Creek (Badenoch Creek)

The headwaters of Mountsberg Creek originate within the Badenoch-Moffat Swamp complex. This reservoir is an open marsh that supports a wide variety of fish and wildlife. Historical records indicate that the Mountsberg Creek supported coldwater habitat downstream to its confluence with Bronte Creek. However, warmwater discharged from the reservoir during summer degrades the coldwater habitat in this reach. Results of water quality sampling at Centre Road, north of Carlisle (Station M1) indicate generally good water quality, although indications of upstream thermal impacts were detected.

Strabane Creek

Strabane Creek flows through the hamlet of Strabane before discharging to Bronte Creek downstream of Brock Road. Significant groundwater inputs downstream of Brock Road help maintain coldwater conditions within Bronte Creek. Water quality monitoring at Brock Road in the village of Strabane (Station S1) indicates moderate degradation in water quality. Concentrations of aluminum, iron, zinc and total phosphorus sometimes exceed provincial objectives. In addition, concentrations of *E.coli* exceed provincial objectives for recreational use. During one rain event the bacterial concentration was approximately 1340 *Ec*/100ml., somewhat in excess of the recreational objective of 100 *Ec*/100ml.

Chapter 4: *GUIDELINES AND STRATEGIES*

Good water quality is a key component to the health of the Bronte Creek. Water resources remain essential to all residents of the watershed. The following are guidelines and strategies to help protect and enhance aquatic resources.

The section has been divided into two sub-sections. The first sub-section provides general guidelines that should be followed to ensure that water quality and aquatic habitat in the Bronte Creek watershed are protected and enhanced. The second sub-section provides site-specific recommendations for each sub-reach and tributary to improve water quality and aquatic habitat within the watershed. Implementation of these guidelines and site-specific recommendations will improve the health of the Bronte Creek.

4.1 General Guidelines

The following guidelines have been developed to protect, enhance and restore water quality and aquatic habitat within Bronte Creek:

- ensure that land use planning policies are compatible with objectives for the protection of water quality;
- continue to regulate activities affecting water quality through review of development proposals;
- continue to apply timing restrictions to projects requiring instream works so as to reduce impacts to surface waters and the aquatic habitat;
- implement Stormwater Best Management Practices throughout the watershed to improve stream channel stability and water quality;
- improve the quality of stormwater discharge;
- encourage infiltration of water and the protection of wetlands and flood plain lands to maintain or enhance base flows, water temperature and water quality;
- encourage the regular maintenance, proper operation and/or upgrading of all private sewage disposal systems;
- encourage landowners to remove or modify on-line ponds to improve water quality;
- minimize alterations to stream channels and ensure that all other alternatives are carefully considered. Where channels have been previously altered encourage rehabilitation using natural channel design techniques;
- encourage the restoration and naturalization of degraded riparian areas. Riparian vegetation is an important habitat feature of aquatic ecosystems. It slows and diffuses overland flows; filters and assimilates nutrients and contaminants; provides shading, as well as overhead and instream cover; provides bank stability and reduces erosion;
- encourage environmentally sound agricultural practices (restrictive fencing, less intrusive tillage practices, water conservation) to minimize impacts on aquatic habitat (loss of riparian habitat, reduced base flow, bank erosion, sediment loading and excessive nutrient inputs);
- encourage the protection and enhancement of groundwater springs and seeps in order to protect and enhance coolwater and coldwater habitats and to protect water quality within the watercourse;
- encourage the protection and enhancement of areas or recharge and discharge;
- reduce the use of pesticides and fertilizers and encourage landowners to find alternate, environmentally friendly methods of pest control and growth augmentation.

4.2 Specific Sub-reach and Tributary Strategies

The sub-reaches and tributaries of Bronte Creek have been negatively impacted by human activities within the watershed. An opportunity exists to address these impacts through the development and implementation of restoration projects within, and adjacent to, these watercourses. Public involvement in restoration projects through stewardship programs is strongly encouraged.

Continued monitoring of water and sediment quality and benthic communities within the Bronte Creek watershed is important to identify and assess ecosystem changes associated with changing land uses and ongoing restoration projects. Information from these monitoring efforts is required to make future resource decisions within the watershed.

Lower Bronte Creek

In the lower Bronte Creek watershed restoration activities could include edge plantings and bank stabilization.

Mid Bronte Creek

In this reach Bronte Creek flows within a well-defined valley feature downstream to Lake Ontario. Adjacent lands represent a variety of agricultural land uses and natural areas. Riparian cover in the valley upstream of Zimmerman is patchy.

Stewardship initiatives targeted at riparian enhancement would improve water quality and enhance aquatic habitat in this reach. The landowners in Cedar Springs should be contacted to assess potential impacts from septic systems.

Upper Bronte Creek

In the headwaters, Bronte Creek meanders through a series of wetlands associated with the Beverly Swamp complex. Stream

gradient is relatively low. Riparian cover upstream of Courtcliffe Park is patchy with large areas of wooded swamp separated by areas of agricultural activity. A number of farms where there is livestock access to the creek have been observed. Riparian enhancements would reduce thermal impacts and enhance instream cover in this reach.

Stewardship initiatives should also focus on working with farmers to fence the livestock from the creek. On-line ponds have significant impacts on instream water temperatures. Efforts should be made to contact these landowners and discuss potential options to minimize/eliminate the adverse impacts of on-line ponds in this important coldwater reach.

Indian Creek

Indian Creek arises as a number of small tributaries that emerge along the face of the Niagara Escarpment. Agricultural and settlement activities (woodland clearing, irrigation, cattle grazing with access to the creek) within this subwatershed have resulted in degradation of the aquatic habitat. Although historically characterized as permanently flowing over much of its length, the recent drought (1998, 1999 and 2001) has resulted in intermittent flow conditions through the middle and lower reaches during the summer months. Water quality is poor.

Riparian cover enhancement, modified land management practices and on-line pond modifications need to be conducted to reduce the effects of erosion, agricultural runoff and thermal impacts during the summer months.

It is recommended that stewardship activities should focus on working with the agricultural community to address the concerns pertaining to degraded water quality and aquatic habitat. Buffer zones along the tributaries and main branch of Indian Creek should be left to regenerate naturally or planted with trees and shrubs to provide watercourse shading and an uptake

area to capture sediment and nutrients running off adjacent fields. Fencing should be utilized to restrict livestock access to specific watering areas. Where feasible, farmers should be encouraged to allow altered stream sections to re-naturalize instead of re-dredging the channels on a continuous basis.

On-line ponds on permanently flowing coolwater tributaries may have significant impacts on instream water temperatures. Efforts should be made to contact landowners with such ponds and discuss potential options (e.g. removal of ponds or retrofitting of structures) to minimize or eliminate the adverse impacts to the habitat within Indian Creek.

Growth is slated for the Indian Creek watershed. Development associated with Milton Phase 2 and 3 urban expansions and the CN Intermodal facility will affect the Indian Creek watershed. However, this development will provide an excellent opportunity to enhance aquatic habitat through properly designed Storm Water Management facilities and the dedication of creek blocks that can form the basis for a relatively extensive riparian corridor adjacent to the watercourse.

Mount Nemo Creek

Similar to Indian Creek, Mount Nemo Creek arises as a series of small tributaries that emanate from the base of the Niagara Escarpment (Mount Nemo). This relatively small subwatershed is characterized by an intermittent flow regime.

Although no monitoring took place in Mount Nemo Creek, it is estimated that the water quality of escarpment tributaries could be enhanced through bank stabilization and riparian regeneration where necessary.

Stewardship activities should focus on working with farmers and rural residents to

address the concerns pertaining to degraded water quality and aquatic habitat. Buffer zones along the tributaries of Mount Nemo Creek should be left to regenerate naturally or planted with trees and shrubs to provide watercourse shading and an uptake area to capture sediment and nutrients running off adjacent fields. Where feasible, farmers should be encouraged to allow altered stream sections to re-naturalize instead of re-dredging the channels on a continuous basis. Efforts should also be made to contact those landowners with on-line ponds and discuss potential options to minimize/eliminate the adverse impacts of these structures.

Lowville Creek

Lowville Creek originates as a series of tributaries that arise along the Niagara Escarpment in the vicinity of the Conservation Halton administration office. These tributaries coalesce downstream of Guelph Line and the main branch flows through agricultural fields and the Indian Wells Golf Course before discharging to Bronte Creek downstream of No. 4 Sideroad.

Most of the tributaries are intermittent; however, one spring-fed tributary that flows through the Lowville Golf Course does support permanent flow. While historically characterized as permanently flowing, recent changes to the flow regime of this spring-fed tributary (water taking combined with the recent drought) have led to intermittent flow conditions on its main branch downstream to Bronte Creek.

Lowville Golf Course has taken steps to ensure that baseflow from the spring tributary is released downstream of the irrigation pond and that irrigation, fertilizer and pesticide use is optimized.

Like Mount Nemo Creek, water quality of the other escarpment tributaries could be enhanced through bank stabilization and riparian regeneration where necessary.

Limestone Creek

The upstream branches of Limestone Creek arise from the Crawford Lake/Calcium Pits wetland complex and from the Nassagaweya Canyon. Groundwater discharge and extensive forest cover help support a coldwater fishery upstream of Derry Road. Downstream of Derry Road, forest cover dissipates and extensive agricultural land use predominates. This reach supports a coolwater fishery.

Additional riparian plantings are recommended in several sections downstream of Derry Road to assist in maintaining coolwater habitat conditions. Riparian buffers would also stabilize streambanks and reduce sediment and nutrient loadings. Cattle with access to the creek should be fenced from the watercourse and buffer areas.

Landowners with on-line ponds on the east and west branches should be contacted to discuss potential options to minimize/eliminate any adverse impacts associated with these structures.

Willoughby Creek (Cedar Springs Creek)

Fed by extensive groundwater discharge through the Medad Valley and the Bronte Creek Escarpment Valley, this relatively small subwatershed supports a highly productive coldwater fishery. A dam located approximately 100 m upstream of the Bronte Creek confluence represents a barrier to fish passage for species entering Willoughby Creek from Bronte Creek. Although much of the watershed remains in a natural, wooded state, barriers to fish passage and thermal impacts appear to be associated with a number of on-line ponds adjacent to Cedar Springs Road.

Significant water quality enhancement could be realized through the retrofitting/removal of on-line ponds. This would reduce thermal

impacts. Riparian plantings following this work would provide additional benefits by reducing the potential for runoff and erosion.

Landowners with on-line ponds along Cedar Springs Road should be contacted to discuss potential options to minimize/eliminate adverse impacts associated with these structures. Removal of on-line ponds, combined with riparian plantings along this reach, would enhance degraded coolwater habitat and provide conditions more suitable for a coldwater fishery. Adjacent landowners should also be encouraged to conduct regular inspections and maintenance of septic systems to improve efficiency and reduce the possibility of bacterial contamination.

In the short-term, water-taking on the east branch of Willoughby Creek needs to be managed in a sustainable manner which provides sufficient downstream flows to sustain aquatic life as well as a water supply for the Burlington Springs Golf and Country Club. In the long-term, Nelson Quarry does not plan to continue pumping to the east branch following the termination of quarry operations. The impacts of this loss of flow on Willoughby Creek need to be assessed.

Kilbride Creek

Kilbride Creek originates above the Niagara Escarpment within the Guelph Junction wetland complex. Fed by groundwater discharge, the headwaters support a healthy coldwater fishery. Immediately upstream of Kilbride, flows may become intermittent during drought conditions; however, groundwater inputs through the hamlet quickly restore flows through this reach.

Riparian plantings, and natural channel design would enhance degraded habitat within Kilbride Creek. Removal or reconfiguration of the on-line ponds would enhance coolwater habitat in this reach. The feasibility of constructing a bottom draw structure in Burns Reservoir should be investigated.

Flamboro Creek

Flamboro Creek arises from a series of wetlands associated with the Lower Mountsberg Creek complex and the North Progreston Swamp. A large on-line pond found within the Carlisle Golf and Country Club property is located at the downstream boundary of the swamp, between the CNR tracks and Carlisle Road. Extensive spring activity along the valley slopes provides coldwater conditions.

Riparian cover along some reaches (i.e. upstream of 10th Concession) is patchy with small areas. Riparian enhancements would reduce thermal impacts and enhance instream cover in this reach. Efforts should be made to contact landowners with on-line ponds and discuss potential options to minimize/eliminate the adverse impacts of these structures.

Mountsberg Creek (Badenoch Creek)

The headwaters of Mountsberg Creek originate within the Badenoch-Moffat Swamp complex. Groundwater discharge emanating from the wetland complex provides coldwater conditions downstream to Mountsberg Reservoir. This reservoir is an open marsh that supports a wide variety of fish and wildlife. However, warmwater discharged from the reservoir during the summer results in significant degradation to the coldwater habitat in the downstream portions of this reach. Near its confluence with Bronte Creek, Mountsberg Creek has been highly altered through Courtcliff Park.

Like Flamboro Creek, riparian cover along a number of reaches of Mountsberg Creek is patchy. The use of natural channel design techniques (to restore altered reaches) and riparian enhancements would reduce thermal impacts and enhance instream cover. Water quality and aquatic habitat could be enhanced through riparian strip plantings and

naturalization projects and through modification/removal of on-line ponds to reduce thermal impacts. An investigation should be carried out on Mountsberg Reservoir to determine if options exist to reduce the thermal loadings to the creek and provide more suitable temperature conditions.

Strabane Creek

Strabane Creek arises within Beverly Swamp and flows through the hamlet of Strabane before discharging to Bronte Creek downstream of Brock Road.

The removal of the large on-line pond at the east end of Beverly Swamp would enhance degraded habitat downstream and provide more suitable temperature conditions. The landowner with this pond should be contacted to discuss potential options to minimize/eliminate adverse impacts associated with this structure.

4.3 Summary

On-line ponds and lack of riparian cover are significant issues throughout the watershed. Additional work should be undertaken to inventory the location of all on-line ponds/dams within the watershed and to develop a priority list for potential removal/alteration of these structures. Stewardship opportunities to increase riparian cover along watercourses should be also be identified and developed.

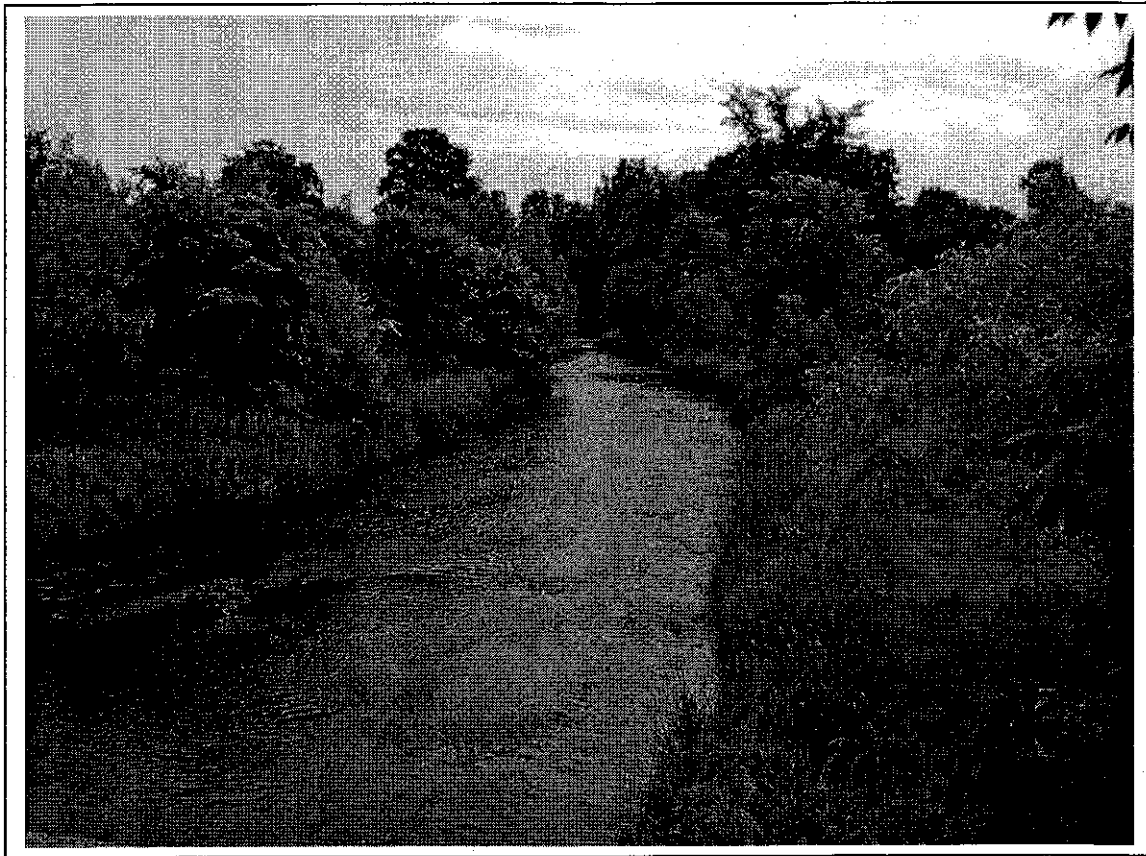
Watercourse alteration is a local issue within the watershed (i.e. Indian Creek and Bronte Creek at Carlisle). A restoration plan has been developed for altered channel areas within Courtcliffe Park (Bronte Creek). A similar plan should be developed and implemented within the Carlisle Conservation Area. Stewardship opportunities within agricultural properties should be explored. Significant urbanization

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is proposed within the northeast portion of the Indian Creek subwatershed. Provided that appropriate stormwater controls are implemented, there may be an opportunity to enhance degraded tributaries as part of an overall development plan that would include well-vegetated creek blocks.

Water quality is a concern within the reaches and tributaries of the watershed. Long-term

monitoring is an important component of watershed planning and management. Conservation Halton is preparing a long-term monitoring strategy that will involve regular water quality monitoring at a number of stations strategically placed within the watershed. In addition, water quality monitoring for the Ministry of Environment's PWQMN will be continued throughout the watershed.



Bronte Creek downstream of Britannia Road

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Appendices

Appendix A

Water Quality Parameters

There are many hundreds of parameters with which to measure water quality as almost every element and many compounds can determine the relative quality of the water. Normally, though, only the most important parameters are tested. The following discussions define some of the more important parameters. The descriptions of the individual parameters are based on McNeely *et al.*, (1979) unless otherwise noted. Although this is not a complete list, it discusses the objectives used by the Ministry of Environment (M.O.E.) based on their publication "Policies, Guidelines, Provincial Water Quality Objectives" (1994). and those of importance in the context of the report. Reference is also made to Environment Canada (E.C.) guidelines where applicable or appropriate. Parameters are listed alphabetically below.

Total Alkalinity

Total alkalinity is used as an indicator of the acid buffering capacity of the water, the ability of the water to resist a change in pH. If an acidic waste or rain is discharged into a natural water system, the affect on the water may not result in a pH change, but may be detected as a drop in alkalinity. (McNeely *et al.*, 1979) According to M.O.E., alkalinity should not be decreased by more than 25% of the natural concentrations (M.O.E., 1994).

Aluminum

Although aluminum is the third most abundant of the elements in the earth's outer crust, it rarely occurs in natural water in concentrations greater than a few micrograms per litre, due to the chemistry of the element. M.O.E. states that in most natural waters, the ionized or potentially ionizable aluminum would be in the form of anionic or neutral precipitates (McNeely *et al.*, 1979). M.O.E. has established an objective of concentrations of no more than 75 micrograms per litre in clay-free samples in waters of pH 6.5 - 9.0 (M.O.E., 1994). Environment Canada has established guidelines of total aluminum concentrations not to exceed 100 micrograms per litre in waters with pH greater than 6.5.

Bacteria

Bacteria, viruses, protozoa, worms and fungi are all present in the aquatic environment. Bacteria are micro-organisms and certain types of bacteria can be used to determine the relative suitability of waters for recreational use or human consumption. These indicator bacteria, some of which may be pathogenic, are commonly found in the presence of disease-causing bacteria originating in animal or human feces. Water-borne and water-associated communicable diseases caused by pathogenic organisms include dysentery, cholera, typhoid, and enteritis in humans or mastitis in livestock. Indicator bacteria can be measured to assess their relative concentration which, in turn, can indicate the suitability of the waters for specific uses (McNeely *et al.*, 1979).

There are three standard groups of indicator micro-organisms (coliforms). They are:

- 1) Total Coliforms - bacterial species associated with fecal matter and soil vegetation
- 2) Faecal Coliforms - bacteria species associated with animal and human fecal matter

3) Faecal Streptococci - bacteria species associated with animal and human fecal matter

The number of coliform bacteria in water is the most widely used indicator of the presence of disease producing organisms. Coliform bacteria are themselves mostly harmless micro-organisms found in the intestinal tracts of man and warm-blooded mammals in large numbers and in vegetation and soils. The presence of Coliform bacteria can be used as an indicator of the possible presence of enteric-pathogens. There is no M.O.E. objective for Coliform bacteria (M.O.E., 1994).

The genus most frequently associated with faecal pollution is Escherichia. Because it does not grow in the natural environment Escherichia coli is used by the M.O.E. as the indicator organism for bacterial pollution. Based on the geometric mean of 5 samples taken over a 30 day period the concentration of E. coli should not exceed 100 organisms per 100 millilitres for water used for recreational purposes (M.O.E., 1994).

Fecal streptococci do not belong to the coliform group of bacteria. In the past, fecal streptococci were used in ratio to faecal coliform as an indicator of potential faecal source (i.e. animal vs human). Recent research seems to suggest that such ratios are neither reliable nor valid. There is no M.O.E. objective for these bacteria (M.O.E., 1994).

Barium

Barium, an alkaline-earth metal, is usually found in only trace amounts in natural surface and groundwaters. Although no objectives have been proposed it has been shown that concentrations greater than 500 micrograms per litre may be toxic to many species of fish and rooted aquatic plants (McNeely *et al.*, 1979). There is no M.O.E. objective (M.O.E., 1994).

Beryllium

Beryllium is a trace element rarely found in natural waters. It is present in the particulate rather than the dissolved form in all except very strongly acidic waters. The principle source is from substrates as a result of weathering (McNeely *et al.*, 1979). The M.O.E objective is 11 µg/l (hardness as CaCO₃ mg/l <75) and 1100 µg/l (hardness as CaCO₃ mg/l > 75) (M.O.E., 1994).

Cadmium

Cadmium and its compounds are usually only present in surface water in trace quantities. Elemental cadmium is insoluble in water and cadmium salts are present as organic and inorganic complexes or adsorb on suspended particles or bottom sediments. The toxicity of this element is dependent on the pH and hardness of water (McNeely *et al.*, 1979). The M.O.E. objective is 0.1 µg/l (hardness as CaCO₃ mg/l <100) and 0.5 µg/l (hardness as CaCO₃ mg/l > 100) (M.O.E., 1994).

Calcium

Calcium salts and calcium ions are substances frequently encountered in water. They may have their source in soil runoff or in sewage and industrial effluents. Excessive calcium in drinking water has been implicated as factors, predisposing to the formation of concretions in the body, such as kidney or bladder stones. On the other hand, there is

evidence of adverse physiological effects from calcium insufficiency. Calcium ions, along with magnesium, are primarily responsible for the hardness of water and often produce boiler scales, deposits on cooking utensils and excessive soap requirements in washing and laundering. Where water is used for irrigation, calcium is beneficial to plant growth (McNeely *et al.*, 1979). There is no M.O.E. objective (M.O.E., 1994).

Chloride

Chloride is an important anion in domestic wastes and in many natural water supplies. Winter applications of salt on roads can produce high salt concentrations in water after runoff. Pollution sources of chlorides can greatly affect natural concentrations. For example, the concentration of chloride in Lake Erie increased threefold in 50 years due to industrial sources, road salting and municipal wastewaters (N.D.C.A., 1980). Chloride poses no direct health hazard, but the water quality objective for domestic water supplies has been specified at 250 mg/l (M.O.E., 1994) while water for irrigation purposes should have chlorine levels no greater than 150 mg/l. Concentrations of 250 mg/l impart a salty taste to water and inhibits growth of certain aquatic plants (McNeely *et al.*, 1979).

Chromium

Few waters contain chromium from natural sources; however, minor quantities may be present in igneous rocks. During weathering chromium behaves like iron and is retained in clays and sands, with the result that a minor amount of chromium goes into solution. The toxicity of chromium with aquatic life varies from species to species and is dependent on the oxidation of state of chromium, temperature and pH (McNeely *et al.*, 1979). The M.O.E. objective is 100 micrograms per litre (M.O.E., 1994).

Cobalt

Cobalt is a heavy metal with similar characteristics to nickel but is more soluble. It may be present in a number of ionic forms. Sources include the weathering of igneous and sedimentary rocks, soils and alluvial deposits. The solution of cobalt is enhanced by bacterial activity. Cobalt is an essential trace nutrient for optimum growth and reproduction in many plants and animals (McNeely *et al.*, 1979). The M.O.E. objective is 0.6 micrograms per litre (M.O.E., 1994).

Conductivity

Conductivity or electrical conductance is the ability of a substance to conduct an electric current. The American Society for Testing and Materials (1964) has defined electrical conductivity of water as "the reciprocal of the resistance in ohms measured between opposite faces of a centimetre cube of an aqueous solution at a specified temperature." The definition states that conductivity should be reported in "micromhos per centimetre at t°C." The standard temperature for laboratory measurements is 25°C.

Conductivity is a measure of the ions in waters. The presence of various ions, notably chlorides, sulfates and calcium make the water conductive. Because natural waters contain a variety of ions, the relationships that affect conductance may be complicated. Well defined relationships exist for chloride and sulfate, and almost as good a relationship for hardness (calcium and magnesium) is indicated. Because conductivity is

sensitive to ionic variations, conductivity is a useful indicator of changes (McNeely *et al.*, 1979). There is no M.O.E. objective for conductivity (M.O.E., 1994).

Copper

Copper is a common heavy metal constituent of natural water. It is essential for all plants and animal nutrition. Copper is generally present in trace amounts resulting from weathering. Human input of copper to waters maybe significant. Contact with brass and copper plumbing and equipment is but one source. Others include industrial byproducts, mine tailings, and agricultural effluents (McNeely *et al.*, 1979). The M.O.E. objective is 1.0 µg/l (hardness as CaCO₃ mg/l <20) and 5.0 µg/l (hardness as CaCO₃ mg/l >20) (M.O.E., 1994).

Hardness

Hardness is principally determined by the sum of calcium and magnesium. The presence of other constituents, such as iron, manganese, and aluminum, may contribute to total hardness although these are not usually present in appreciable concentrations. Water hardness relates to water's capability to produce lather from soap. The harder the water, the more difficult it is to lather soap. The hardness of water varies according to local conditions. Water in areas of carbonate bedrock is characteristically hard, whereas waters draining igneous rocks are very soft.

Hard water results in the formation of scale on boilers and pipes and it adversely affects textiles, plating, and canning industries. Hard water results in increased soap consumption, which both domestic and industrial cleaning and laundering activities.

There is no MOE objective for this parameter.

Iron

Iron is present in high concentration in most soils and rocks. There is also iron input from industry and corrosion from iron pipes, etc. Iron is essential micro-nutrient for all organisms, as it is involved in oxygen transportation in the blood.

Iron in natural water systems, where the pH is near-neutral, has a tendency to form particulate matter and sink to the stream bed. Normally, the particulate matter is particulate ferric hydroxide for some form of organic complex (an organic complex with iron does not necessarily have to be particulate). Loose flocs of iron hydroxides can cause turbidity, reduced light penetration and reduce primary productivity. Iron in water also affects fish. Studies have found that fish hatchability is affected by the concentration of the iron in the water; however the concentration varies with the species (McNeely *et al.*, 1979).

M.O.E. objectives state that concentration of iron in an unfiltered sample should not exceed .3 microgram per litre to protect aquatic life (M.O.E., 1994).

Lead

Lead is ubiquitous in the natural environment and may be found in both soluble and suspended forms in water. Generally low concentrations of lead are found in water owing to its low solubility. The concentration of lead and its relative toxicity depends on its hardness, pH, alkalinity, and dissolved oxygen content of water. Lead is strongly absorbed by soils and therefore, does not affect most plants. The principle natural source of lead is weathering.

Man's input of lead to the environment clearly outweighs all natural sources. The burning of leaded fuels, particularly automobile fuels was a major source. Other sources include ore smelting and refining, production of storage batteries, lead pipes, and recycling lead products and motor oils. Lead is a toxic substance that accumulates in the skeletal structure of man and animals (McNeely *et al.*, 1979). In order to protect the freshwater environment, M.O.E. objective concentrations are 1 µg/l (hardness as CaCO₃ <30), 3 µg/l (hardness as CaCO₃ 30 - 80), and 5 µg/l (hardness as CaCO₃ >80) (M.O.E., 1994).

Magnesium

Magnesium, an alkaline earth metal, is an abundant element and a constituent of natural waters. It is one of the two main components that make up total hardness, the other being calcium. Magnesium salts are highly soluble and tend to remain in solution. As a result, in most natural fresh water, the magnesium concentration is much lower than the calcium concentration (McNeely *et al.*, 1979).

The M.O.E. gives no water quality objective for this element (M.O.E., 1994).

Manganese

Manganese, a metallic cation, is similar to iron in its chemical behaviour and is frequently found in association with iron. Manganese is widely distributed in the earth's crust as an oxide, as a sulfide, as a carbonate and as a silicate. Manganese is not usually present in appreciable concentrations in surface waters. Soils and sediments along with sedimentary rocks, are important sources. Manganese is an essential micronutrient of freshwater flora and fauna (McNeely *et al.*, 1979). There is no M.O.E. objective for this metal (M.O.E., 1994).

Molybdenum

Molybdenum is a trace metal not widely distributed in nature. Like copper, it is a biologically essential micronutrient that is active in oxidation, reduction enzyme systems. It is an essential element for nitrogen fixation and is also necessary for plants that metabolize nitrates into amino acids and proteins (McNeely *et al.*, 1979). The M.O.E. objective is 10 micrograms per litre (M.O.E., 1994).

Nickel

Nickel, although relatively inert, is seldom found in its native state but is present in many minerals and ores. In the weathering process, nickel forms insoluble minerals. Natural sources include leaching from igneous rocks and other weathering processes. The

processing of nickel ores, metal plating, burning of fossil fuels and waste incinerations are all anthropogenic sources. Some of these contribute waste directly to water, while others generate contamination through aerosol fallout. Nickel has not been proven as an essential element or nutrient for plants and animals. Nickel toxicity to wildlife has not been reported, but it has been demonstrated for man. Nickel toxicity to invertebrates varies with the species (McNeely *et al.*, 1979). M.O.E. recommends that concentrations of nickel not exceed 25 micrograms per litre for the protection of aquatic life (M.O.E., 1994).

Nitrogen

Nitrogen sources for fresh water include the atmosphere, nitrogen fixation by organisms and weathering. There are a number of chemical forms of nitrogen. The atmosphere provides a reservoir of inorganic or elemental nitrogen, but it is the combined forms of nitrogen that are of interest in the chemical composition of water. The process of nitrogen fixation involves a number of plant/bacteria symbioses. In the aquatic environment bacteria and blue green algae reduce elemental nitrogen to ammonia. Other bacteria convert ammonia to nitrite; a second group of bacteria converts nitrite to nitrate. In the process of denitrification, bacteria convert nitrate to nitrite and then to elemental nitrogen (McNeely *et al.*, 1979).

As mentioned above, nitrogen can exist in several forms; the four major parameters are discussed below:

1) AMMONIA: Ammonia is the most reduced inorganic form of nitrogen in water. It enters natural water systems from several sources either directly as ammonia or indirectly by formation from other nitrogenous matter. Direct sources are precipitation of ammonia with rain and snow, gas exchange with the atmosphere and effluents from urban, industrial and agricultural sources.

The amount of ammonia in water systems is also influenced by the temperature and pH of the water. The fraction of ammonia increases with rising temperature, particularly at low pH levels. At low concentrations, ammonia becomes a significant toxicant to the aquatic biota. For the protection of the freshwater environment, M.O.E. recommends ammonia concentrations not exceed 0.02 mg/l in its un-ionized form, depending on pH and temperature (M.O.E., 1994). For example, at 20°C and pH 8.0, a total ammonia concentration of 0.5 mg/l would give an un-ionized concentration of $0.5 \times 3.8/100 = 0.019$ which is less than the un-ionized objective of 0.02 mg/l. For individual readings, reference should be made to a conversion chart.

2) NITRATE: Nitrate is the principle form of combined nitrogen found in natural waters. The highly soluble nitrate ion, which is the most stable form of combined nitrogen in surface waters, results from the complete oxidation of nitrogen compounds. Most surface waters contain some nitrates; however, the presence of nitrates in concentrations greater than 5 mg/l may reflect anthropogenic inputs. Sources of nitrate include fertilizer runoff, decaying plant and animal debris, as well as human and animal waste (McNeely *et al.*, 1979). There is no M.O.E. objective related to the protection of aquatic life (M.O.E., 1994).

3) NITRITE: Nitrite is a very unstable form of nitrogen usually found in minute quantities in surface waters. It is unstable in the presence of oxygen, and occurs in

intermediate forms between ammonia and nitrate. The presence of nitrite in water indicates active biological processes influenced by organic pollution (McNeely *et al.*, 1979). There is no M.O.E. objective related to the protection of aquatic life (M.O.E., 1994).

4) TOTAL KJELDAHL NITROGEN: Total kjeldahl nitrogen (TKN) measures both ammonia and organic nitrogen. This is primarily a measure of nitrogen present in the organic form. It does not include nitrogen present as nitrite or nitrate. High levels of total kjeldahl is often indicative of organic wastes being added to the system. TKN may contribute to the overall abundance nutrients in water and thus, eutrophication (McNeely *et al.*, 1979). While there are no M.O.E. objectives for TKN, the concentrations in rivers that are not influenced by excessive or organic inputs should not exceed 0.5 mg/l (M.O.E., 1994).

Oxygen

1) BIOCHEMICAL OXYGEN DEMAND: The biochemical oxygen demand (B.O.D.) of water is the amount of oxygen required to oxidized the organic matter by microbial decomposition to a stable inorganic form. B.O.D. is usually recorded as the amount of oxygen consumed over specific time period at a specific temperature. A five day time period at an incubation temperature of 20°C is frequently used and recorded as B.O.D₅. B.O.D. is only a measure of the amount of oxygen consumed; it is not a pollutant in itself but is a measure of organic pollution. A B.O.D. load can pose a threat to the aquatic environment by depressing the dissolved oxygen concentrations to levels that affect aquatic organisms (McNeely *et al.*, 1979). No specific objectives for B.O.D. have been proposed but waters with B.O.D. levels less than 4 mg/l are considered reasonably clean (M.O.E., 1994) (McNeely *et al.*, 1979). Waters with levels greater than 10 mg/l are considered polluted since they contain large amounts of degraded organic matter.

2) DISSOLVED OXYGEN: The dissolved oxygen (D.O.) concentration is a measure of the amount of oxygen dissolved in natural surface waters. The amount of dissolved oxygen in natural waters varies since it is dependent upon temperature, salinity, turbulence of the water and atmospheric pressure. It is subject to diurnal and seasonal fluctuations. The decomposition of organic wastes and oxidation of inorganic wastes may reduce the dissolved oxygen levels to concentrations approaching zero. It is one of the most important measures of surface water quality. Dissolved oxygen is essential to the metabolism of all aquatic organisms that possess aerobic respiratory biochemistry. The sources of dissolved oxygen from the atmosphere and from photosynthetic inputs and the hydromechanical distribution of oxygen are counterbalanced by consumptive metabolism (McNeely *et al.*, 1979).

Fish and other desirable clean-water biota require relatively high dissolved-oxygen levels. The dissolved oxygen content of a water sample then, is an indicator of the biochemical condition of the water at that time and place. Streams with large loads of organic material, however, may have oxygen consuming organic and inorganic reactions that deplete oxygen to levels unfavourable for the clean-water species, which leads to septic conditions with its associated foul odours and unpleasant appearance (McNeely *et al.*, 1979).

According to M.O.E., dissolved oxygen concentrations should range from 4 mg/l to 7 mg/l (for warmwater biota depending on temperature and percent saturation) and between

5 mg/l and 8 mg/l (for coldwater biota depending on temperature and percent saturation) (M.O.E., 1994).

Pesticides

Pesticides are organic or inorganic compounds used to control noxious "pests" that attack crops, animals and man. Such pests may be insects, weeds, or fungi, hence the term pesticide. Pesticides include insecticides, herbicides, and fungicides. Pesticides have both beneficial and detrimental characteristics and may be regarded as environmental contaminants if they extend beyond the area of intentional application or persists longer than is necessary to control the pests. A major concern with pesticides is their accumulation in the environment and, in particular, their biological magnification in the food chain (McNeely *et al.*, 1979).

Pesticides may reach the aquatic environment in a number of ways; 1) drift from aerial spraying; 2) surface runoff; 3) percolation and subsurface runoff from treated lands; 4) careless application or spillage; 5) direct aquatic application to control undesirable aquatic organisms; and 6) sewage discharge and industrial effluents. Pesticides may also be subject to atmospheric transport and re-deposition.

Pesticides may be subdivided into chemical compounds sharing common characteristics. One main division is whether the compound is organic or inorganic; organic compounds contain linked carbon atoms in their chemical structure. In general, organic pesticides can then be grouped into four major categories based on their molecular structure; chlorinated hydrocarbons such as DDT, organophosphates such as diazinon, carbamates such as carbyls, and urea derivatives. Inorganic compounds include fungicides such as copper sulfate. Generally, the impact of a pesticide extends beyond the target organism by altering environmental conditions required by other organisms that do not adversely affect man's use of the environment.

There are dozens of M.O.E. objectives based on individual pesticides and their chemical composition, too numerous to detail here (M.O.E., 1994).

pH

The symbol pH is used to designate the logarithm of the reciprocal of the hydrogen ion concentration. In general terms, pH is an index of the acidity or alkalinity of a solution. The pH scale ranges from 0 to 14, with 7.0 being the neutral point. Acids have values of less than 7.0 whereas alkaline substances have values of more than 7. M.O.E. states the pH should be between 6.5 - 8.5 to protect aquatic life and avoid irritation to those using the water for recreational purposes (M.O.E., 1994). Soils and the substrate usually has the most profound affect on the pH of natural waters.

Phosphorus

Phosphorus, a non-metallic element, can occur in numerous organic or inorganic forms and can be present in waters as a dissolved or particulate species. It plays a major role in the biological process. In comparison to the rich, natural supply of the other nutritional and structural component of the biota (carbon, hydrogen, nitrogen, oxygen, sulfur), phosphorus is the least abundant and most commonly limits biological productivity (McNeely *et al.*, 1979).

Phosphorus occurs in waters in several different combinations which included orthophosphates. All are used in metabolic processes. Artificial inputs of phosphorus via waste-water and land runoff play a major part in the over-abundance of algae and aquatic plants which impair the quality of the water. When discussing phosphorus concentrations that are desirable, the main criteria should be the levels of phosphorus that will not cause excessive growth. There is no M.O.E. objective; however, concentrations of less than 0.03 mg/l are desirable to eliminate excessive aquatic plant growth and the resultant eutrophication (M.O.E., 1994).

Polycyclic Aromatic Hydrocarbons

Polycyclic aromatic hydrocarbons (P.A.H.) are the by-products of the combustion of fossil fuels. These combustion-derived contaminants enter the ecosystem primarily from vehicular sources as well as from industrial sources. They tend to concentrate in soils and sediments. They are delivered either by airborne deposition or roadway runoff. There are no M.O.E. objectives (M.O.E., 1994).

Potassium

Potassium is one of the principal alkalis present in water and is usually found in association with sodium. Although potassium may be found in many rocks, those with significant amounts of potassium are resistant to weathering. Industrial effluents and water contact with potassium-bearing soils may contribute potassium to surface waters.

Moderate quantities of potassium do not adversely affect the use of water. Although potassium is an essential nutrient for plant and animal life, very high concentrations of potassium may be harmful to the human nervous and digestive systems. No recommended limit has been prescribed for potassium.

There is no MOE objective for this parameter.

Sodium

Sodium, the principal alkali metal, is found in an ionic form in all surface waters. Nearly all sodium compounds are readily soluble in water and tend to remain in aqueous solution. Sodium is an important cation and significant in the balance of total cations. It is usually found in association with potassium.

Plants use sodium in limited amounts for growth, but the presence of large amounts of sodium often proves injurious, especially to fruit crops. Sodium can adversely affect soil structure and create alkali soils, which impair agricultural uses.

There is no MOE objective for this parameter.

Solids: Suspended

Suspended solids is a measure of the amount of substances in suspension in the water column. The presence of such solutes alters the physical and chemical properties of water.

Suspended solids will restrict light penetration in the water column, which will have an affect on the biota living there. Suspended solids act as a reservoir of toxic chemicals, and high concentrations are able to cause behavioural reactions or death in fish.

There is no MOE objective for this parameter.

Strontium

Strontium is an alkaline earth metal that is chemically similar to calcium. In most surface waters strontium is less abundant than calcium. Strontium is not found as a native metal in nature but occurs primarily as salts that are only slightly soluble in water (McNeely *et al.*, 1979). There are no water quality guidelines for strontium (M.O.E., 1994).

Temperature

Water temperature can affect the diversity, distribution and abundance of plant and animal life. Aerobic and anaerobic biochemical processes are temperature dependent. Oxygen solubility is also temperature dependent and oxygen availability besides affecting fish species, affects the natural self-purification process. Extremely high temperatures or rapid fluctuations in temperature can be detrimental to fish and aquatic life. Studies have found that rivers and streams have more rapid but not as intense fluctuations as lakes (McNeely *et al.*, 1979). M.O.E. states that the natural thermal regime of any body of water shall not be altered so as to impair the quality of the aquatic habitat (M.O.E., 1994). The temperature at the edge of a mixing zone must not exceed the natural ambient water temperature by 10°C. The maximum temperature of the receiving body of water must not exceed 30°C (86°F) due to input from point sources.

Titanium

Titanium is a metal that ranks eighth in order of abundance in igneous rocks. Titanium metal is extensively used in industry because of its resistance to corrosion and its inertness. It is not considered an essential element for either plants or animals (McNeely *et al.*, 1979). There is no M.O.E. objective (M.O.E., 1994).

Total Dissolved Solids

Total dissolved solids is an index of the amount of dissolved substances in water. The presence of such solutes alters the physical and chemical properties of water. The base flow of a waterway acquires mineral constituents in the form of dissolved salts. In periods of high surface runoff overland flow contribute dissolved materials to waters. In addition, significant contributions to the total dissolved solids load are anthropogenic in the form of municipal and industrial effluents, agricultural runoff, and aerosol fallout (McNeely *et al.*, 1979). There is no M.O.E. guideline for total dissolved solids.

Turbidity

Turbidity is a measure of suspended particles such as silt, clay, organic matter, plankton and microscopic organisms held in suspension that reduces water clarity and light penetration. Turbidity is measured by comparing the optical interferences of suspended particles to the transmission of light in water (McNeely *et al.*, 1979). While there is no M.O.E. guideline for turbidity, readings in excess of 1.0 Formazin Turbidity Units can

impair light penetration sufficiently to deter aquatic plant growth (M.O.E., 1994). The recommended range is 5 to 50 FTUs.

Vanadium

Vanadium is a ubiquitous element in the earth's crust. However, metallic vanadium does not occur in nature. Sources include igneous and sedimentary rocks. Vanadium compounds are widely used in commercial processes, including catalytic converters. The anthropogenic enhancement of environmental vanadium results mainly from man's use of fossil fuels, ending up as residues or byproducts of combustion. In either case, vanadium eventually enters the aquatic environment (McNeely et al., 1979). The M.O.E. guideline is 7 micrograms per litre (M.O.E., 1994).

Zinc

Zinc is commonly found in nature as zinc sulfide and zinc carbonate. Zinc has many industrial applications and can enter the aquatic environment as industrial discharge. On the other hand, in plants, zinc is an essential nutrient for growth, and plants in zinc deficient soil are severely stunted. In animals, zinc (a constituent in enzymes) is vital for normal respiration (McNeely et al., 1979). M.O.E. guidelines suggest that concentrations of zinc should not exceed 20 micrograms per litre (M.O.E., 1994).

Appendix B

Bronte Creek 1999 Data - ALKALINITY; Total (mg/l CaCO ₃)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	284.0	256.0	139.0	223.0	257.0	262.0	234.0		191.0	183.0
14-Sep-99	W	257.0	241.0	140.0	187.0	250.0	199.0	247.0	196.0	206.0	193.0
30-Sep-99	W	173.0	215.0	136.0	204.0	219.0	207.0	151.0	206.0	186.0	176.0
14-Oct-99	W	154.0	205.0	159.0	225.0	234.0	189.0	200.0	166.0	194.0	183.0
26-Oct-99	D	197.0	237.0	199.0	246.0	279.0	234.0	274.0	210.0	252.0	234.0
10-Nov-99	D	180.0	213.0	176.0	246.0	260.0	244.0	244.0	224.0	218.0	219.0
Max		284.0	256.0	199.0	246.0	279.0	262.0	274.0	224.0	252.0	234.0
3rd Quart		242.0	240.0	171.8	240.8	259.3	241.5	246.3	210.0	215.0	212.5
Median		188.5	226.0	149.5	224.0	253.5	220.5	239.0	206.0	200.0	188.0
Avg		207.5	227.8	158.2	221.8	249.8	222.5	225.0	200.4	207.8	198.0
1st Quart		174.8	213.5	139.3	208.8	238.0	201.0	208.5	196.0	191.8	183.0
Min		154.0	205.0	136.0	187.0	219.0	189.0	151.0	166.0	186.0	176.0

Bronte Creek 1999 Data - ALUMINUM (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	175	14	23	124	35	11	37		19	99
14-Sep-99	W	14	15	18	119	13	22	58	54	22	32
30-Sep-99	W	68	44	30	163	65	84	175	360	336	563
14-Oct-99	W	67	29	32	327	56	283	1130	1320	1570	1270
26-Oct-99	D	9	15	7	103	15	10	27	36	13	61
10-Nov-99	D	10	13	13	128	9	12	42	323	34	44
Max		175	44	32	327	65	283	1130	1320	1570	1270
3rd Quart		68	26	28	154	51	69	146	360	261	447
Median		40	15	21	126	25	17	50	323	28	80
Avg		57	22	20	161	32	70	245	419	332	345
1st Quart		11	14	14	120	14	11	39	54	20	48
Min		9	13	7	103	9	10	27	36	13	32

Bronte Creek 1999 Data - <i>ESCHERICHIA COLI</i> (Ec/100mL)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	24									
14-Sep-99	W										
30-Sep-99	W	1340			820	700	2380				22000
14-Oct-99	W	640	220	390		460	1010		38000		2100
26-Oct-99	D										
10-Nov-99	D										
Max		1340	220	390	820	700	2380		38000		22000
3rd Quart		1165	220	390	820	640	1695		38000		17025
Median		990	220	390	820	580	1010		38000		12050
GeoMean		926	220	390	820	567	386		38000		6797
1st Quart		815	220	390	820	520	517		38000		7075
Min		640	220	390	820	460	24		38000		2100

Bronte Creek 1999 Data - FECAL STREPTOCOCCUS (FC/100mL)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	144									
14-Sep-99	W										
30-Sep-99	W	3000			3000	3000	3000				46000
14-Oct-99	W	4200	1180	2800		2200	7600		63000		11500
26-Oct-99	D										
10-Nov-99	D										
Max		4200	1180	2800	3000	3000	7600		63000		46000
3rd Quart		3900	1180	2800	3000	2800	5300		63000		37375
Median		3600	1180	2800	3000	2600	3000		63000		28750
GeoMean		3550	1180	2800	3000	2569	1486		63000		23000
1st Quart		3300	1180	2800	3000	2400	1572		63000		20125
Min		3000	1180	2800	3000	2200	144		63000		11500

Appendix B

Bronte Creek 1999 Data - <i>PSEUDOMONAS AERUGINOSA</i> (PA/100mL)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D						24				
14-Sep-99	W										
30-Sep-99	W	300			84	114	82				430
14-Oct-99	W	8	4	4		4	52		220		36
26-Oct-99	D										
10-Nov-99	D										
Max		300	4	4	84	114	82		220		430
3rd Quart		227	4	4	84	87	67		220		332
Median		154	4	4	84	59	52		220		233
GeoMean		49	4	4	84	21	47		220		124
1st Quart		81	4	4	84	32	38		220		135
Min		8	4	4	84	4	24		220		36

Bronte Creek 1999 Data - BARIUM (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	128.0	48.9	24.3	52.5	67.0	112.0	85.7		56.5	65.2
14-Sep-99	W	58.8	58.1	27.8	43.3	61.7	114.0	80.3	97.2	82.5	72.4
30-Sep-99	W	62.2	47.6	29.1	43.6	48.2	103.0	69.9	76.6	72.3	77.4
14-Oct-99	W	47.5	54.0	31.7	41.8	44.2	82.5	64.2	56.8	60.9	75.9
26-Oct-99	D	45.0	54.1	31.2	36.3	53.7	103.0	57.1	64.3	62.6	64.3
10-Nov-99	D	36.0	46.8	29.0	33.3	48.2	86.7	43.6	62.6	51.6	54.6
Max		128.0	58.1	31.7	52.5	67.0	114.0	85.7	97.2	82.5	77.4
3rd Quart		61.4	54.1	30.7	43.5	59.7	109.8	77.7	76.6	69.9	75.0
Median		53.2	51.5	29.1	42.6	51.0	103.0	67.1	64.3	61.8	68.8
Avg		62.9	51.6	28.9	41.8	53.8	100.2	66.8	71.5	64.4	68.3
1st Quart		45.6	47.9	28.1	37.7	48.2	90.8	58.9	62.6	57.6	64.5
Min		36.0	46.8	24.3	33.3	44.2	82.5	43.6	56.8	51.6	54.6

Bronte Creek 1999 Data - BERYLLIUM (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	0.048	0.035	0.004	0.032	0.018	0.016	0.002		0.002	0.019
14-Sep-99	W	0.015	0.018	0.009	0.021	0.018	0.021	0.025	0.014	0.017	0.006
30-Sep-99	W	0.013	0.008	0.005	0.016	0.009	0.017	0.013	0.031	0.023	0.055
14-Oct-99	W	0.012	0.008	0.005	0.021	0.008	0.018	0.060	0.049	0.042	0.063
26-Oct-99	D	0.008	0.008	0.003	0.011	0.013	0.009	0.001	0.002	0.004	0.008
10-Nov-99	D	0.008	0.013	0.005	0.012	0.009	0.015	0.009	0.020	0.008	0.015
Max		0.048	0.035	0.009	0.032	0.018	0.021	0.060	0.049	0.042	0.063
3rd Quart		0.014	0.017	0.005	0.021	0.017	0.018	0.022	0.031	0.022	0.046
Median		0.013	0.011	0.005	0.018	0.011	0.016	0.011	0.020	0.012	0.017
Avg		0.017	0.015	0.005	0.019	0.013	0.016	0.018	0.023	0.016	0.028
1st Quart		0.009	0.008	0.004	0.013	0.009	0.015	0.004	0.014	0.005	0.010
Min		0.008	0.008	0.003	0.011	0.008	0.009	0.001	0.002	0.002	0.006

Bronte Creek 1999 Data - CADMIUM (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	0.674	0.283	0.217	0.264	0.382	0.053	0.283		0.004	0.269
14-Sep-99	W	0.136	0.446	0.275	0.457	0.571	0.105	0.461	0.307	0.508	0.198
30-Sep-99	W	0.261	0.040	0.039	0.118	0.229	0.185	0.094	0.066	0.082	0.097
14-Oct-99	W	0.039	0.113	0.131	0.256	0.130	0.116	0.223	0.165	0.130	0.047
26-Oct-99	D	0.267	0.021	0.238	0.009	0.021	0.050	0.497	0.252	0.122	0.137
10-Nov-99	D	0.421	0.033	0.045	0.214	0.125	0.250	0.219	0.354	0.371	0.343
Max		0.674	0.446	0.275	0.457	0.571	0.250	0.497	0.354	0.508	0.343
3rd Quart		0.383	0.241	0.233	0.262	0.344	0.168	0.417	0.307	0.311	0.251
Median		0.264	0.077	0.174	0.235	0.180	0.111	0.253	0.252	0.126	0.168
Avg		0.300	0.156	0.158	0.220	0.243	0.126	0.296	0.229	0.203	0.182
1st Quart		0.167	0.034	0.067	0.142	0.126	0.066	0.220	0.165	0.092	0.107
Min		0.039	0.021	0.039	0.009	0.021	0.050	0.094	0.066	0.004	0.047

Appendix B

Bronte Creek 1999 Data - CALCIUM (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	103.0	80.8	35.9	73.4	74.7		62.9		56.6	60.2
14-Sep-99	W	103.0	95.3	39.8	77.0	84.7	165.0	83.3	88.5	95.8	82.0
30-Sep-99	W	102.0	75.6	43.3	78.0	74.0	122.0	73.1	77.3	72.4	71.4
14-Oct-99	W	80.0	92.9	54.1	82.1	78.5	94.6	80.9	64.2	71.1	76.6
26-Oct-99	D	91.5	105.0	63.9	81.9	83.1	132.0	87.0	83.6	94.6	93.3
10-Nov-99	D	76.4	93.6	57.8	81.7	87.0	121.0	84.5	101.0	87.6	86.0
Max		103.00	105.00	63.90	82.10	87.00	165.00	87.00	101.00	95.80	93.30
3rd Quart		102.75	94.88	56.88	81.85	84.30	132.00	84.20	88.50	92.85	85.00
Median		96.75	93.25	48.70	79.85	80.80	122.00	82.10	83.60	80.00	79.30
Avg		92.65	90.53	49.13	79.02	80.33	126.92	78.62	82.92	79.68	78.25
1st Quart		82.88	83.83	40.68	77.25	75.65	121.00	75.05	77.30	71.43	72.70
Min		76.40	75.60	35.90	73.40	74.00	94.60	62.90	64.20	56.60	60.20

Bronte Creek 1999 Data - CHLORIDE (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	86.4	56.6	39.4	28.4	79.6	100.0	63.4		65.4	3.0
14-Sep-99	W	41.2	70.0	35.2	30.0	66.6	88.2	55.0	93.6	66.0	67.6
30-Sep-99	W	31.8	40.4	27.2	29.2	56.2	100.0	62.2	67.8	60.8	67.8
14-Oct-99	W	35.8	59.0	26.6	29.6	54.2	74.4	60.0	78.2	63.6	65.0
26-Oct-99	D	35.4	72.8	34.8	31.0	72.4	83.6	60.2	99.6	66.0	71.2
10-Nov-99	D	31.2	73.0	35.2	29.6	60.8	76.4	55.4	79.4	57.8	61.4
Max		86.4	73.0	39.4	31.0	79.6	100.0	63.4	99.6	66.0	71.2
3rd Quart		39.9	72.1	35.2	29.9	71.0	97.1	61.7	93.6	65.9	67.8
Median		35.6	64.5	35.0	29.6	63.7	85.9	60.1	79.4	64.5	66.3
Avg		43.6	62.0	33.1	29.6	65.0	87.1	59.4	83.7	63.3	56.0
1st Quart		32.7	57.2	29.1	29.3	57.4	78.2	56.6	78.2	61.5	62.3
Min		31.2	40.4	26.6	28.4	54.2	74.4	55.0	67.8	57.8	3.0

Bronte Creek 1999 Data - CHROMIUM (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	0.470	0.383	0.162	0.224	0.971	0.167	0.298		0.232	0.618
14-Sep-99	W	0.340	0.157	0.165	0.340	0.740	0.009	0.130	0.226	0.331	0.365
30-Sep-99	W	0.325	0.110	0.156	0.094	0.894	0.361	0.635	0.272	0.823	0.965
14-Oct-99	W	0.710	0.541	0.085	0.326	0.382	0.794	0.439	0.915	1.270	0.831
26-Oct-99	D	0.608	0.176	0.013	0.266	0.510	0.142	0.428	0.372	0.241	0.323
10-Nov-99	D	0.012	0.320	0.586	0.071	0.271	0.163	0.179	0.296	0.496	0.471
Max		0.710	0.541	0.586	0.340	0.971	0.794	0.635	0.915	1.270	0.965
3rd Quart		0.574	0.367	0.164	0.311	0.856	0.313	0.436	0.372	0.741	0.778
Median		0.405	0.248	0.159	0.245	0.625	0.165	0.363	0.296	0.414	0.545
Avg		0.411	0.281	0.194	0.220	0.628	0.273	0.352	0.416	0.566	0.596
1st Quart		0.329	0.162	0.103	0.127	0.414	0.147	0.209	0.272	0.264	0.392
Min		0.012	0.110	0.013	0.071	0.271	0.009	0.130	0.226	0.232	0.323

Bronte Creek 1999 Data - COBALT (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	0.815	0.402	0.140	0.150	0.234	0.198	0.479		0.402	0.241
14-Sep-99	W	0.316	0.316	0.639	0.377	0.388	0.622	0.277	0.650	0.204	0.437
30-Sep-99	W	0.216	0.398	0.721	0.154	0.159	0.088	0.301	0.121	0.235	0.198
14-Oct-99	W	1.230	0.082	0.177	0.309	0.097	0.731	1.250	0.752	0.586	0.992
26-Oct-99	D	0.139	0.541	0.077	0.495	0.482	0.712	0.890	0.088	0.204	0.834
10-Nov-99	D	-0.081	0.434	0.113	0.171	0.111	0.262	0.249	0.007	0.094	0.011
Max		1.230	0.541	0.721	0.495	0.482	0.731	1.250	0.752	0.586	0.992
3rd Quart		0.690	0.426	0.524	0.360	0.350	0.690	0.787	0.650	0.360	0.735
Median		0.266	0.400	0.159	0.240	0.197	0.442	0.390	0.121	0.220	0.339
Avg		0.439	0.362	0.311	0.276	0.245	0.436	0.574	0.324	0.287	0.452
1st Quart		0.158	0.337	0.120	0.158	0.123	0.214	0.283	0.088	0.204	0.209
Min		-0.081	0.082	0.077	0.150	0.097	0.088	0.249	0.007	0.094	0.011

Appendix B

Bronte Creek 1999 Data - CONDUCTIVITY (μ mhos/cm)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	802	664	396	530	700	810	630		581	600
14-Sep-99	W	671	698	371	505	635	995	612	730	687	632
30-Sep-99	W	650	556	379	520	572	845	550	584	549	561
14-Oct-99	W	540	635	380	520	585	748	554	574	591	558
26-Oct-99	D	593	737	524	557	680	893	652	716	674	671
10-Nov-99	D	608	784	520	589	699	940	686	802	690	704
Max		802	784	524	589	700	995	686	802	690	704
3rd Quart		666	727	489	550	694	928	647	730	684	661
Median		629	681	388	525	658	869	621	716	633	616
Avg		644	679	428	537	645	872	614	681	629	621
1st Quart		597	642	379	520	598	819	569	584	584	571
Min		540	556	371	505	572	748	550	574	549	558

Bronte Creek 1999 Data - COPPER (μ g/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	2.91	0.15	0.40	0.62	0.91	0.08	0.79		0.25	1.22
14-Sep-99	W	0.12	0.15	0.13	1.20	0.71	0.11	0.98	1.77	0.47	0.58
30-Sep-99	W	1.64	0.67	0.59	1.38	1.63	1.66	1.88	2.40	2.20	3.33
14-Oct-99	W	1.25	0.81	0.52	1.00	1.11	1.57	2.14	3.91	1.81	2.55
26-Oct-99	D	0.16	0.91	0.45	1.06	0.93	0.06	0.39	1.56	0.57	0.66
10-Nov-99	D	0.23	0.89	0.29	0.61	0.85	0.41	0.86	1.92	0.72	0.93
Max		2.91	0.91	0.59	1.38	1.63	1.66	2.14	3.91	2.20	3.33
3rd Quart		1.54	0.87	0.50	1.17	1.07	1.28	1.66	2.40	1.54	2.22
Median		0.74	0.74	0.43	1.03	0.92	0.26	0.92	1.92	0.64	1.08
Avg		1.05	0.60	0.40	0.98	1.02	0.65	1.18	2.31	1.00	1.55
1st Quart		0.18	0.28	0.32	0.72	0.87	0.09	0.81	1.77	0.49	0.73
Min		0.12	0.15	0.13	0.61	0.71	0.06	0.39	1.56	0.25	0.58

Bronte Creek 1999 Data - HARDNESS (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	386.0	323.0	190.0	275.0	309.0	368.0	288.0		253.0	254.0
14-Sep-99	W	384.0	348.0	191.0	263.0	313.0	603.0	306.0	296.0	350.0	307.0
30-Sep-99	W	272.0	203.0	120.0	283.0	285.0	440.0	231.0	272.0	255.0	171.0
14-Oct-99	W	298.0	345.0	227.0	303.0	300.0	348.0	263.0	215.0	272.0	253.0
26-Oct-99	D	339.0	396.0	280.0	318.0	336.0	517.0	334.0	298.0	354.0	344.0
10-Nov-99	D	304.0	354.0	327.0	457.0	323.0	325.0	198.0	171.0	311.0	327.0
Max		386.0	396.0	327.0	457.0	336.0	603.0	334.0	298.0	354.0	344.0
3rd Quart		372.8	352.5	266.8	314.3	320.5	497.8	301.5	296.0	340.3	322.0
Median		321.5	346.5	209.0	293.0	311.0	404.0	275.5	272.0	291.5	280.5
Avg		330.5	328.2	222.5	316.5	311.0	433.5	270.0	250.4	299.2	276.0
1st Quart		299.5	328.5	190.3	277.0	302.3	353.0	239.0	215.0	259.3	253.3
Min		272.0	203.0	120.0	263.0	285.0	325.0	198.0	171.0	253.0	171.0

Bronte Creek 1999 Data - IRON (μ g/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	1610.0	78.2	123.0	558.0	81.5	17.2	75.9		32.2	167.0
14-Sep-99	W	56.5	74.7	111.0	410.0	13.1	46.4	98.3	43.3	41.8	45.5
30-Sep-99	W	117.0	98.7	147.0	273.0	128.0	171.0	185.0	450.0	450.0	787.0
14-Oct-99	W	125.0	72.8	142.0	351.0	89.1	327.0	730.0	847.0	910.0	828.0
26-Oct-99	D	61.7	50.4	38.4	227.0	11.6	19.3	54.6	38.7	27.6	40.1
10-Nov-99	D	48.6	58.9	53.1	227.0	15.9	24.3	65.0	199.0	55.3	54.0
Max		1610.0	98.7	147.0	558.0	128.0	327.0	730.0	847.0	910.0	828.0
3rd Quart		123.0	77.3	137.3	395.3	87.2	139.9	163.3	450.0	351.3	632.0
Median		89.4	73.8	117.0	312.0	48.7	35.4	87.1	199.0	48.6	110.5
Avg		336.5	72.3	102.4	341.0	56.5	100.9	201.5	315.6	252.8	320.3
1st Quart		57.8	62.4	67.6	238.5	13.8	20.6	67.7	43.3	34.6	47.6
Min		48.6	50.4	38.4	227.0	11.6	17.2	54.6	38.7	27.6	40.1

Appendix B

Bronte Creek 1999 Data - LEAD (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	9.19	0.62	0.73	1.28	1.58	2.39	4.65		2.26	1.24
14-Sep-99	W	3.82	2.14	2.28	0.72	1.72	1.86	4.80	1.09	1.09	3.94
30-Sep-99	W	3.20	0.23	0.85	4.07	0.06	2.25	0.86	2.86	3.52	4.50
14-Oct-99	W	0.23	2.12	0.15	1.21	3.76	3.34	1.34	0.13	0.87	1.52
26-Oct-99	D	2.62	5.74	1.24	2.47	1.09	0.58	2.25	3.12	1.23	2.26
10-Nov-99	D	3.16	0.85	0.02	0.35	1.61	2.97	1.22	1.70	0.93	2.73
Max		9.19	5.74	2.28	4.07	3.76	3.34	4.80	3.12	3.52	4.50
3rd Quart		3.67	2.14	1.14	2.17	1.69	2.83	4.05	2.86	2.00	3.64
Median		3.18	1.49	0.79	1.25	1.60	2.32	1.80	1.70	1.16	2.50
Avg		3.70	1.95	0.88	1.68	1.64	2.23	2.52	1.78	1.65	2.70
1st Quart		2.76	0.68	0.30	0.85	1.21	1.96	1.25	1.09	0.97	1.71
Min		0.23	0.23	0.02	0.35	0.06	0.58	0.86	0.13	0.87	1.24

Bronte Creek 1999 Data - MAGNESIUM (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	36.1	30.4	25.7	23.9	29.9	30.3	32.9		27.2	27.0
14-Sep-99	W	34.1	32.2	25.4	23.3	29.7	52.5	30.9	24.6	34.0	31.1
30-Sep-99	W	32.7	27.3	22.7	24.5	27.7	38.1	19.6	23.6	22.5	22.5
14-Oct-99	W	27.8	30.5	24.5	25.9	27.5	30.0	20.3	17.8	21.0	21.4
26-Oct-99	D	33.5	35.2	29.7	27.1	29.8	44.4	31.8	24.2	32.3	33.2
10-Nov-99	D	28.1	31.1	26.6	27.1	30.0	38.6	29.8	22.9	29.5	28.9
Max		36.1	35.2	29.7	27.1	30.0	52.5	32.9	24.6	34.0	33.2
3rd Quart		34.0	31.9	26.4	26.8	29.9	43.0	31.6	24.2	31.6	30.6
Median		33.1	30.8	25.6	25.2	29.8	38.4	30.4	23.6	28.4	28.0
Avg		32.1	31.1	25.8	25.3	29.1	39.0	27.6	22.6	27.8	27.4
1st Quart		29.3	30.4	24.7	24.1	28.2	32.3	22.7	22.9	23.7	23.6
Min		27.8	27.3	22.7	23.3	27.5	30.0	19.6	17.8	21.0	21.4

Bronte Creek 1999 Data - MANGANESE (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	2790.0	34.8	52.4	235.0	31.8	12.2	14.3		8.6	81.2
14-Sep-99	W	38.3	40.0	41.5	176.0	4.1	19.5	19.7	31.3	11.0	21.5
30-Sep-99	W	32.7	29.6	47.8	51.0	28.7	37.9	19.1	51.0	58.8	136.0
14-Oct-99	W	28.0	20.7	50.7	62.4	17.3	38.1	64.1	35.5	13.0	105.0
26-Oct-99	D	13.9	14.5	18.4	59.2	3.6	9.5	11.9	9.6	8.0	18.3
10-Nov-99	D	10.4	18.4	23.1	59.0	4.6	12.1	20.8	10.2	14.4	18.8
Max		2790.0	40.0	52.4	235.0	31.8	38.1	64.1	51.0	58.8	136.0
3rd Quart		36.9	33.5	50.0	147.6	25.9	33.3	20.5	35.5	14.1	99.1
Median		30.4	25.2	44.7	60.8	10.9	15.9	19.4	31.3	12.0	51.4
Avg		485.6	26.3	39.0	107.1	15.0	21.6	25.0	27.5	19.0	63.5
1st Quart		17.4	19.0	27.7	59.1	4.2	12.1	15.5	10.2	9.2	19.5
Min		10.4	14.5	18.4	51.0	3.6	9.5	11.9	9.6	8.0	18.3

Bronte Creek 1999 Data - MOLYBDENUM (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	0.05	0.58	0.25	0.37	0.55	0.01	0.31		0.67	0.17
14-Sep-99	W	0.43	0.70	0.50	0.28	0.07	1.13	0.35	0.85	0.85	0.28
30-Sep-99	W	0.48	0.11	0.36	0.73	0.54	0.17	0.45	0.36	0.29	0.85
14-Oct-99	W	0.72	0.85	1.24	0.78	0.98	1.04	1.43	0.78	0.77	0.98
26-Oct-99	D	1.16	1.16	1.16	1.32	0.85	0.62	1.71	1.40	1.32	2.74
10-Nov-99	D	0.66	0.21	0.57	0.83	0.75	0.30	1.01	0.57	1.01	0.57
Max		1.16	1.16	1.24	1.32	0.98	1.13	1.71	1.40	1.32	2.74
3rd Quart		0.70	0.81	1.01	0.82	0.83	0.93	1.33	0.85	0.97	0.95
Median		0.57	0.64	0.53	0.76	0.65	0.46	0.73	0.78	0.81	0.71
Avg		0.58	0.60	0.68	0.72	0.62	0.55	0.88	0.79	0.82	0.93
1st Quart		0.44	0.31	0.39	0.46	0.54	0.20	0.38	0.57	0.69	0.35
Min		0.05	0.11	0.25	0.28	0.07	0.01	0.31	0.36	0.29	0.17

Appendix B

Bronte Creek 1999 Data - NICKEL (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	3.66	0.07	0.30	0.45	0.54	0.51	0.61		0.38	0.46
14-Sep-99	W	0.23	0.32	0.30	0.20	0.40	1.22	0.16	0.60	0.01	0.51
30-Sep-99	W	1.10	0.40	0.46	0.31	0.32	0.83	0.02	0.21	0.93	0.70
14-Oct-99	W	0.18	1.07	0.20	0.00	0.24	0.39	0.54	1.74	1.01	0.62
26-Oct-99	D	0.35	0.30	0.09	0.38	0.45	0.31	0.06	0.34	0.05	0.76
10-Nov-99	D	0.39	0.39	0.22	0.19	0.62	0.66	0.15	0.41	0.62	0.23
Max		3.66	1.07	0.46	0.45	0.62	1.22	0.61	1.74	1.01	0.76
3rd Quart		0.92	0.40	0.30	0.37	0.51	0.79	0.45	0.60	0.85	0.68
Median		0.37	0.35	0.26	0.26	0.42	0.58	0.15	0.41	0.50	0.57
Avg		0.99	0.42	0.26	0.26	0.42	0.65	0.26	0.66	0.50	0.55
1st Quart		0.26	0.31	0.21	0.19	0.34	0.42	0.08	0.34	0.14	0.47
Min		0.18	0.07	0.09	0.00	0.24	0.31	0.02	0.21	0.01	0.23

Bronte Creek 1999 Data - AMMONIUM (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	0.016	0.016	0.002	0.280	0.002	0.004	0.012		0.002	0.006
14-Sep-99	W	0.004	0.024	0.004	0.194	0.002	0.002	0.008	0.002	0.002	0.004
30-Sep-99	W	0.024	0.020	0.012	0.104	0.004	0.002	0.008	0.016	0.004	0.032
14-Oct-99	W	0.040	0.016	0.014	0.136	0.012	0.022	0.032	0.076	0.018	0.040
26-Oct-99	D	0.006	0.004	0.004	0.028	0.002	0.002	0.002	0.002	0.004	0.008
10-Nov-99	D	0.008	0.008	0.008	0.060	0.004	0.004	0.008	0.022	0.004	0.012
Max		0.040	0.024	0.014	0.280	0.012	0.022	0.032	0.076	0.018	0.040
3rd Quart		0.022	0.019	0.011	0.180	0.004	0.004	0.011	0.022	0.004	0.027
Median		0.012	0.016	0.006	0.120	0.003	0.003	0.008	0.016	0.004	0.010
Avg		0.016	0.015	0.007	0.134	0.004	0.006	0.012	0.024	0.006	0.017
1st Quart		0.007	0.010	0.004	0.071	0.002	0.002	0.008	0.002	0.003	0.007
Min		0.004	0.004	0.002	0.028	0.002	0.002	0.002	0.002	0.002	0.004

Bronte Creek 1999 Data - NITRATE (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	0.128	0.369	0.078	0.066	1.770	3.230	1.330		0.504	0.092
14-Sep-99	W	0.340	0.506	0.256	0.097	0.951	1.820	0.943	0.030	0.993	0.463
30-Sep-99	W	1.690	0.709	0.372	0.017	0.397	1.090	0.391	1.480	1.240	1.180
14-Oct-99	W	0.931	0.729	0.448	0.147	0.458	1.270	3.960	0.989	1.970	1.970
26-Oct-99	D	0.285	0.566	0.294	0.233	0.929	1.610	0.815	1.120	0.890	0.536
10-Nov-99	D	0.314	0.477	0.256	0.506	0.647	1.680	1.680	4.980	1.080	0.983
Max		1.690	0.729	0.448	0.506	1.770	3.230	3.960	4.980	1.970	1.970
3rd Quart		0.783	0.673	0.353	0.212	0.946	1.785	1.593	1.480	1.200	1.131
Median		0.327	0.536	0.275	0.122	0.788	1.645	1.137	1.120	1.037	0.760
Avg		0.615	0.559	0.284	0.178	0.859	1.783	1.520	1.720	1.113	0.871
1st Quart		0.292	0.484	0.256	0.074	0.505	1.355	0.847	0.989	0.916	0.481
Min		0.128	0.369	0.078	0.017	0.397	1.090	0.391	0.030	0.504	0.092

Bronte Creek 1999 Data - NITRITE (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	0.0050	0.0040	0.0010	0.0220	0.0010	0.0020	0.0050		0.0010	0.0010
14-Sep-99	W	0.0080	0.0100	0.0080	0.0210	0.0070	0.0060	0.0090	0.0050	0.0070	0.0070
30-Sep-99	W	0.0180	0.0050	0.0050	0.0060	0.0030	0.0040	0.0080	0.0120	0.0110	0.0130
14-Oct-99	W	0.0090	0.0030	0.0030	0.0090	0.0030	0.0060	0.0180	0.0310	0.0080	0.0200
26-Oct-99	D	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
10-Nov-99	D	0.0050	0.0050	0.0030	0.0080	0.0020	0.0020	0.0060	0.0380	0.0050	0.0060
Max		0.0180	0.0100	0.0080	0.0220	0.0070	0.0060	0.0180	0.0380	0.0110	0.0200
3rd Quart		0.0088	0.0050	0.0045	0.0180	0.0030	0.0055	0.0088	0.0310	0.0078	0.0115
Median		0.0065	0.0045	0.0030	0.0085	0.0025	0.0030	0.0070	0.0120	0.0060	0.0065
Avg		0.0077	0.0047	0.0035	0.0112	0.0028	0.0035	0.0078	0.0174	0.0055	0.0080
1st Quart		0.0050	0.0033	0.0015	0.0065	0.0013	0.0020	0.0053	0.0050	0.0020	0.0023
Min		0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010

Appendix B

Bronte Creek 1999 Data - TOTAL KJELDAHL NITROGEN (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	0.20	0.34	0.68	1.36	0.32	0.12	0.48		0.32	0.28
14-Sep-99	W	1.56	0.40	0.58	1.00	0.36	0.24	0.44	0.46	0.36	0.36
30-Sep-99	W	1.08	0.44	0.34	0.88	0.56	0.82	0.80	0.72	0.86	0.92
14-Oct-99	W	1.22	0.84	0.66	0.78	0.01	0.03	1.18	1.10	2.76	0.08
26-Oct-99	D	0.90	0.62	0.54	0.76	0.48	0.36	0.48	0.56	0.50	0.50
10-Nov-99	D	0.76	0.66	0.64	0.56	0.44	0.32	0.62	0.68	0.62	0.64
Max		1.56	0.84	0.68	1.36	0.56	0.82	1.18	1.10	2.76	0.92
3rd Quart		1.19	0.65	0.66	0.97	0.47	0.35	0.76	0.72	0.80	0.61
Median		0.99	0.53	0.61	0.83	0.40	0.28	0.55	0.68	0.56	0.43
Avg		0.95	0.55	0.57	0.89	0.36	0.32	0.67	0.70	0.90	0.46
1st Quart		0.80	0.41	0.55	0.77	0.33	0.15	0.48	0.56	0.40	0.30
Min		0.20	0.34	0.34	0.56	0.01	0.03	0.44	0.46	0.32	0.08

Bronte Creek 1999 Data - DISSOLVED OXYGEN; (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	4.4	8.8	8.6	5.2	9.4	9.5	6.6		9.6	9.5
14-Sep-99	W	9.5	7.4	8.7	5.9	9.1	8.2	9.4	7.0	8.2	9.8
30-Sep-99	W	7.2	6.5	7.2	7.5	7.9	7.3	7.8	7.6	7.9	8.2
14-Oct-99	W										
26-Oct-99	D	8.2	4.0	8.3	8.5	9.4		9.3	9.1	10.3	10.6
10-Nov-99	D	7.3	7.8	8.5	7.9	9.3	9.6	9.5	8.7	9.5	9.2
Max		9.5	8.8	8.7	8.5	9.4	9.6	9.5	9.1	10.3	10.6
3rd Quart		8.2	7.8	8.6	7.9	9.4	9.5	9.4	8.8	9.6	9.8
Median		7.3	7.4	8.5	7.5	9.3	8.9	9.3	8.2	9.5	9.5
Avg		7.3	6.9	8.3	7.0	9.0	8.7	8.5	8.1	9.1	9.5
1st Quart		7.2	6.5	8.3	5.9	9.1	8.0	7.8	7.5	8.2	9.2
Min		4.4	4.0	7.2	5.2	7.9	7.3	6.6	7.0	7.9	8.2

Bronte Creek 1999 Data - pH											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	7.98	8.33	8.28	8.14	8.32	8.25	8.24		8.31	8.38
14-Sep-99	W	8.16	8.11	8.14	7.94	8.38	8.22	8.29	8.08	8.33	8.48
30-Sep-99	W	7.88	8.12	8.00	8.09	8.32	8.16	7.98	8.12	8.17	8.18
14-Oct-99	W	7.95	8.18	8.12	8.16	8.30	8.02	8.18	8.05	8.05	8.34
26-Oct-99	D	7.97	8.14	8.16	8.09	8.49	8.41	8.46	8.33	8.46	8.56
10-Nov-99	D	7.99	8.14	8.17	8.11	8.38	8.35	8.35	8.25	8.35	8.39
Max		8.16	8.33	8.28	8.16	8.49	8.41	8.46	8.33	8.46	8.56
3rd Quart		7.99	8.17	8.17	8.13	8.38	8.33	8.34	8.25	8.35	8.46
Median		7.98	8.14	8.15	8.10	8.35	8.24	8.27	8.12	8.32	8.39
Avg		7.99	8.17	8.15	8.09	8.37	8.24	8.25	8.17	8.28	8.39
1st Quart		7.96	8.13	8.13	8.09	8.32	8.18	8.20	8.08	8.21	8.35
Min		7.88	8.11	8.00	7.94	8.30	8.02	7.98	8.05	8.05	8.18

Bronte Creek 1999 Data - PHOSPHATE (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	0.016	0.009	0.011	0.038	0.003	0.004	0.020		0.001	0.003
14-Sep-99	W	0.012	0.008	0.010	0.033	0.006	0.007	0.012	0.017	0.001	0.001
30-Sep-99	W	0.021	0.006	0.014	0.019	0.007	0.020	0.046	0.046	0.027	0.027
14-Oct-99	W	0.016	0.006	0.012	0.026	0.010	0.032	0.099	0.120	0.050	0.082
26-Oct-99	D	0.001	0.001	0.002	0.011	0.001	0.001	0.006	0.006	0.005	0.002
10-Nov-99	D	0.007	0.006	0.005	0.029	0.006	0.004	0.010	0.028	0.008	0.011
Max		0.021	0.009	0.014	0.038	0.010	0.032	0.099	0.120	0.050	0.082
3rd Quart		0.016	0.008	0.012	0.032	0.007	0.017	0.040	0.046	0.022	0.023
Median		0.014	0.006	0.011	0.028	0.006	0.006	0.016	0.028	0.007	0.007
Avg		0.012	0.006	0.009	0.026	0.005	0.011	0.032	0.043	0.015	0.021
1st Quart		0.008	0.006	0.006	0.021	0.004	0.004	0.011	0.017	0.002	0.002
Min		0.001	0.001	0.002	0.011	0.001	0.001	0.006	0.006	0.001	0.001

Appendix B

Bronte Creek 1999 Data - TOTAL PHOSPHORUS (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	0.028	0.018	0.022	0.166	0.012	0.006	0.030		0.002	0.012
14-Sep-99	W	0.234	0.020	0.034	0.096	0.018	0.016	0.020	0.028	0.002	0.020
30-Sep-99	W	0.038	0.016	0.016	0.019	0.034	0.050	0.072	0.108	0.082	0.166
14-Oct-99	W	0.048	0.016	0.030	0.026	0.010	0.032	0.188	0.188	0.124	0.152
26-Oct-99	D	0.016	0.008	0.008	0.044	0.012	0.008	0.012	0.016	0.008	0.010
10-Nov-99	D	0.016	0.012	0.016	0.036	0.008	0.008	0.016	0.040	0.010	0.022
Max		0.234	0.020	0.034	0.166	0.034	0.050	0.188	0.188	0.124	0.166
3rd Quart		0.046	0.018	0.028	0.083	0.017	0.028	0.062	0.108	0.064	0.120
Median		0.033	0.016	0.019	0.040	0.012	0.012	0.025	0.040	0.009	0.021
Avg		0.063	0.015	0.021	0.065	0.016	0.020	0.056	0.076	0.038	0.064
1st Quart		0.019	0.013	0.016	0.029	0.011	0.008	0.017	0.028	0.004	0.014
Min		0.016	0.008	0.008	0.019	0.008	0.006	0.012	0.016	0.002	0.010

Bronte Creek 1999 Data - POTASSIUM (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	1.80	1.84	0.98	2.26	1.71	2.03	4.17		1.73	2.02
14-Sep-99	W	2.29	2.43	1.13	2.58	1.79	5.63	3.28	6.68	2.89	2.54
30-Sep-99	W	0.73	0.38	0.29	2.49	1.93	3.35	5.14	4.59	3.67	0.68
14-Oct-99	W	4.31	2.13	1.91	2.36	2.14	3.38	4.53	8.70	3.99	4.61
26-Oct-99	D	1.25	1.86	1.55	1.97	1.79	3.83	2.29	4.60	2.12	2.29
10-Nov-99	D	1.35	1.92	1.64	2.93	1.99	4.16	1.44	1.74	1.91	2.13
Max		4.31	2.43	1.91	2.93	2.14	5.63	5.14	8.70	3.99	4.61
3rd Quart		2.17	2.08	1.62	2.56	1.98	4.08	4.44	6.68	3.48	2.48
Median		1.58	1.89	1.34	2.43	1.86	3.61	3.73	4.60	2.51	2.21
Avg		1.96	1.76	1.25	2.43	1.89	3.73	3.48	5.26	2.72	2.38
1st Quart		1.28	1.85	1.02	2.29	1.79	3.36	2.54	4.59	1.96	2.05
Min		0.73	0.38	0.29	1.97	1.71	2.03	1.44	1.74	1.73	0.68

Bronte Creek 1999 Data - SODIUM (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	40.7	27.8	19.5	13.8	42.3	50.9	28.8		31.6	36.4
14-Sep-99	W	18.9	36.4	17.5	15.1	36.3	42.9	25.7	60.3	31.6	33.0
30-Sep-99	W	12.2	19.5	12.9	13.7	30.2	52.5	39.7	37.3	32.8	36.8
14-Oct-99	W	15.0	27.5	12.5	14.5	27.2	36.7	33.4	55.0	33.1	33.2
26-Oct-99	D	15.1	34.4	16.4	15.1	38.7	40.0	28.2	54.5	31.6	42.1
10-Nov-99	D	13.3	34.8	31.8	36.6	27.5	43.5	7.0	10.4	26.6	29.8
Max		40.7	36.4	31.8	36.6	42.3	52.5	39.7	60.3	33.1	42.1
3rd Quart		18.0	34.7	19.0	15.1	38.1	49.1	32.3	55.0	32.5	36.7
Median		15.1	31.1	17.0	14.8	33.3	43.2	28.5	54.5	31.6	34.8
Avg		19.2	30.1	18.4	18.1	33.7	44.4	27.1	43.5	31.2	35.2
1st Quart		13.7	27.6	13.8	14.0	28.2	40.7	26.3	37.3	31.6	33.1
Min		12.2	19.5	12.5	13.7	27.2	36.7	7.0	10.4	26.6	29.8

Bronte Creek 1999 Data - STRONTIUM (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	1580.0	309.0	77.7	152.0	123.0	304.0	163.0		225.0	321.0
14-Sep-99	W	4270.0	324.0	81.1	129.0	127.0	1230.0	168.0	863.0	480.0	386.0
30-Sep-99	W	4720.0	291.0	86.2	144.0	122.0	518.0	1070.0	166.0	245.0	284.0
14-Oct-99	W	2840.0	265.0	97.8	137.0	122.0	299.0	162.0	385.0	275.0	323.0
26-Oct-99	D	2870.0	280.0	116.0	130.0	128.0	827.0	136.0	579.0	479.0	494.0
10-Nov-99	D	1980.0	206.0	100.0	116.0	124.0	608.0	118.0	426.0	447.0	456.0
Max		4720.0	324.0	116.0	152.0	128.0	1230.0	1070.0	863.0	480.0	494.0
3rd Quart		3920.0	304.5	99.5	142.3	126.3	772.3	166.8	579.0	471.0	438.5
Median		2855.0	285.5	92.0	133.5	123.5	563.0	162.5	426.0	361.0	354.5
Avg		3043.3	279.2	93.1	134.7	124.3	631.0	302.8	483.8	358.5	377.3
1st Quart		2195.0	268.8	82.4	129.3	122.3	357.5	142.5	385.0	252.5	321.5
Min		1580.0	206.0	77.7	116.0	122.0	299.0	118.0	166.0	225.0	284.0

Appendix B

Bronte Creek 1999 Data - TEMPERATURE (°C)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	15.9	16.8	17.0	19.8	14.8		15.8		16.0	21.8
14-Sep-99	W	16.5	17.0	16.4	18.4	15.9	16.9	16.0	17.0	16.9	19.5
30-Sep-99	W	15.0	15.0	14.5	16.8	14.8	14.0	14.8	14.8	14.8	16.5
14-Oct-99	W										
26-Oct-99	D	9.9	10.0	9.0	10.0	9.0		9.0	9.0	8.8	12.0
10-Nov-99	D	11.0	11.0	11.2	11.0	11.0	11.5	11.0	12.0	11.0	12.5
Max		16.5	17.0	17.0	19.8	15.9	16.9	16.0	17.0	16.9	21.8
3rd Quart		15.9	16.8	16.4	18.4	14.8	15.5	15.8	15.4	16.0	19.5
Median		15.0	15.0	14.5	16.8	14.8	14.0	14.8	13.4	14.8	16.5
Avg		13.7	14.0	13.6	15.2	13.1	14.1	13.3	13.2	13.5	16.5
1st Quart		11.0	11.0	11.2	11.0	11.0	12.8	11.0	11.3	11.0	12.5
Min		9.9	10.0	9.0	10.0	9.0	11.5	9.0	9.0	8.8	12.0

Bronte Creek 1999 Data - TITANIUM (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	2.030	0.734	0.013	1.590	0.354	0.933	0.310		0.216	0.766
14-Sep-99	W	0.908	0.754	0.032	1.710	0.674	1.130	0.824	0.312	0.491	0.277
30-Sep-99	W	0.575	0.366	0.136	2.350	0.918	0.575	3.340	4.470	4.050	3.470
14-Oct-99	W	1.110	0.183	0.154	7.410	0.822	6.940	25.400	38.000	41.900	29.800
26-Oct-99	D	0.746	0.853	0.546	1.330	0.699	1.320	0.303	0.318	0.663	0.364
10-Nov-99	D	0.532	0.603	0.373	2.140	0.753	1.030	0.394	10.500	0.229	0.621
Max		2.030	0.853	0.546	7.410	0.918	6.940	25.400	38.000	41.900	29.800
3rd Quart		1.060	0.749	0.318	2.298	0.805	1.273	2.711	10.500	3.203	2.794
Median		0.827	0.669	0.145	1.925	0.726	1.080	0.609	4.470	0.577	0.694
Avg		0.984	0.582	0.209	2.755	0.703	1.988	5.095	10.720	7.925	5.883
1st Quart		0.618	0.425	0.058	1.620	0.680	0.957	0.331	0.318	0.295	0.428
Min		0.532	0.183	0.013	1.330	0.354	0.575	0.303	0.312	0.216	0.277

Bronte Creek 1999 Data - SOLIDS; DISSOLVED (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	608	432	256	344	456	572	410		378	390
14-Sep-99	W	436	454	240	328	412	956	398	474	448	412
30-Sep-99	W	422	360	246	338	372	742	358	380	356	364
14-Oct-99	W	352	412	248	338	380	486	360	372	384	364
26-Oct-99	D	384	480	344	362	442	852	424	464	438	436
10-Nov-99	D	396	510	338	384	454	668	446	520	448	458
Max		608	510	344	384	456	956	446	520	448	458
3rd Quart		433	474	318	358	451	825	421	474	446	430
Median		409	443	252	341	427	705	404	464	411	401
Avg		433	441	279	349	419	713	399	442	409	404
1st Quart		387	417	247	338	388	596	370	380	380	371
Min		352	360	240	328	372	486	358	372	356	364

Bronte Creek 1999 Data - SOLIDS; SUSPENDED (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	7.0	3.5	2.5	25.0	13.5	3.0	2.0		1.0	3.0
14-Sep-99	W	29.0	2.0	2.5	12.5	1.5	3.0	3.5	1.5	1.5	2.0
30-Sep-99	W	3.0	5.0	4.5	13.5	7.0	10.0	6.0	29.0	34.0	258.0
14-Oct-99	W	5.0	2.5	6.5	17.0	6.0	10.0	61.0	30.5	45.0	74.5
26-Oct-99	D	1.0	2.0	2.0	9.5	2.0	1.5	2.0	1.5	1.5	5.0
10-Nov-99	D	2.5	3.5	2.5	13.5	2.0	1.5	4.5	4.5	3.5	9.5
Max		29.0	5.0	6.5	25.0	13.5	10.0	61.0	30.5	45.0	258.0
3rd Quart		6.5	3.5	4.0	16.1	6.8	8.3	5.6	29.0	26.4	58.3
Median		4.0	3.0	2.5	13.5	4.0	3.0	4.0	4.5	2.5	7.3
Avg		7.9	3.1	3.4	15.2	5.3	4.8	13.2	13.4	14.4	58.7
1st Quart		2.6	2.1	2.5	12.8	2.0	1.9	2.4	1.5	1.5	3.5
Min		1.0	2.0	2.0	9.5	1.5	1.5	2.0	1.5	1.0	2.0

Appendix B

Bronte Creek 1999 Data - SOLIDS; TOTAL (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	616	436	260	370	468	574	412		380	392
14-Sep-99	W	464	456	244	340	414	958	402	476	448	414
30-Sep-99	W	424	366	250	352	380	752	364	410	390	624
14-Oct-99	W	356	416	254	356	386	496	420	404	430	438
26-Oct-99	D	386	480	344	372	444	854	426	466	440	442
10-Nov-99	D	398	514	340	396	456	670	450	524	452	468
Max		616	514	344	396	468	958	450	524	452	624
3rd Quart		454	474	320	372	453	829	425	476	446	462
Median		411	446	257	363	429	711	416	466	435	440
Avg		441	445	282	364	425	717	412	456	423	463
1st Quart		389	421	251	353	393	598	405	410	400	420
Min		356	366	244	340	380	496	364	404	380	392

Bronte Creek 1999 Data - TURBIDITY (FTU)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	1.90	1.28	1.77	19.90	1.80	0.40	1.82		1.27	2.83
14-Sep-99	W	10.20	1.55	1.74	16.10	0.63	1.65	2.98	1.98	1.31	2.02
30-Sep-99	W	2.63	2.14	1.98	16.70	3.70	4.69	30.90	27.20	10.60	95.40
14-Oct-99	W	2.29	1.44	2.02	18.10	2.42	9.38	73.20	38.30	45.30	84.30
26-Oct-99	D	0.49	0.67	0.37	10.60	0.29	0.41	1.33	1.29	0.55	1.53
10-Nov-99	D	0.57	0.65	0.94	11.80	0.47	0.43	2.46	7.43	1.29	3.22
Max		10.20	2.14	2.02	19.90	3.70	9.38	73.20	38.30	45.30	95.40
3rd Quart		2.55	1.52	1.93	17.75	2.27	3.93	23.92	27.20	8.28	64.03
Median		2.10	1.36	1.76	16.40	1.22	1.04	2.72	7.43	1.30	3.03
Avg		3.01	1.29	1.47	15.53	1.55	2.83	18.78	15.24	10.05	31.55
1st Quart		0.90	0.82	1.14	12.88	0.51	0.42	1.98	1.98	1.28	2.22
Min		0.49	0.65	0.37	10.60	0.29	0.40	1.33	1.29	0.55	1.53

Bronte Creek 1999 Data - VANADIUM (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	0.562	0.221	0.710	0.755	0.825	0.079	0.658		0.465	0.877
14-Sep-99	W	0.337	0.367	0.307	0.653	0.201	0.527	0.892	0.051	0.361	0.005
30-Sep-99	W	0.019	0.207	0.737	0.196	0.064	0.094	0.828	0.340	0.778	1.710
14-Oct-99	W	0.786	0.751	0.152	0.737	0.462	1.200	2.560	3.340	3.180	2.450
26-Oct-99	D	0.164	0.373	0.025	0.588	0.088	0.152	0.935	0.335	0.291	0.006
10-Nov-99	D	0.220	0.290	0.044	0.302	0.044	0.050	0.586	1.190	0.542	0.390
Max		0.786	0.751	0.737	0.755	0.825	1.200	2.560	3.340	3.180	2.450
3rd Quart		0.506	0.372	0.609	0.716	0.397	0.433	0.924	1.190	0.719	1.502
Median		0.279	0.329	0.230	0.621	0.145	0.123	0.860	0.340	0.504	0.634
Avg		0.348	0.368	0.329	0.539	0.281	0.350	1.077	1.051	0.936	0.906
1st Quart		0.178	0.238	0.071	0.374	0.070	0.083	0.701	0.335	0.387	0.102
Min		0.019	0.207	0.025	0.196	0.044	0.050	0.586	0.051	0.291	0.005

Bronte Creek 1999 Data - ZINC (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
31-Aug-99	D	329.00	5.34	9.32	2.74	2.41	0.69	2.53		1.36	5.64
14-Sep-99	W	33.80	7.47	7.97	4.77	1.03	2.65	1.37	1.49	1.27	1.51
30-Sep-99	W	94.90	16.60	13.30	2.41	3.04	5.45	1.73	3.58	9.99	19.70
14-Oct-99	W	124.00	25.10	16.90	1.65	0.96	6.39	3.51	5.01	2.90	12.10
26-Oct-99	D	80.70	40.50	4.92	2.03	0.85	1.37	0.32	0.61	1.64	1.60
10-Nov-99	D	57.90	63.80	9.39	2.62	1.25	1.93	0.92	1.23	6.10	3.73
Max		329.00	63.80	16.90	4.77	3.04	6.39	3.51	5.01	9.99	19.70
3rd Quart		116.73	36.65	12.32	2.71	2.12	4.75	2.33	3.58	5.30	10.49
Median		87.80	20.85	9.36	2.52	1.14	2.29	1.55	1.49	2.27	4.69
Avg		120.05	26.47	10.30	2.70	1.59	3.08	1.73	2.38	3.88	7.38
1st Quart		63.60	9.75	8.31	2.13	0.98	1.51	1.03	1.23	1.43	2.13
Min		33.80	5.34	4.92	1.65	0.85	0.69	0.32	0.61	1.27	1.51

Appendix B

Bronte Creek 2000 Data - ALKALINITY; Total (mg/l CaCO)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	252.0	303.0	209.0	290.0	289.0	266.0	289.0	163.0	258.0	251.0
27-Jul-00	W	246.0	289.0	165.0	293.0	271.0	269.0	277.0	151.0	241.0	236.0
09-Aug-00	W	233.0	293.0	187.0	282.0	272.0	244.0	272.0	185.0	240.0	237.0
21-Aug-00	D	254.0	313.0	178.0	295.0	281.0	283.0	281.0	181.0	244.0	246.0
20-Sep-00	D	249.0	314.0	178.0	286.0	270.0	278.0	280.0	199.0	250.0	
Max		254.0	314.0	209.0	295.0	289.0	283.0	289.0	199.0	258.0	251.0
3rd Quart		252.0	313.0	187.0	293.0	281.0	278.0	281.0	185.0	250.0	247.3
Median		249.0	303.0	178.0	290.0	272.0	269.0	280.0	181.0	244.0	241.5
Avg		246.8	302.4	183.4	289.2	276.6	268.0	279.8	175.8	246.6	242.5
1st Quart		246.0	293.0	178.0	286.0	271.0	266.0	277.0	163.0	241.0	236.8
Min		233.0	289.0	165.0	282.0	270.0	244.0	272.0	151.0	240.0	236.0

Bronte Creek 2000 Data - ALUMINUM (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	17	18	33	39	22	46	120	44	52	60
27-Jul-00	W	20	21	60	89	50	105	75	23	48	105
09-Aug-00	W	24	17	45	38	29	149	159	47	105	104
21-Aug-00	D	17	105	22	77	14	16	69	56	30	111
20-Sep-00	D	13	29	17	23	15	22	49	27	16	
Max		24	105	60	89	50	149	159	56	105	111
3rd Quart		20	29	45	77	29	105	120	47	52	107
Median		17	21	33	39	22	46	75	44	48	105
Avg		18	38	35	53	26	68	94	39	50	95
1st Quart		17	18	22	38	15	22	69	27	30	93
Min		13	17	17	23	14	16	49	23	16	60

Bronte Creek 2000 Data - <i>ESCHERICHIA COLI</i> (Ec/100mL)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D										
27-Jul-00	W										
09-Aug-00	W										
21-Aug-00	D										
20-Sep-00	D										
Max											
3rd Quart											
Median											
GeoMean											
1st Quart											
Min											

Bronte Creek 2000 Data - FECAL STREPTOCOCCUS (FC/100mL)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D										
27-Jul-00	W										
09-Aug-00	W										
21-Aug-00	D										
20-Sep-00	D										
Max											
3rd Quart											
Median											
GeoMean											
1st Quart											
Min											

Appendix B

Bronte Creek 2000 Data - <i>PSEUDOMONAS AERUGINOSA</i> (PA/100mL)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D										
27-Jul-00	W										
09-Aug-00	W										
21-Aug-00	D										
20-Sep-00	D										
Max											
3rd Quart											
Median											
GeoMean											
1st Quart											
Min											

Bronte Creek 2000 Data - BARIUM (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	33.6	44.3	34.1	29.4	51.8	71.3	56.6	38.0	51.6	55.5
27-Jul-00	W	32.8	42.5	25.9	43.2	50.3	82.0	69.1	44.6	52.1	60.8
09-Aug-00	W	32.1	40.9	27.1	36.0	40.1	86.7	61.4	45.9	50.7	50.8
21-Aug-00	D	32.8	49.7	24.0	38.4	43.2	84.9	76.2	41.3	48.3	74.2
20-Sep-00	D	36.0	51.8	24.9	35.4	50.8	91.2	75.0	57.9	54.0	
Max		36.0	51.8	34.1	43.2	51.8	91.2	76.2	57.9	54.0	74.2
3rd Quart		33.6	49.7	27.1	38.4	50.8	86.7	75.0	45.9	52.1	64.2
Median		32.8	44.3	25.9	36.0	50.3	84.9	69.1	44.6	51.6	58.2
Avg		33.5	45.8	27.2	36.5	47.2	83.2	67.7	45.5	51.3	60.3
1st Quart		32.8	42.5	24.9	35.4	43.2	82.0	61.4	41.3	50.7	54.3
Min		32.1	40.9	24.0	29.4	40.1	71.3	56.6	38.0	48.3	50.8

Bronte Creek 2000 Data - BERYLLIUM (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	0.009	0.009	0.012	0.013	0.014	0.023	0.017	0.011	0.013	0.012
27-Jul-00	W	0.011	0.010	0.009	0.017	0.014	0.019	0.014	0.003	0.013	0.014
09-Aug-00	W	0.016	0.006	0.006	0.007	0.007	0.025	0.012	0.003	0.014	0.018
21-Aug-00	D	0.009	0.028	0.007	0.016	0.018	0.018	0.021	0.019	0.018	0.022
20-Sep-00	D	0.013	0.018	0.014	0.014	0.017	0.017	0.016	0.013	0.017	
Max		0.016	0.028	0.014	0.017	0.018	0.025	0.021	0.019	0.018	0.022
3rd Quart		0.013	0.018	0.012	0.016	0.017	0.023	0.017	0.013	0.017	0.019
Median		0.011	0.010	0.009	0.014	0.014	0.019	0.016	0.011	0.014	0.016
Avg		0.012	0.014	0.010	0.013	0.014	0.020	0.016	0.010	0.015	0.016
1st Quart		0.009	0.009	0.007	0.013	0.014	0.018	0.014	0.003	0.013	0.014
Min		0.009	0.006	0.006	0.007	0.007	0.017	0.012	0.003	0.013	0.012

Bronte Creek 2000 Data - CADMIUM (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	0.037	0.037	0.192	0.583	0.427	0.054	0.006	0.473	0.133	0.102
27-Jul-00	W	0.351	0.302	0.215	0.093	0.030	0.410	0.027	0.102	0.161	0.018
09-Aug-00	W	0.118	0.007	0.083	0.175	0.222	0.204	0.053	0.126	0.113	0.328
21-Aug-00	D	0.318	0.164	0.297	0.024	0.007	0.167	0.065	0.253	0.398	0.209
20-Sep-00	D	0.522	0.040	0.025	0.019	0.381	0.048	0.063	0.218	0.247	
Max		0.522	0.302	0.297	0.583	0.427	0.410	0.065	0.473	0.398	0.328
3rd Quart		0.351	0.164	0.215	0.175	0.381	0.204	0.063	0.253	0.247	0.239
Median		0.318	0.040	0.192	0.093	0.222	0.167	0.053	0.218	0.161	0.156
Avg		0.269	0.110	0.162	0.179	0.213	0.177	0.043	0.234	0.210	0.164
1st Quart		0.118	0.037	0.083	0.024	0.030	0.054	0.027	0.126	0.133	0.081
Min		0.037	0.007	0.025	0.019	0.007	0.048	0.006	0.102	0.113	0.018

Appendix B

Bronte Creek 2000 Data - CALCIUM (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	61.4	79.6	51.0	75.1	76.6	110.0	73.8	44.8	75.0	74.2
27-Jul-00	W	65.3	81.2	37.8	78.1	69.8	104.0	78.4	42.0	68.5	67.6
09-Aug-00	W	60.0	82.0	44.4	77.1	74.6	125.0	77.7	58.4	69.3	67.4
21-Aug-00	D	68.2	87.8	42.6	77.6	72.4	96.6	76.4	51.2	67.7	72.9
20-Sep-00	D	63.0	89.8	42.9	78.9	72.4	106.0	79.4	57.7	71.3	
Max		68.2	89.8	51.0	78.9	76.6	125.0	79.4	58.4	75.0	74.2
3rd Quart		65.3	87.8	44.4	78.1	74.6	110.0	78.4	57.7	71.3	73.2
Median		63.0	82.0	42.9	77.6	72.4	106.0	77.7	51.2	69.3	70.3
Avg		63.6	84.1	43.7	77.4	73.2	108.3	77.1	50.8	70.4	70.5
1st Quart		61.4	81.2	42.6	77.1	72.4	104.0	76.4	44.8	68.5	67.6
Min		60.0	79.6	37.8	75.1	69.8	96.6	73.8	42.0	67.7	67.4

Bronte Creek 2000 Data - CHLORIDE (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	24.0	53.6	35.4	22.6	47.6	60.6	37.4	62.6	45.4	48.4
27-Jul-00	W	25.8	48.4	26.4	25.0	47.6	71.2	43.0	72.2	48.4	61.6
09-Aug-00	W	23.0	47.6	25.4	22.8	38.8	66.6	42.8	61.4	42.8	46.8
21-Aug-00	D	27.8	55.8	27.0	25.2	47.4	77.8	43.8	64.8	47.8	78.6
22-Aug-00	D	29.6	59.2	27.6	24.6	50.4	85.6	45.2	80.6	49.4	
Max		29.6	59.2	35.4	25.2	50.4	85.6	45.2	80.6	49.4	78.6
3rd Quart		27.8	55.8	27.6	25.0	47.6	77.8	43.8	72.2	48.4	65.9
Median		25.8	53.6	27.0	24.6	47.6	71.2	43.0	64.8	47.8	55.0
Avg		26.0	52.9	28.4	24.0	46.4	72.4	42.4	68.3	46.8	58.9
1st Quart		24.0	48.4	26.4	22.8	47.4	66.6	42.8	62.6	45.4	48.0
Min		23.0	47.6	25.4	22.6	38.8	60.6	37.4	61.4	42.8	46.8

Bronte Creek 2000 Data - CHROMIUM (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	0.052	0.077	0.135	0.453	0.944	0.035	0.060	0.445	0.353	0.216
27-Jul-00	W	0.059	0.164	0.133	0.300	0.982	0.428	0.316	0.061	0.404	0.093
09-Aug-00	W	0.209	0.423	0.559	0.440	0.930	0.905	0.677	0.314	0.947	0.261
21-Aug-00	D	0.194	0.186	0.063	0.463	1.330	0.822	0.768	0.472	0.947	0.330
20-Sep-00	D	0.022	0.759	0.341	0.413	0.727	0.014	0.129	0.134	0.145	
Max		0.209	0.759	0.559	0.463	1.330	0.905	0.768	0.472	0.947	0.330
3rd Quart		0.194	0.423	0.341	0.453	0.982	0.822	0.677	0.445	0.947	0.278
Median		0.059	0.186	0.135	0.440	0.944	0.428	0.316	0.314	0.404	0.239
Avg		0.107	0.322	0.246	0.414	0.983	0.441	0.390	0.285	0.559	0.225
1st Quart		0.052	0.164	0.133	0.413	0.930	0.035	0.129	0.134	0.353	0.185
Min		0.022	0.077	0.063	0.300	0.727	0.014	0.060	0.061	0.145	0.093

Bronte Creek 2000 Data - COBALT (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	0.694	0.106	0.935	0.228	0.927	0.340	0.448	0.967	0.289	0.360
27-Jul-00	W	0.103	0.177	0.326	0.290	0.592	0.321	0.128	0.249	0.194	0.253
09-Aug-00	W	0.298	0.216	0.414	0.285	0.254	0.052	0.606	0.237	0.012	0.212
21-Aug-00	D	0.142	0.801	0.010	0.372	0.121	0.350	0.239	0.444	0.006	0.379
20-Sep-00	D	0.261	0.271	0.144	0.521	0.224	0.451	0.499	0.352	0.024	
Max		0.694	0.801	0.935	0.521	0.927	0.451	0.606	0.967	0.289	0.379
3rd Quart		0.298	0.271	0.414	0.372	0.592	0.350	0.499	0.444	0.194	0.365
Median		0.261	0.216	0.326	0.290	0.254	0.340	0.448	0.352	0.024	0.307
Avg		0.300	0.314	0.366	0.339	0.424	0.303	0.384	0.450	0.105	0.301
1st Quart		0.142	0.177	0.144	0.285	0.224	0.321	0.239	0.249	0.012	0.243
Min		0.103	0.106	0.010	0.228	0.121	0.052	0.128	0.237	0.006	0.212

Appendix B

Bronte Creek 2000 Data - CONDUCTIVITY ($\mu\text{mhos/cm}$)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	498	630	490	550	600	795	595	505	595	625
27-Jul-00	W	500	620	400	600	605	825	605	550	605	690
09-Aug-00	W	500	625	410	575	595	900	600	595	595	600
21-Aug-00	D	495	605	395	550	550	695	505	500	505	695
20-Sep-00	D	500	695	400	540	600	800	590	600	590	
Max		500	695	490	600	605	900	605	600	605	695
3rd Quart		500	630	410	575	600	825	600	595	595	691
Median		500	625	400	550	600	800	595	550	595	658
Avg		499	635	419	563	590	803	579	550	578	653
1st Quart		498	620	400	550	595	795	590	505	590	619
Min		495	605	395	540	550	695	505	500	505	600

Bronte Creek 2000 Data - COPPER ($\mu\text{g/l}$)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	0.25	0.53	0.62	0.44	1.03	0.60	1.20	1.45	0.68	0.98
27-Jul-00	W	0.32	0.34	0.27	0.65	1.20	0.33	0.67	1.28	0.59	1.04
09-Aug-00	W	0.23	0.69	0.47	0.62	1.17	1.29	1.31	1.54	1.21	1.29
21-Aug-00	D	0.12	1.42	0.42	0.55	0.62	0.21	0.38	1.18	0.05	1.42
20-Sep-00	D	0.06	0.61	0.07	0.03	0.71	0.17	0.41	1.12	0.37	
Max		0.32	1.42	0.62	0.65	1.20	1.29	1.31	1.54	1.21	1.42
3rd Quart		0.25	0.69	0.47	0.62	1.17	0.60	1.20	1.45	0.68	1.32
Median		0.23	0.61	0.42	0.55	1.03	0.33	0.67	1.28	0.59	1.17
Avg		0.20	0.72	0.37	0.46	0.95	0.52	0.79	1.31	0.58	1.18
1st Quart		0.12	0.53	0.27	0.44	0.71	0.21	0.41	1.18	0.37	1.03
Min		0.06	0.34	0.07	0.03	0.62	0.17	0.38	1.12	0.05	0.98

Bronte Creek 2000 Data - HARDNESS (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	255.0	313.0	220.0	299.0	312.0	445.0	300.0	197.0	297.0	296.0
27-Jul-00	W	274.0	314.0	178.0	312.0	293.0	422.0	312.0	187.0	278.0	278.0
09-Aug-00	W	243.0	316.0	201.0	304.0	295.0	490.0	302.0	231.0	271.0	269.0
21-Aug-00	D	284.0	344.0	195.0	310.0	303.0	380.0	315.0	213.0	279.0	294.0
20-Sep-00	D	268.0	354.0	194.0	308.0	304.0	413.0	321.0	233.0	289.0	
Max		284.0	354.0	220.0	312.0	312.0	490.0	321.0	233.0	297.0	296.0
3rd Quart		274.0	344.0	201.0	310.0	304.0	445.0	315.0	231.0	289.0	294.5
Median		268.0	316.0	195.0	308.0	303.0	422.0	312.0	213.0	279.0	286.0
Avg		264.8	328.2	197.6	306.6	301.4	430.0	310.0	212.2	282.8	284.3
1st Quart		255.0	314.0	194.0	304.0	295.0	413.0	302.0	197.0	278.0	275.8
Min		243.0	313.0	178.0	299.0	293.0	380.0	300.0	187.0	271.0	269.0

Bronte Creek 2000 Data - IRON ($\mu\text{g/l}$)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	173.0	174.0	143.0	148.0	38.7	96.0	189.0	33.4	108.0	85.9
27-Jul-00	W	162.0	160.0	194.0	382.0	49.7	205.0	102.0	18.8	78.9	210.0
09-Aug-00	W	191.0	155.0	185.0	159.0	63.1	283.0	204.0	42.4	172.0	150.0
21-Aug-00	D	128.0	470.0	74.7	245.0	21.0	36.6	86.7	57.1	49.4	317.0
20-Sep-00	D	99.6	98.5	65.7	107.0	13.9	46.7	60.5	26.2	25.0	
Max		191.0	470.0	194.0	382.0	63.1	283.0	204.0	57.1	172.0	317.0
3rd Quart		173.0	174.0	185.0	245.0	49.7	205.0	189.0	42.4	108.0	236.8
Median		162.0	160.0	143.0	159.0	38.7	96.0	102.0	33.4	78.9	180.0
Avg		150.7	211.5	132.5	208.2	37.3	133.5	128.4	35.6	86.7	190.7
1st Quart		128.0	155.0	74.7	148.0	21.0	46.7	86.7	26.2	49.4	134.0
Min		99.6	98.5	65.7	107.0	13.9	36.6	60.5	18.8	25.0	85.9

Appendix B

Bronte Creek 2000 Data - LEAD (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	1.32	0.20	4.87	4.84	0.05	0.97	1.39	4.03	4.69	0.26
27-Jul-00	W	3.38	0.03	0.67	1.66	2.80	3.81	2.30	0.28	1.99	2.99
09-Aug-00	W	7.34	0.33	4.00	4.20	5.81	5.80	5.20	5.88	6.21	2.60
21-Aug-00	D	0.61	1.04	1.13	3.88	3.76	0.01	3.49	3.56	6.84	0.24
20-Sep-00	D	1.72	1.29	1.16	2.14	0.96	5.43	2.28	1.22	0.39	
Max		7.34	1.29	4.87	4.84	5.81	5.80	5.20	5.88	6.84	2.99
3rd Quart		3.38	1.04	4.00	4.20	3.76	5.43	3.49	4.03	6.21	2.70
Median		1.72	0.33	1.16	3.88	2.80	3.81	2.30	3.56	4.69	1.43
Avg		2.87	0.58	2.37	3.34	2.67	3.20	2.93	2.99	4.02	1.52
1st Quart		1.32	0.20	1.13	2.14	0.96	0.97	2.28	1.22	1.99	0.26
Min		0.61	0.03	0.67	1.66	0.05	0.01	1.39	0.28	0.39	0.24

Bronte Creek 2000 Data - MAGNESIUM (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	24.8	27.8	22.6	27.1	29.4	41.3	28.1	20.6	26.7	26.8
27-Jul-00	W	27.0	27.1	20.4	28.4	28.9	39.3	28.3	19.9	25.9	26.4
09-Aug-00	W	22.7	27.2	21.9	27.2	26.3	43.4	26.2	20.7	23.8	24.3
21-Aug-00	D	27.7	30.3	21.5	28.1	29.7	33.7	30.1	20.7	26.6	27.3
20-Sep-00	D	26.8	31.5	21.0	26.9	29.9	36.0	29.8	21.7	27.0	
Max		27.7	31.5	22.6	28.4	29.9	43.4	30.1	21.7	27.0	27.3
3rd Quart		27.0	30.3	21.9	28.1	29.7	41.3	29.8	20.7	26.7	26.9
Median		26.8	27.8	21.5	27.2	29.4	39.3	28.3	20.7	26.6	26.6
Avg		25.8	28.8	21.5	27.5	28.8	38.7	28.5	20.7	26.0	26.2
1st Quart		24.8	27.2	21.0	27.1	28.9	36.0	28.1	20.6	25.9	25.9
Min		22.7	27.1	20.4	26.9	26.3	33.7	26.2	19.9	23.8	24.3

Bronte Creek 2000 Data - MANGANESE (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	34.4	39.9	54.1	50.0	12.4	34.3	39.5	3.9	22.7	30.4
27-Jul-00	W	41.6	63.2	61.7	202.0	13.9	57.4	18.2	2.9	15.8	140.0
09-Aug-00	W	39.8	39.2	55.8	89.3	21.5	89.0	35.0	5.8	39.5	62.2
21-Aug-00	D	41.4	137.0	26.5	90.4	6.2	15.1	13.0	6.1	7.4	312.0
20-Sep-00	D	35.2	28.8	27.8	35.0	5.1	17.0	13.3	14.4	4.6	
Max		41.6	137.0	61.7	202.0	21.5	89.0	39.5	14.4	39.5	312.0
3rd Quart		41.4	63.2	55.8	90.4	13.9	57.4	35.0	6.1	22.7	183.0
Median		39.8	39.9	54.1	89.3	12.4	34.3	18.2	5.8	15.8	101.1
Avg		38.5	61.6	45.2	93.3	11.8	42.6	23.8	6.6	18.0	136.2
1st Quart		35.2	39.2	27.8	50.0	6.2	17.0	13.3	3.9	7.4	54.3
Min		34.4	28.8	26.5	35.0	5.1	15.1	13.0	2.9	4.6	30.4

Bronte Creek 2000 Data - MOLYBDENUM (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	0.57	0.20	0.20	0.05	0.20	0.90	0.56	0.10	0.05	0.71
27-Jul-00	W	0.69	2.11	1.53	1.61	0.78	1.11	0.94	0.94	1.36	0.86
09-Aug-00	W	0.28	1.95	1.60	2.12	1.78	1.43	2.30	1.25	1.95	0.23
21-Aug-00	D	0.44	0.58	0.51	0.64	1.40	1.40	1.01	0.68	1.01	0.44
20-Sep-00	D	0.16	0.23	0.08	0.79	0.16	0.00	0.55	0.15	0.31	
Max		0.69	2.11	1.60	2.12	1.78	1.43	2.30	1.25	1.95	0.86
3rd Quart		0.57	1.95	1.53	1.61	1.40	1.40	1.01	0.94	1.36	0.75
Median		0.44	0.58	0.51	0.79	0.78	1.11	0.94	0.68	1.01	0.58
Avg		0.43	1.01	0.78	1.04	0.86	0.97	1.07	0.62	0.94	0.56
1st Quart		0.28	0.23	0.20	0.64	0.20	0.90	0.56	0.15	0.31	0.39
Min		0.16	0.20	0.08	0.05	0.16	0.00	0.55	0.10	0.05	0.23

Appendix B

Bronte Creek 2000 Data - NICKEL (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	0.26	0.32	0.47	0.27	0.61	0.24	0.63	0.84	0.01	0.16
27-Jul-00	W	0.14	0.04	0.06	0.06	0.16	0.64	0.46	0.51	0.85	0.86
09-Aug-00	W	1.61	0.70	0.48	0.53	0.86	1.88	0.69	1.12	0.93	1.14
21-Aug-00	D	0.10	0.42	0.25	0.15	0.66	0.44	0.46	0.93	0.34	0.08
20-Sep-00	D	0.18	0.85	0.11	0.09	0.36	0.70	0.76	0.32	0.04	
Max		1.61	0.85	0.48	0.53	0.86	1.88	0.76	1.12	0.93	1.14
3rd Quart		0.26	0.70	0.47	0.27	0.66	0.70	0.69	0.93	0.85	0.93
Median		0.18	0.42	0.25	0.15	0.61	0.64	0.63	0.84	0.34	0.51
Avg		0.46	0.46	0.27	0.22	0.53	0.78	0.60	0.75	0.43	0.56
1st Quart		0.14	0.32	0.11	0.09	0.36	0.44	0.46	0.51	0.04	0.14
Min		0.10	0.04	0.06	0.06	0.16	0.24	0.46	0.32	0.01	0.08

Bronte Creek 2000 Data - AMMONIUM (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	0.008	0.008	0.018	0.080	0.002	0.002	0.008	0.002	0.008	0.012
27-Jul-00	W	0.008	0.028	0.032	0.134	0.004	0.004	0.004	0.008	0.012	0.038
09-Aug-00	W	0.012	0.008	0.012	0.102	0.002	0.002	0.008	0.010	0.010	0.012
21-Aug-00	D	0.002	0.024	0.002	0.092	0.002	0.002	0.002	0.002	0.002	0.060
20-Sep-00	D	0.008	0.008	0.008	0.032	0.004	0.002	0.002	0.002	0.008	
Max		0.012	0.028	0.032	0.134	0.004	0.004	0.008	0.010	0.012	0.060
3rd Quart		0.008	0.024	0.018	0.102	0.004	0.002	0.008	0.008	0.010	0.044
Median		0.008	0.008	0.012	0.092	0.002	0.002	0.004	0.002	0.008	0.025
Avg		0.008	0.015	0.014	0.088	0.003	0.002	0.005	0.005	0.008	0.031
1st Quart		0.008	0.008	0.008	0.080	0.002	0.002	0.002	0.002	0.008	0.012
Min		0.002	0.008	0.002	0.032	0.002	0.002	0.002	0.002	0.002	0.012

Bronte Creek 2000 Data - NITRATE (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	0.707	0.726	0.843	0.472	1.340	1.960	0.818	0.893	1.160	0.919
27-Jul-00	W	1.470	1.070	0.372	0.352	1.130	1.930	1.210	0.007	1.140	0.330
09-Aug-00	W	0.488	0.654	0.338	0.351	0.666	1.760	0.800	0.504	0.922	0.613
21-Aug-00	D	1.720	1.630	0.219	0.081	0.943	2.520	1.350	0.012	1.070	0.127
20-Sep-00	D	0.513	1.370	0.156	0.037	1.240	2.130	1.220	0.005	0.987	
Max		1.720	1.630	0.843	0.472	1.340	2.520	1.350	0.893	1.160	0.919
3rd Quart		1.470	1.370	0.372	0.352	1.240	2.130	1.220	0.504	1.140	0.690
Median		0.707	1.070	0.338	0.351	1.130	1.960	1.210	0.012	1.070	0.472
Avg		0.980	1.090	0.386	0.259	1.064	2.060	1.080	0.284	1.056	0.497
1st Quart		0.513	0.726	0.219	0.081	0.943	1.930	0.818	0.007	0.987	0.279
Min		0.488	0.654	0.156	0.037	0.666	1.760	0.800	0.005	0.922	0.127

Bronte Creek 2000 Data - NITRITE (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	0.0110	0.0100	0.0110	0.0140	0.0040	0.0040	0.0050	0.0070	0.0060	0.0060
27-Jul-00	W	0.0220	0.0150	0.0100	0.0360	0.0030	0.0020	0.0080	0.0010	0.0090	0.0150
09-Aug-00	W	0.0150	0.0110	0.0090	0.0180	0.0040	0.0060	0.0090	0.0080	0.0080	0.0090
21-Aug-00	D	0.0150	0.0070	0.0020	0.0160	0.0010	0.0010	0.0060	0.0010	0.0040	0.0030
20-Sep-00	D	0.0070	0.0080	0.0020	0.0070	0.0020	0.0020	0.0050	0.0010	0.0050	
Max		0.0220	0.0150	0.0110	0.0360	0.0040	0.0060	0.0090	0.0080	0.0090	0.0150
3rd Quart		0.0150	0.0110	0.0100	0.0180	0.0040	0.0040	0.0080	0.0070	0.0080	0.0105
Median		0.0150	0.0100	0.0090	0.0160	0.0030	0.0020	0.0060	0.0010	0.0060	0.0075
Avg		0.0140	0.0102	0.0068	0.0182	0.0028	0.0030	0.0066	0.0036	0.0064	0.0083
1st Quart		0.0110	0.0080	0.0020	0.0140	0.0020	0.0020	0.0050	0.0010	0.0050	0.0053
Min		0.0070	0.0070	0.0020	0.0070	0.0010	0.0010	0.0050	0.0010	0.0040	0.0030

Appendix B

Bronte Creek 2000 Data - TOTAL KJELDAHL NITROGEN (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	0.84	0.72	0.66	0.52	0.40	0.40	0.48	0.48	0.58	0.52
27-Jul-00	W	0.88	0.76	0.78	1.38	0.46	0.28	0.40	0.48	0.58	0.56
09-Aug-00	W	0.92	0.84	0.72	0.74	0.54	0.52	0.54	0.64	0.64	0.64
21-Aug-00	D	0.82	1.14	0.62	0.92	0.40	0.26	0.40	0.50	0.50	0.66
20-Sep-00	D	0.82	0.68	0.60	0.66	0.32	0.32	0.40	0.48	0.52	
Max		0.92	1.14	0.78	1.38	0.54	0.52	0.54	0.64	0.64	0.66
3rd Quart		0.88	0.84	0.72	0.92	0.46	0.40	0.48	0.50	0.58	0.65
Median		0.84	0.76	0.66	0.74	0.40	0.32	0.40	0.48	0.58	0.60
Avg		0.86	0.83	0.68	0.84	0.42	0.36	0.44	0.52	0.56	0.60
1st Quart		0.82	0.72	0.62	0.66	0.40	0.28	0.40	0.48	0.52	0.55
Min		0.82	0.68	0.60	0.52	0.32	0.26	0.40	0.48	0.50	0.52

Bronte Creek 2000 Data - DISSOLVED OXYGEN; (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	6.3	7.3	7.4	7.3	8.4	8.5	8.4	9.7	8.8	9.3
27-Jul-00	W	6.0	6.5	7.1	6.2	8.0	9.0	8.2	10.0	10.0	6.8
09-Aug-00	W	5.7	7.1	7.4	7.3	8.2	8.4	8.0	10.4	8.3	9.4
21-Aug-00	D	8.3	8.2	8.3	8.2	9.4	16.0	9.3	9.3	9.5	8.3
20-Sep-00	D	7.2	7.2	8.0	9.2	8.8	8.8	8.6	7.7	8.4	
Max		8.3	8.2	8.3	9.2	9.4	16.0	9.3	10.4	10.0	9.4
3rd Quart		7.2	7.3	8.0	8.2	8.8	9.0	8.6	10.0	9.5	9.3
Median		6.3	7.2	7.4	7.3	8.4	8.8	8.4	9.7	8.8	8.8
Avg		6.7	7.3	7.6	7.6	8.6	10.1	8.5	9.4	9.0	8.5
1st Quart		6.0	7.1	7.4	7.3	8.2	8.5	8.2	9.3	8.4	7.9
Min		5.7	6.5	7.1	6.2	8.0	8.4	8.0	7.7	8.3	6.8

Bronte Creek 2000 Data - pH											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	9.20	9.10	9.10	9.15	9.00	9.00	8.80	8.90	8.95	8.60
27-Jul-00	W	7.50	7.70	7.65	7.75	8.30	8.20	8.20	8.20	8.20	7.80
09-Aug-00	W	7.70	8.10	8.10	8.00	8.50	8.50	8.20	8.30	8.30	8.20
21-Aug-00	D	7.50	7.70	7.80	8.00	8.25	8.25	8.25	7.90	8.25	7.50
20-Sep-00	D	7.80	6.98	8.00	8.30	7.10	8.25	8.35	7.90	8.30	
Max		9.20	9.10	9.10	9.15	9.00	9.00	8.80	8.90	8.95	8.60
3rd Quart		7.80	8.10	8.10	8.30	8.50	8.50	8.35	8.30	8.30	8.30
Median		7.70	7.70	8.00	8.00	8.30	8.25	8.25	8.20	8.30	8.00
Avg		7.94	7.92	8.13	8.24	8.23	8.44	8.36	8.24	8.40	8.03
1st Quart		7.50	7.70	7.80	8.00	8.25	8.25	8.20	7.90	8.25	7.73
Min		7.50	6.98	7.65	7.75	7.10	8.20	8.20	7.90	8.20	7.50

Bronte Creek 2000 Data - PHOSPHATE (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	0.007	0.004	0.006	0.006	0.005	0.008	0.007	0.001	0.002	0.002
27-Jul-00	W	0.005	0.004	0.003	0.003	0.002	0.007	0.002	0.001	0.002	0.003
09-Aug-00	W	0.018	0.008	0.010	0.005	0.007	0.014	0.014	0.003	0.013	0.009
21-Aug-00	D	0.005	0.001	0.004	0.003	0.001	0.009	0.001	0.001	0.001	0.005
20-Sep-00	D	0.006	0.003	0.006	0.004	0.003	0.011	0.009	0.005	0.002	
Max		0.018	0.008	0.010	0.006	0.007	0.014	0.014	0.005	0.013	0.009
3rd Quart		0.007	0.004	0.006	0.005	0.005	0.011	0.009	0.003	0.002	0.006
Median		0.006	0.004	0.006	0.004	0.003	0.009	0.007	0.001	0.002	0.004
Avg		0.008	0.004	0.006	0.004	0.004	0.010	0.007	0.002	0.004	0.005
1st Quart		0.005	0.003	0.004	0.003	0.002	0.008	0.002	0.001	0.002	0.003
Min		0.005	0.001	0.003	0.003	0.001	0.007	0.001	0.001	0.001	0.002

Appendix B

Bronte Creek 2000 Data - TOTAL PHOSPHORUS (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	0.032	0.022	0.028	0.032	0.020	0.020	0.030	0.014	0.020	0.020
27-Jul-00	W	0.032	0.024	0.032	0.130	0.012	0.016	0.020	0.008	0.020	0.028
09-Aug-00	W	0.036	0.024	0.032	0.040	0.024	0.064	0.048	0.026	0.032	0.026
21-Aug-00	D	0.020	0.096	0.012	0.072	0.010	0.014	0.020	0.016	0.016	0.060
20-Sep-00	D	0.020	0.036	0.020	0.040	0.016	0.022	0.022	0.018	0.012	
Max		0.036	0.096	0.032	0.130	0.024	0.064	0.048	0.026	0.032	0.060
3rd Quart		0.032	0.036	0.032	0.072	0.020	0.022	0.030	0.018	0.020	0.036
Median		0.032	0.024	0.028	0.040	0.016	0.020	0.022	0.016	0.020	0.027
Avg		0.028	0.040	0.025	0.063	0.016	0.027	0.028	0.016	0.020	0.034
1st Quart		0.020	0.024	0.020	0.040	0.012	0.016	0.020	0.014	0.016	0.025
Min		0.020	0.022	0.012	0.032	0.010	0.014	0.020	0.008	0.012	0.020

Bronte Creek 2000 Data - POTASSIUM (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	0.57	1.49	0.90	1.20	1.29	3.26	1.57	0.95	1.53	1.70
27-Jul-00	W	0.77	1.51	0.90	1.28	1.24	2.85	1.85	2.37	1.40	1.66
09-Aug-00	W	1.48	1.76	1.03	1.40	1.32	4.17	2.31	4.39	1.94	1.83
21-Aug-00	D	0.99	1.71	1.11	1.46	1.25	1.99	2.16	2.51	1.49	2.07
20-Sep-00	D	1.38	2.34	1.43	1.97	1.54	2.70	2.50	5.00	2.00	
Max		1.48	2.34	1.43	1.97	1.54	4.17	2.50	5.00	2.00	2.07
3rd Quart		1.38	1.76	1.11	1.46	1.32	3.26	2.31	4.39	1.94	1.89
Median		0.99	1.71	1.03	1.40	1.29	2.85	2.16	2.51	1.53	1.77
Avg		1.04	1.76	1.07	1.46	1.33	2.99	2.08	3.04	1.67	1.82
1st Quart		0.77	1.51	0.90	1.28	1.25	2.70	1.85	2.37	1.49	1.69
Min		0.57	1.49	0.90	1.20	1.24	1.99	1.57	0.95	1.40	1.66

Bronte Creek 2000 Data - SODIUM (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	13.0	28.6	20.0	12.4	27.0	28.5	19.4	35.2	23.4	24.5
27-Jul-00	W	12.9	26.7	15.0	13.3	27.6	34.9	21.2	41.2	25.6	29.9
09-Aug-00	W	11.8	27.4	14.5	12.5	23.2	31.7	23.1	36.3	23.0	24.7
21-Aug-00	D	13.3	29.8	15.2	13.3	27.2	38.2	21.6	38.3	25.3	35.3
20-Sep-00	D	15.9	31.4	15.9	12.8	28.9	41.8	21.6	45.8	25.6	
Max		15.9	31.4	20.0	13.3	28.9	41.8	23.1	45.8	25.6	35.3
3rd Quart		13.3	29.8	15.9	13.3	27.6	38.2	21.6	41.2	25.6	31.3
Median		13.0	28.6	15.2	12.8	27.2	34.9	21.6	38.3	25.3	27.3
Avg		13.4	28.8	16.1	12.9	26.8	35.0	21.4	39.4	24.6	28.6
1st Quart		12.9	27.4	15.0	12.5	27.0	31.7	21.2	36.3	23.4	24.7
Min		11.8	26.7	14.5	12.4	23.2	28.5	19.4	35.2	23.0	24.5

Bronte Creek 2000 Data - STRONTIUM (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	1730.0	199.0	102.0	110.0	127.0	699.0	129.0	351.0	360.0	377.0
27-Jul-00	W	1740.0	186.0	78.8	122.0	116.0	566.0	133.0	444.0	314.0	365.0
09-Aug-00	W	1730.0	178.0	87.7	112.0	117.0	813.0	133.0	406.0	317.0	353.0
21-Aug-00	D	2010.0	232.0	91.3	127.0	113.0	374.0	135.0	415.0	272.0	449.0
20-Sep-00	D	1910.0	237.0	87.6	122.0	114.0	487.0	132.0	506.0	335.0	
Max		2010.0	237.0	102.0	127.0	127.0	813.0	135.0	506.0	360.0	449.0
3rd Quart		1910.0	232.0	91.3	122.0	117.0	699.0	133.0	444.0	335.0	395.0
Median		1740.0	199.0	87.7	122.0	116.0	566.0	133.0	415.0	317.0	371.0
Avg		1824.0	206.4	89.5	118.6	117.4	587.8	132.4	424.4	319.6	386.0
1st Quart		1730.0	186.0	87.6	112.0	114.0	487.0	132.0	406.0	314.0	362.0
Min		1730.0	178.0	78.8	110.0	113.0	374.0	129.0	351.0	272.0	353.0

Appendix B

Bronte Creek 2000 Data - TEMPERATURE (°C)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	19.0	18.0	19.0	20.3	17.0	16.0	18.0	20.0	18.5	22.0
27-Jul-00	W	20.1	20.0	21.3	22.2	19.8	21.8	20.0	22.1	21.8	24.0
09-Aug-00	W	22.0	21.0	22.0	12.0	20.0	19.0	21.0	22.0	21.0	24.0
21-Aug-00	D	16.5	16.0	16.5	18.5	14.5	14.0	15.0	15.5	15.2	20.5
20-Sep-00	D	18.0	17.0	17.0	18.0	17.0	17.0	16.5	18.5	17.5	
Max		22.0	21.0	22.0	22.2	20.0	21.8	21.0	22.1	21.8	24.0
3rd Quart		20.1	20.0	21.3	20.3	19.8	19.0	20.0	22.0	21.0	24.0
Median		19.0	18.0	19.0	18.5	17.0	17.0	18.0	20.0	18.5	23.0
Avg		19.1	18.4	19.2	18.2	17.7	17.6	18.1	19.6	18.8	22.6
1st Quart		18.0	17.0	17.0	18.0	17.0	16.0	16.5	18.5	17.5	21.6
Min		16.5	16.0	16.5	12.0	14.5	14.0	15.0	15.5	15.2	20.5

Bronte Creek 2000 Data - TITANIUM (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	0.301	0.340	0.011	0.048	0.486	0.393	1.220	0.619	0.441	0.554
27-Jul-00	W	0.350	0.439	0.209	0.612	0.103	0.090	0.920	0.133	0.028	0.845
09-Aug-00	W	0.130	0.393	0.404	0.108	0.336	0.705	2.650	0.910	1.460	1.590
21-Aug-00	D	0.454	0.059	0.008	0.578	0.555	0.749	0.857	0.935	0.079	0.978
20-Sep-00	D	0.495	0.541	0.238	0.340	0.685	0.956	0.173	0.180	0.489	
Max		0.495	0.541	0.404	0.612	0.685	0.956	2.650	0.935	1.460	1.590
3rd Quart		0.454	0.439	0.238	0.578	0.555	0.749	1.220	0.910	0.489	1.131
Median		0.350	0.393	0.209	0.340	0.486	0.705	0.920	0.619	0.441	0.912
Avg		0.346	0.354	0.174	0.337	0.433	0.579	1.164	0.555	0.499	0.992
1st Quart		0.301	0.340	0.011	0.108	0.336	0.393	0.857	0.180	0.079	0.772
Min		0.130	0.059	0.008	0.048	0.103	0.090	0.173	0.133	0.028	0.554

Bronte Creek 2000 Data - SOLIDS; DISSOLVED (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	Data Not Available									
27-Jul-00	W										
09-Aug-00	W										
21-Aug-00	D										
20-Sep-00	D										
Max											
3rd Quart											
Median											
Avg											
1st Quart											
Min											

Bronte Creek 2000 Data - SOLIDS; SUSPENDED (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	Data Not Available									
27-Jul-00	W										
09-Aug-00	W										
21-Aug-00	D										
20-Sep-00	D										
Max											
3rd Quart											
Median											
Avg											
1st Quart											
Min											

Appendix B

Bronte Creek 2000 Data - SOLIDS; TOTAL (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	Data Not Available									
27-Jul-00	W										
09-Aug-00	W										
21-Aug-00	D										
20-Sep-00	D										
Max											
3rd Quart											
Median											
Avg											
1st Quart											
Min											

Bronte Creek 2000 Data - TURBIDITY (FTU)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	1.11	1.76	2.47	2.91	2.02	2.02	6.83	1.08	3.43	5.15
27-Jul-00	W	1.17	1.85	4.92	9.14	1.70	1.67	3.93	0.78	3.52	9.49
09-Aug-00	W	1.71	1.81	3.97	3.65	2.01	13.70	10.80	1.21	8.44	8.10
21-Aug-00	D	1.00	6.51	1.49	8.72	0.82	0.88	2.39	1.90	1.36	8.17
20-Sep-00	D	1.07	1.78	1.15	3.16	1.80	1.40	2.20	1.40	1.33	
Max		1.71	6.51	4.92	9.14	2.02	13.70	10.80	1.90	8.44	9.49
3rd Quart		1.17	1.85	3.97	8.72	2.01	2.02	6.83	1.40	3.52	8.50
Median		1.11	1.81	2.47	3.65	1.80	1.67	3.93	1.21	3.43	8.14
Avg		1.21	2.74	2.80	5.52	1.67	3.93	5.23	1.27	3.62	7.73
1st Quart		1.07	1.78	1.49	3.16	1.70	1.40	2.39	1.08	1.36	7.36
Min		1.00	1.76	1.15	2.91	0.82	0.88	2.20	0.78	1.33	5.15

Bronte Creek 2000 Data - VANADIUM (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	0.322	0.225	0.823	0.482	0.278	0.406	0.179	0.422	0.300	0.786
27-Jul-00	W	0.480	0.142	0.537	0.552	0.652	0.401	0.825	0.138	0.803	0.350
09-Aug-00	W	0.628	0.102	0.244	0.296	0.431	0.813	0.543	0.334	0.551	0.827
21-Aug-00	D	0.350	0.315	0.322	0.278	0.453	0.686	0.766	0.439	0.555	0.076
20-Sep-00	D	0.001	0.504	0.022	0.109	0.120	0.299	0.212	0.235	0.559	
Max		0.628	0.504	0.823	0.552	0.652	0.813	0.825	0.439	0.803	0.827
3rd Quart		0.480	0.315	0.537	0.482	0.453	0.686	0.766	0.422	0.559	0.796
Median		0.350	0.225	0.322	0.296	0.431	0.406	0.543	0.334	0.555	0.568
Avg		0.356	0.258	0.390	0.343	0.387	0.521	0.505	0.314	0.554	0.510
1st Quart		0.322	0.142	0.244	0.278	0.278	0.401	0.212	0.235	0.551	0.282
Min		0.001	0.102	0.022	0.109	0.120	0.299	0.179	0.138	0.300	0.076

Bronte Creek 2000 Data - ZINC (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
11-Jul-00	D	18.50	18.70	12.50	0.79	1.19	4.02	1.83	1.12	5.14	2.84
27-Jul-00	W	19.40	17.40	22.70	3.98	2.18	5.66	0.95	0.39	3.27	3.29
09-Aug-00	W	16.50	15.50	15.80	1.02	2.07	9.94	1.95	0.84	9.25	3.98
21-Aug-00	D	17.90	101.00	6.95	1.53	1.04	1.27	1.10	1.22	2.13	5.05
20-Sep-00	D	16.10	14.80	5.51	0.36	2.37	0.86	1.28	0.09	1.08	
Max		19.40	101.00	22.70	3.98	2.37	9.94	1.95	1.22	9.25	5.05
3rd Quart		18.50	18.70	15.80	1.53	2.18	5.66	1.83	1.12	5.14	4.25
Median		17.90	17.40	12.50	1.02	2.07	4.02	1.28	0.84	3.27	3.64
Avg		17.68	33.48	12.69	1.54	1.77	4.35	1.42	0.73	4.17	3.79
1st Quart		16.50	15.50	6.95	0.79	1.19	1.27	1.10	0.39	2.13	3.18
Min		16.10	14.80	5.51	0.36	1.04	0.86	0.95	0.09	1.08	2.84

Appendix B

Bronte Creek 2001 Data - ALKALINITY; Total (mg/l CaCO)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	231.0	276.0	220.0	268.0	272.0	278.0	273.0	208.0	255.0	248.0
04-Jul-01	D	256.0	292.0	142.0	292.0	279.0	204.0	270.0	178.0	232.0	215.0
18-Jul-01	D	242.0	281.0	127.0	286.0	275.0	247.0	267.0	235.0	222.0	203.0
14-Aug-01	D	299.0	281.0	137.0	248.0	268.0	267.0	247.0		203.0	175.0
07-Nov-01	D	172.0	215.0	171.0	247.0	235.0	234.0	273.0	214.0	225.0	223.0
Max		299.0	292.0	220.0	292.0	279.0	278.0	273.0	235.0	255.0	248.0
3rd Quart		256.0	281.0	171.0	286.0	275.0	267.0	273.0	219.3	232.0	223.0
Median		242.0	281.0	142.0	268.0	272.0	247.0	270.0	211.0	225.0	215.0
Avg		240.0	269.0	159.4	268.2	265.8	246.0	266.0	208.8	227.4	212.8
1st Quart		231.0	276.0	137.0	248.0	268.0	234.0	267.0	200.5	222.0	203.0
Min		172.0	215.0	127.0	247.0	235.0	204.0	247.0	178.0	203.0	175.0

Bronte Creek 2001 Data - ALUMINUM (µg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	16	17	21	48	14	23	51	66	31	31
04-Jul-01	D	21	14	35	61	16	123	66	45	31	41
18-Jul-01	D	19	16	74	98	18	61	54	32	29	33
14-Aug-01	D	49	12	57	165	12	19	61		30	165
07-Nov-01	D	16	17	8	31	12	20	29	79	16	38
Max		49	17	74	165	18	123	66	79	31	165
3rd Quart		21	17	57	98	16	61	61	69	31	41
Median		19	16	35	61	14	23	54	56	30	38
Avg		24	15	39	81	14	49	52	56	27	62
1st Quart		16	14	21	48	12	20	51	42	29	33
Min		16	12	8	31	12	19	29	32	16	31

Bronte Creek 2001 Data - <i>ESCHERICHIA COLI</i> (Ec/100mL)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D										
04-Jul-01	D										
18-Jul-01	D										
14-Aug-01	D										
07-Nov-01	D										
Max											
3rd Quart											
Median											
GeoMean											
1st Quart											
Min											

Bronte Creek 2001 Data - FECAL STREPTOCOCCUS (FC/100mL)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D										
04-Jul-01	D										
18-Jul-01	D										
14-Aug-01	D										
07-Nov-01	D										
Max											
3rd Quart											
Median											
GeoMean											
1st Quart											
Min											

Appendix B

Bronte Creek 2001 Data - <i>PSEUDOMONAS AERUGINOSA</i> (PA /100mL)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D										
04-Jul-01	D										
18-Jul-01	D										
14-Aug-01	D										
07-Nov-01	D										
Max											
3rd Quart											
Median											
GeoMean											
1st Quart											
Min											

Bronte Creek 2001 Data - BARIUM (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	31.3	40.7	35.0	27.9	38.9	70.9	48.7	47.6	46.3	48.1
04-Jul-01	D	43.6	49.3	24.3	39.3	49.4	98.1	80.3	59.0	54.1	53.6
18-Jul-01	D	44.8	51.5	24.6	43.2	54.6	104.0	95.3	93.0	62.4	55.0
14-Aug-01	D	80.7	54.8	24.8	49.2	62.1	89.7	88.6		58.5	65.7
07-Nov-01	D	47.2	51.7	27.9	38.2	45.7	88.1	85.4	72.0	61.2	64.2
Max		80.7	54.8	35.0	49.2	62.1	104.0	95.3	93.0	62.4	65.7
3rd Quart		47.2	51.7	27.9	43.2	54.6	98.1	88.6	77.3	61.2	64.2
Median		44.8	51.5	24.8	39.3	49.4	89.7	85.4	65.5	58.5	55.0
Avg		49.5	49.6	27.3	39.6	50.1	90.2	79.7	67.9	56.5	57.3
1st Quart		43.6	49.3	24.6	38.2	45.7	88.1	80.3	56.2	54.1	53.6
Min		31.3	40.7	24.3	27.9	38.9	70.9	48.7	47.6	46.3	48.1

Bronte Creek 2001 Data - BERYLLIUM (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	0.016	0.017	0.017	0.014	0.015	0.016	0.018	0.017	0.014	0.155
04-Jul-01	D	0.014	0.015	0.010	0.020	0.015	0.033	0.015	0.013	0.011	0.012
18-Jul-01	D	0.009	0.010	0.007	0.022	0.012	0.015	0.011	0.012	0.014	0.011
14-Aug-01	D	0.018	0.009	0.006	0.014	0.014	0.010	0.014		0.011	0.021
07-Nov-01	D	0.015	0.016	0.006	0.065	0.012	0.023	0.035	0.015	0.012	0.017
Max		0.018	0.017	0.017	0.065	0.015	0.033	0.035	0.017	0.014	0.155
3rd Quart		0.016	0.016	0.010	0.022	0.015	0.023	0.018	0.016	0.014	0.021
Median		0.015	0.015	0.007	0.020	0.014	0.016	0.015	0.014	0.012	0.017
Avg		0.014	0.014	0.009	0.027	0.013	0.019	0.019	0.014	0.013	0.043
1st Quart		0.014	0.010	0.006	0.014	0.012	0.015	0.014	0.013	0.011	0.012
Min		0.009	0.009	0.006	0.014	0.012	0.010	0.011	0.012	0.011	0.011

Bronte Creek 2001 Data - CADMIUM (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	0.065	0.056	0.257	0.065	0.378	0.449	0.035	0.187	0.580	0.066
04-Jul-01	D	0.250	0.232	0.374	0.146	0.034	0.015	0.179	0.159	0.141	0.322
18-Jul-01	D	0.360	0.089	0.016	0.018	0.048	0.110	0.152	0.402	0.006	0.131
14-Aug-01	D	0.192	0.279	0.147	0.083	0.034	0.057	0.148		0.301	0.006
07-Nov-01	D	0.056	0.177	0.205	0.152	0.129	0.120	0.301	0.056	0.281	0.283
Max		0.360	0.279	0.374	0.152	0.378	0.449	0.301	0.402	0.580	0.322
3rd Quart		0.250	0.232	0.257	0.146	0.129	0.120	0.179	0.241	0.301	0.283
Median		0.192	0.177	0.205	0.083	0.048	0.110	0.152	0.173	0.281	0.131
Avg		0.185	0.167	0.200	0.093	0.125	0.150	0.163	0.201	0.262	0.162
1st Quart		0.065	0.089	0.147	0.065	0.034	0.057	0.148	0.133	0.141	0.066
Min		0.056	0.056	0.016	0.018	0.034	0.015	0.035	0.056	0.006	0.006

Appendix B

Bronte Creek 2001 Data - CALCIUM (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	60.0	78.2	60.4	72.8	76.4	96.4	75.6	68.4	74.5	71.6
04-Jul-01	D	88.3	87.6	33.4	77.7	74.8	143.0	75.5	58.0	66.7	59.5
18-Jul-01	D	72.4	89.2	28.0	82.0	74.8	121.0	75.5	93.7	70.1	58.8
14-Aug-01	D	94.2	83.0	27.6	71.5	72.0	93.0	70.0		54.4	52.0
07-Nov-01	D	88.0	101.0	54.4	86.8	91.0	137.0	87.0	92.6	87.5	87.2
Max		94.2	101.0	60.4	86.8	91.0	143.0	87.0	93.7	87.5	87.2
3rd Quart		88.3	89.2	54.4	82.0	76.4	137.0	75.6	92.9	74.5	71.6
Median		88.0	87.6	33.4	77.7	74.8	121.0	75.5	80.5	70.1	59.5
Avg		80.6	87.8	40.8	78.2	77.8	118.1	76.7	78.2	70.6	65.8
1st Quart		72.4	83.0	28.0	72.8	74.8	96.4	75.5	65.8	66.7	58.8
Min		60.0	78.2	27.6	71.5	72.0	93.0	70.0	58.0	54.4	52.0

Bronte Creek 2001 Data - CHLORIDE (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	26.0	60.2	38.0	24.2	51.4	59.8	41.8	81.6	49.0	52.2
04-Jul-01	D	35.6	56.6	33.8	27.0	57.2	78.6	45.6	100.0	54.8	61.0
18-Jul-01	D	41.0	56.2	33.0	27.6	59.2	90.6	49.2	314.0	57.0	61.4
14-Aug-01	D	90.2	61.8	37.2	26.0	79.0	87.4	51.0		60.2	65.2
07-Nov-01	D	36.6	71.6	34.8	30.0	70.2	82.0	54.2	104.0	61.6	67.0
Max		90.2	71.6	38.0	30.0	79.0	90.6	54.2	314.0	61.6	67.0
3rd Quart		41.0	61.8	37.2	27.6	70.2	87.4	51.0	156.5	60.2	65.2
Median		36.6	60.2	34.8	27.0	59.2	82.0	49.2	102.0	57.0	61.4
Avg		45.9	61.3	35.4	27.0	63.4	79.7	48.4	149.9	56.5	61.4
1st Quart		35.6	56.6	33.8	26.0	57.2	78.6	45.6	95.4	54.8	61.0
Min		26.0	56.2	33.0	24.2	51.4	59.8	41.8	81.6	49.0	52.2

Bronte Creek 2001 Data - CHROMIUM (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	0.188	0.130	0.032	0.049	0.408	0.086	0.225	0.293	0.418	0.333
04-Jul-01	D	0.079	0.091	0.121	0.239	0.376	0.428	0.388	0.005	0.075	0.396
18-Jul-01	D	0.030	0.378	0.320	0.100	0.519	0.229	0.049	0.085	0.072	0.159
14-Aug-01	D	0.160	0.038	0.077	0.146	0.441	0.214	0.103		0.013	0.034
07-Nov-01	D	0.590	0.590	0.245	0.198	0.077	0.492	0.163	0.802	0.027	0.581
Max		0.590	0.590	0.320	0.239	0.519	0.492	0.388	0.802	0.418	0.581
3rd Quart		0.188	0.378	0.245	0.198	0.441	0.428	0.225	0.420	0.075	0.396
Median		0.160	0.130	0.121	0.146	0.408	0.229	0.163	0.189	0.072	0.333
Avg		0.209	0.245	0.159	0.146	0.364	0.290	0.186	0.296	0.121	0.301
1st Quart		0.079	0.091	0.077	0.100	0.376	0.214	0.103	0.065	0.027	0.159
Min		0.030	0.038	0.032	0.049	0.077	0.086	0.049	0.005	0.013	0.034

Bronte Creek 2001 Data - COBALT (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	0.210	0.406	0.651	0.368	0.077	0.009	0.185	0.207	0.112	0.553
04-Jul-01	D	0.053	0.625	0.200	0.120	0.125	0.176	0.108	0.312	0.092	0.246
18-Jul-01	D	0.294	0.043	0.037	0.309	0.367	0.508	0.048	0.315	0.406	0.716
14-Aug-01	D	0.384	0.523	0.070	0.486	0.392	0.078	0.196		0.135	0.015
07-Nov-01	D	0.127	0.530	0.261	0.111	0.441	0.374	0.277	0.888	0.621	0.126
Max		0.384	0.625	0.651	0.486	0.441	0.508	0.277	0.888	0.621	0.716
3rd Quart		0.294	0.530	0.261	0.368	0.392	0.374	0.196	0.458	0.406	0.553
Median		0.210	0.523	0.200	0.309	0.367	0.176	0.185	0.314	0.135	0.246
Avg		0.214	0.425	0.244	0.279	0.280	0.229	0.163	0.431	0.273	0.331
1st Quart		0.127	0.406	0.070	0.120	0.125	0.078	0.108	0.286	0.112	0.126
Min		0.053	0.043	0.037	0.111	0.077	0.009	0.048	0.207	0.092	0.015

Appendix B

Bronte Creek 2001 Data - CONDUCTIVITY (mmhos/cm)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	517	705	530	561	663	793	632	620	644	637
04-Jul-01	D	646	764	399	611	692	1150	662	690	625	636
18-Jul-01	D	916	735	369	608	688	1030	676	1290	663	602
14-Aug-01	D	700	763	397	583	776	876	649		607	596
07-Nov-01	D	450	860	522	644	796	1110	710	600	768	768
Max		916	860	530	644	796	1150	710	1290	768	768
3rd Quart		700	764	522	611	776	1110	676	840	663	637
Median		646	763	399	608	692	1030	662	655	644	636
Avg		646	765	443	601	723	992	666	800	661	648
1st Quart		517	735	397	583	688	876	649	615	625	602
Min		450	705	369	561	663	793	632	600	607	596

Bronte Creek 2001 Data - COPPER (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	0.11	0.32	0.35	0.47	0.76	0.28	0.65	1.26	0.73	0.68
04-Jul-01	D	0.26	0.43	0.34	0.60	0.75	1.15	0.50	0.94	0.63	0.96
18-Jul-01	D	0.10	0.31	0.39	0.87	0.75	0.31	0.36	1.20	0.62	0.95
14-Aug-01	D	0.45	0.24	0.39	1.35	0.59	0.18	0.64		0.71	2.84
07-Nov-01	D	0.06	0.80	0.04	0.25	0.60	0.46	0.45	2.77	0.88	29.60
Max		0.45	0.80	0.39	1.35	0.76	1.15	0.65	2.77	0.88	29.60
3rd Quart		0.26	0.43	0.39	0.87	0.75	0.46	0.64	1.64	0.73	2.84
Median		0.11	0.32	0.35	0.60	0.75	0.31	0.50	1.23	0.71	0.96
Avg		0.20	0.42	0.30	0.71	0.69	0.48	0.52	1.54	0.71	7.01
1st Quart		0.10	0.31	0.34	0.47	0.60	0.28	0.45	1.13	0.63	0.95
Min		0.06	0.24	0.04	0.25	0.59	0.18	0.36	0.94	0.62	0.68

Bronte Creek 2001 Data - HARDNESS (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	250.0	310.0	241.0	295.0	309.0	379.0	303.0	270.0	293.0	287.0
04-Jul-01	D	344.0	340.0	164.0	309.0	312.0	583.0	311.0	233.0	276.0	255.0
18-Jul-01	D	301.0	346.0	151.0	322.0	313.0	480.0	314.0	345.0	290.0	252.0
14-Aug-01	D	387.0	331.0	159.0	281.0	309.0	370.0	303.0		246.0	224.0
07-Nov-01	D	348.0	396.0	248.0	336.0	360.0	549.0	342.0	333.0	346.0	345.0
Max		387.0	396.0	248.0	336.0	360.0	583.0	342.0	345.0	346.0	345.0
3rd Quart		348.0	346.0	241.0	322.0	313.0	549.0	314.0	336.0	293.0	287.0
Median		344.0	340.0	164.0	309.0	312.0	480.0	311.0	301.5	290.0	255.0
Avg		326.0	344.6	192.6	308.6	320.6	472.2	314.6	295.3	290.2	272.6
1st Quart		301.0	331.0	159.0	295.0	309.0	379.0	303.0	260.8	276.0	252.0
Min		250.0	310.0	151.0	281.0	309.0	370.0	303.0	233.0	246.0	224.0

Bronte Creek 2001 Data - IRON (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	116.0	110.0	87.8	148.0	31.2	43.2	67.8	56.2	63.1	39.6
04-Jul-01	D	196.0	94.6	152.0	348.0	28.0	291.0	68.4	35.7	38.2	38.0
18-Jul-01	D	184.0	100.0	270.0	470.0	22.2	142.0	72.2	41.5	38.0	34.8
14-Aug-01	D	374.0	116.0	233.0	600.0	12.1	37.0	84.1		39.8	364.0
07-Nov-01	D	62.5	57.2	32.5	106.0	16.2	23.8	52.5	97.8	37.4	79.3
Max		374.0	116.0	270.0	600.0	31.2	291.0	84.1	97.8	63.1	364.0
3rd Quart		196.0	110.0	233.0	470.0	28.0	142.0	72.2	66.6	39.8	79.3
Median		184.0	100.0	152.0	348.0	22.2	43.2	68.4	48.9	38.2	39.6
Avg		186.5	95.6	155.1	334.4	21.9	107.4	69.0	57.8	43.3	111.1
1st Quart		116.0	94.6	87.8	148.0	16.2	37.0	67.8	40.1	38.0	38.0
Min		62.5	57.2	32.5	106.0	12.1	23.8	52.5	35.7	37.4	34.8

Appendix B

Bronte Creek 2001 Data - LEAD (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	0.66	3.02	1.33	4.33	2.02	0.16	3.04	0.53	3.93	1.55
04-Jul-01	D	4.26	0.20	0.10	0.78	0.78	1.93	0.29	2.90	0.77	5.71
18-Jul-01	D	2.09	1.46	1.04	1.04	0.11	0.32	1.66	1.26	2.40	0.83
14-Aug-01	D	0.13	0.83	0.62	3.33	4.95	2.14	4.63		2.35	4.14
07-Nov-01	D	1.67	3.53	0.70	0.18	2.56	6.07	0.24	2.77	1.23	1.54
Max		4.26	3.53	1.33	4.33	4.95	6.07	4.63	2.90	3.93	5.71
3rd Quart		2.09	3.02	1.04	3.33	2.56	2.14	3.04	2.80	2.40	4.14
Median		1.67	1.46	0.70	1.04	2.02	1.93	1.66	2.02	2.35	1.55
Avg		1.76	1.81	0.76	1.93	2.08	2.12	1.97	1.87	2.14	2.75
1st Quart		0.66	0.83	0.62	0.78	0.78	0.32	0.29	1.08	1.23	1.54
Min		0.13	0.20	0.10	0.18	0.11	0.16	0.24	0.53	0.77	0.83

Bronte Creek 2001 Data - MAGNESIUM (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	24.4	28.0	21.9	27.4	28.7	33.7	27.8	24.1	26.0	26.3
04-Jul-01	D	29.9	29.5	19.6	28.0	30.4	54.9	29.8	21.4	26.7	25.9
18-Jul-01	D	29.2	29.8	19.8	28.4	30.6	43.3	30.4	26.9	28.0	25.6
14-Aug-01	D	36.9	30.0	21.8	25.0	31.3	33.5	31.1		26.7	23.0
07-Nov-01	D	31.3	34.8	27.3	29.1	32.2	50.0	30.4	24.8	31.0	30.8
Max		36.9	34.8	27.3	29.1	32.2	54.9	31.1	26.9	31.0	30.8
3rd Quart		31.3	30.0	21.9	28.4	31.3	50.0	30.4	25.3	28.0	26.3
Median		29.9	29.8	21.8	28.0	30.6	43.3	30.4	24.5	26.7	25.9
Avg		30.3	30.4	22.1	27.6	30.6	43.1	29.9	24.3	27.7	26.3
1st Quart		29.2	29.5	19.8	27.4	30.4	33.7	29.8	23.4	26.7	25.6
Min		24.4	28.0	19.6	25.0	28.7	33.5	27.8	21.4	26.0	23.0

Bronte Creek 2001 Data - MANGANESE (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	70.30	62.60	66.90	61.50	16.00	20.80	28.80	8.84	30.70	21.80
04-Jul-01	D	114.00	81.50	80.70	137.00	12.80	139.00	16.30	21.80	10.60	16.70
18-Jul-01	D	97.00	82.40	112.00	191.00	7.60	47.00	15.00	161.00	8.69	14.80
14-Aug-01	D	380.00	73.70	99.60	199.00	4.40	15.30	12.10		11.20	222.00
07-Nov-01	D	18.30	15.60	12.70	38.50	3.34	9.91	11.20	7.62	11.60	32.90
Max		380.00	82.40	112.00	199.00	16.00	139.00	28.80	161.00	30.70	222.00
3rd Quart		114.00	81.50	99.60	191.00	12.80	47.00	16.30	56.60	11.60	32.90
Median		97.00	73.70	80.70	137.00	7.60	20.80	15.00	15.32	11.20	21.80
Avg		135.92	63.16	74.38	125.40	8.83	46.40	16.68	49.82	14.56	61.64
1st Quart		70.30	62.60	66.90	61.50	4.40	15.30	12.10	8.54	10.60	16.70
Min		18.30	15.60	12.70	38.50	3.34	9.91	11.20	7.62	8.69	14.80

Bronte Creek 2001 Data - MOLYBDENUM (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	0.17	0.18	0.36	0.54	0.45	0.26	0.45	0.27	1.08	0.08
04-Jul-01	D	0.78	1.29	0.06	0.98	0.78	0.15	0.78	0.36	0.36	0.98
18-Jul-01	D	0.36	0.55	0.55	0.21	0.36	0.27	0.36	0.69	0.40	0.31
14-Aug-01	D	0.37	1.02	0.83	1.02	1.08	1.11	1.02		0.46	0.27
07-Nov-01	D	0.22	0.12	0.22	0.84	0.74	0.65	0.60	0.71	0.39	0.33
Max		0.78	1.29	0.83	1.02	1.08	1.11	1.02	0.71	1.08	0.98
3rd Quart		0.37	1.02	0.55	0.98	0.78	0.65	0.78	0.69	0.46	0.33
Median		0.36	0.55	0.36	0.84	0.74	0.27	0.60	0.52	0.40	0.31
Avg		0.38	0.63	0.40	0.72	0.68	0.49	0.64	0.51	0.54	0.39
1st Quart		0.22	0.18	0.22	0.54	0.45	0.26	0.45	0.34	0.39	0.27
Min		0.17	0.12	0.06	0.21	0.36	0.15	0.36	0.27	0.36	0.08

Appendix B

Bronte Creek 2001 Data - NICKEL (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	0.56	0.36	0.78	0.29	0.37	0.40	0.14	0.69	0.54	0.56
04-Jul-01	D	0.58	0.03	0.60	0.47	0.56	1.57	0.27	0.84	0.67	0.46
18-Jul-01	D	0.39	0.08	0.13	0.53	0.18	0.89	0.46	0.39	0.25	0.42
14-Aug-01	D	1.67	0.11	0.29	1.32	0.59	0.20	0.01		0.11	0.66
07-Nov-01	D	0.52	1.02	0.42	0.49	0.01	1.52	0.48	0.26	0.45	0.48
Max		1.67	1.02	0.78	1.32	0.59	1.57	0.48	0.84	0.67	0.66
3rd Quart		0.58	0.36	0.60	0.53	0.56	1.52	0.46	0.73	0.54	0.56
Median		0.56	0.11	0.42	0.49	0.37	0.89	0.27	0.54	0.45	0.48
Avg		0.74	0.32	0.44	0.62	0.34	0.91	0.27	0.55	0.40	0.51
1st Quart		0.52	0.08	0.29	0.47	0.18	0.40	0.14	0.36	0.25	0.46
Min		0.39	0.03	0.13	0.29	0.01	0.20	0.01	0.26	0.11	0.42

Bronte Creek 2001 Data - AMMONIUM (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	0.008	0.002	0.008	0.002	0.002	0.002	0.002	0.002	0.002	0.002
04-Jul-01	D	0.028	0.032	0.024	0.244	0.004	0.002	0.012	0.004	0.004	0.012
18-Jul-01	D	0.034	0.056	0.030	0.274	0.002	0.002	0.120		0.004	0.004
14-Aug-01	D	0.044	0.044	0.020	0.070	0.002	0.002	0.020	0.040	0.002	0.206
07-Nov-01	D	0.080	0.006	0.004	0.040	0.004	0.002	0.040		0.002	0.018
Max		0.080	0.056	0.030	0.274	0.004	0.002	0.120	0.040	0.004	0.206
3rd Quart		0.044	0.044	0.024	0.244	0.004	0.002	0.040	0.013	0.004	0.018
Median		0.034	0.032	0.020	0.070	0.002	0.002	0.020	0.004	0.002	0.012
Avg		0.039	0.028	0.017	0.126	0.003	0.002	0.039	0.013	0.003	0.048
1st Quart		0.028	0.006	0.008	0.040	0.002	0.002	0.012	0.004	0.002	0.004
Min		0.008	0.002	0.004	0.002	0.002	0.002	0.002	0.002	0.002	0.002

Bronte Creek 2001 Data - NITRATE (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	0.943	1.380	0.710	0.469	0.806	2.020	0.978	2.150	1.180	0.897
04-Jul-01	D	2.380	1.810	0.394	0.338	1.210	1.330	1.570	0.014	1.180	0.578
18-Jul-01	D	2.060	1.980	0.427	0.099	1.460	2.200	2.060	0.060	1.360	0.712
14-Aug-01	D	0.467	1.510	0.259	0.031	2.280	2.240	1.760		0.884	0.160
07-Nov-01	D	0.373	0.917	0.172	0.387	0.513	1.080	1.650	1.710	0.969	0.736
Max		2.380	1.980	0.710	0.469	2.280	2.240	2.060	2.150	1.360	0.897
3rd Quart		2.060	1.810	0.427	0.387	1.460	2.200	1.760	1.820	1.180	0.736
Median		0.943	1.510	0.394	0.338	1.210	2.020	1.650	0.885	1.180	0.712
Avg		1.245	1.519	0.392	0.265	1.254	1.774	1.604	0.984	1.115	0.617
1st Quart		0.467	1.380	0.259	0.099	0.806	1.330	1.570	0.049	0.969	0.578
Min		0.373	0.917	0.172	0.031	0.513	1.080	0.978	0.014	0.884	0.160

Bronte Creek 2001 Data - NITRITE (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	0.0110	0.0110	0.0110	0.0090	0.0040	0.0060	0.0050	0.0280	0.0080	0.0090
04-Jul-01	D	0.0340	0.0190	0.0100	0.0460	0.0040	0.0050	0.0110	0.0040	0.0090	0.0060
18-Jul-01	D	0.0180	0.0230	0.0140	0.3100	0.0030	0.0040	0.0130	0.0050	0.0070	0.0060
14-Aug-01	D	0.0290	0.0250	0.0120	0.0130	0.0050	0.0030	0.0090		0.0070	0.0160
07-Nov-01	D	0.0130	0.0040	0.0030	0.0050	0.0010	0.0010	0.0060	0.0100	0.0020	0.0060
Max		0.0340	0.0250	0.0140	0.3100	0.0050	0.0060	0.0130	0.0280	0.0090	0.0160
3rd Quart		0.0290	0.0230	0.0120	0.0460	0.0040	0.0050	0.0110	0.0145	0.0080	0.0090
Median		0.0180	0.0190	0.0110	0.0130	0.0040	0.0040	0.0090	0.0075	0.0070	0.0060
Avg		0.0210	0.0164	0.0108	0.0766	0.0034	0.0038	0.0088	0.0118	0.0066	0.0086
1st Quart		0.0130	0.0110	0.0100	0.0090	0.0030	0.0030	0.0060	0.0048	0.0070	0.0060
Min		0.0110	0.0040	0.0030	0.0050	0.0010	0.0010	0.0050	0.0040	0.0020	0.0060

Appendix B

Bronte Creek 2001 Data - TOTAL KJELDAHL NITROGEN (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	0.58	0.50	0.50	0.40	0.36	0.32	0.30	0.44	0.40	0.40
04-Jul-01	D	0.78	0.52	0.76	0.78	0.32	0.64	0.32	0.52	0.36	0.36
18-Jul-01	D	0.70	0.48	0.72	0.92	0.28	0.24	0.28	0.42	0.36	0.34
14-Aug-01	D	0.52	0.46	0.76	1.64	0.30	0.20	0.36		0.42	0.66
07-Nov-01	D	0.76	0.52	0.54	0.48	0.36	0.20	0.30	0.80	0.44	0.52
Max		0.78	0.52	0.76	1.64	0.36	0.64	0.36	0.80	0.44	0.66
3rd Quart		0.76	0.52	0.76	0.92	0.36	0.32	0.32	0.59	0.42	0.52
Median		0.70	0.50	0.72	0.78	0.32	0.24	0.30	0.48	0.40	0.40
Avg		0.67	0.50	0.66	0.84	0.32	0.32	0.31	0.55	0.40	0.46
1st Quart		0.58	0.48	0.54	0.48	0.30	0.20	0.30	0.44	0.36	0.36
Min		0.52	0.46	0.50	0.40	0.28	0.20	0.28	0.42	0.36	0.34

Bronte Creek 2001 Data - DISSOLVED OXYGEN; (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	7.0	8.0	7.4	8.7	8.2	8.2	7.9	8.4	8.5	9.1
04-Jul-01	D	6.5	5.8	6.8	4.5	7.7	8.0	7.4	6.7	8.1	8.5
18-Jul-01	D	7.1	5.7	6.6	3.5	7.7	8.0	7.4	3.2	7.9	8.8
14-Aug-01	D	2.6	5.6	6.5	4.2	7.6	8.2	7.4		7.2	3.9
07-Nov-01	D	8.2	8.3	8.3	8.3	8.2	8.5	8.7	8.3	8.5	7.8
Max		8.2	8.3	8.3	8.7	8.2	8.5	8.7	8.4	8.5	9.1
3rd Quart		7.1	8.0	7.4	8.3	8.2	8.2	7.9	8.3	8.5	8.8
Median		7.0	5.8	6.8	4.5	7.7	8.2	7.4	7.5	8.1	8.5
Avg		6.3	6.7	7.1	5.8	7.9	8.2	7.8	6.7	8.0	7.6
1st Quart		6.5	5.7	6.6	4.2	7.7	8.0	7.4	5.8	7.9	7.8
Min		2.6	5.6	6.5	3.5	7.6	8.0	7.4	3.2	7.2	3.9

Bronte Creek 2001 Data - pH											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	7.50	7.75	7.90	8.10	8.30	8.30	8.30	8.20	8.25	8.30
04-Jul-01	D	7.70	7.85	7.90	7.80	8.40	8.30	8.40	7.90	8.40	8.50
18-Jul-01	D	7.78	7.79	7.10	7.90	8.40	8.40	8.40	7.60	8.40	8.60
14-Aug-01	D	7.30	7.70	8.50	7.90	8.40	8.40	8.50		8.50	7.80
07-Nov-01	D										
Max		7.78	7.85	8.50	8.10	8.40	8.40	8.50	8.20	8.50	8.60
3rd Quart		7.72	7.81	8.05	7.95	8.40	8.40	8.43	8.05	8.43	8.53
Median		7.60	7.77	7.90	7.90	8.40	8.35	8.40	7.90	8.40	8.40
Avg		7.57	7.77	7.85	7.93	8.38	8.35	8.40	7.90	8.39	8.30
1st Quart		7.45	7.74	7.70	7.88	8.38	8.30	8.38	7.75	8.36	8.18
Min		7.30	7.70	7.10	7.80	8.30	8.30	8.30	7.60	8.25	7.80

Bronte Creek 2001 Data - PHOSPHATE (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	0.002	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001
04-Jul-01	D	0.014	0.004	0.012	0.026	0.006	0.010	0.004	0.002	0.002	0.001
18-Jul-01	D	0.015	0.007	0.014	0.033	0.006	0.009	0.003	0.021	0.002	0.001
14-Aug-01	D	0.012	0.004	0.020	0.010	0.004	0.006	0.005		0.001	0.019
07-Nov-01	D	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.005	0.001	0.001
Max		0.015	0.007	0.020	0.033	0.006	0.010	0.005	0.021	0.002	0.019
3rd Quart		0.014	0.004	0.014	0.026	0.006	0.009	0.005	0.009	0.002	0.001
Median		0.012	0.004	0.012	0.010	0.004	0.006	0.004	0.003	0.001	0.001
Avg		0.009	0.003	0.010	0.014	0.003	0.005	0.004	0.007	0.001	0.005
1st Quart		0.002	0.001	0.001	0.002	0.001	0.001	0.003	0.002	0.001	0.001
Min		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001

Appendix B

Bronte Creek 2001 Data - TOTAL PHOSPHORUS (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	0.018	0.020	0.024	0.024	0.012	0.012	0.014	0.012	0.012	0.016
04-Jul-01	D	0.060	0.024	0.040	0.080	0.020	0.096	0.020	0.020	0.012	0.016
18-Jul-01	D	0.038	0.024	0.052	0.100	0.016	0.020	0.016	0.036	0.010	0.010
14-Aug-01	D	0.054	0.028	0.048	0.170	0.020	0.012	0.018		0.010	0.006
07-Nov-01	D	0.018	0.014	0.016	0.024	0.012	0.008	0.010	0.040	0.008	0.016
Max		0.060	0.028	0.052	0.170	0.020	0.096	0.020	0.040	0.012	0.016
3rd Quart		0.054	0.024	0.048	0.100	0.020	0.020	0.018	0.037	0.012	0.016
Median		0.038	0.024	0.040	0.080	0.016	0.012	0.016	0.028	0.010	0.016
Avg		0.038	0.022	0.036	0.080	0.016	0.030	0.016	0.027	0.010	0.013
1st Quart		0.018	0.020	0.024	0.024	0.012	0.012	0.014	0.018	0.010	0.010
Min		0.018	0.014	0.016	0.024	0.012	0.008	0.010	0.012	0.008	0.006

Bronte Creek 2001 Data - POTASSIUM (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	1.23	1.85	1.69	1.29	1.37	1.95	1.72	2.40	1.78	1.92
04-Jul-01	D	1.56	1.83	0.82	1.58	1.52	5.51	2.30	3.68	1.73	1.95
18-Jul-01	D	1.77	1.98	0.85	1.80	1.55	3.77	2.45	4.16	1.79	1.87
14-Aug-01	D	2.26	2.24	1.02	2.67	1.97	2.48	2.73		2.06	2.55
07-Nov-01	D	1.93	1.98	1.79	1.89	1.66	4.02	2.61	5.08	2.18	2.29
Max		2.26	2.24	1.79	2.67	1.97	5.51	2.73	5.08	2.18	2.55
3rd Quart		1.93	1.98	1.69	1.89	1.66	4.02	2.61	4.39	2.06	2.29
Median		1.77	1.98	1.02	1.80	1.55	3.77	2.45	3.92	1.79	1.95
Avg		1.75	1.98	1.23	1.85	1.61	3.55	2.36	3.83	1.91	2.12
1st Quart		1.56	1.85	0.85	1.58	1.52	2.48	2.30	3.36	1.78	1.92
Min		1.23	1.83	0.82	1.29	1.37	1.95	1.72	2.40	1.73	1.87

Bronte Creek 2001 Data - SODIUM (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	13.3	32.4	19.8	12.6	28.2	31.1	21.8	44.9	25.6	27.2
04-Jul-01	D	17.2	30.2	18.1	14.5	32.4	36.8	22.1	58.0	28.4	31.3
18-Jul-01	D	19.1	29.1	17.8	14.2	32.2	45.0	21.7	166.0	28.0	30.4
14-Aug-01	D	45.1	34.0	19.5	12.8	45.6	46.9	23.3		31.0	32.0
07-Nov-01	D	15.8	36.7	16.7	13.8	37.4	39.7	25.1	61.2	30.6	33.6
Max		45.1	36.7	19.8	14.5	45.6	46.9	25.1	166.0	31.0	33.6
3rd Quart		19.1	34.0	19.5	14.2	37.4	45.0	23.3	87.4	30.6	32.0
Median		17.2	32.4	18.1	13.8	32.4	39.7	22.1	59.6	28.4	31.3
Avg		22.1	32.5	18.4	13.6	35.2	39.9	22.8	82.5	28.7	30.9
1st Quart		15.8	30.2	17.8	12.8	32.2	36.8	21.8	54.7	28.0	30.4
Min		13.3	29.1	16.7	12.6	28.2	31.1	21.7	44.9	25.6	27.2

Bronte Creek 2001 Data - STRONTIUM (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	1480.0	169.0	95.5	95.5	110.0	320.0	114.0	365.0	251.0	275.0
04-Jul-01	D	2070.0	228.0	68.9	126.0	114.0	1060.0	137.0	488.0	234.0	292.0
18-Jul-01	D	2080.0	257.0	63.6	147.0	123.0	711.0	159.0	644.0	266.0	301.0
14-Aug-01	D	1290.0	265.0	63.5	149.0	118.0	389.0	155.0		227.0	323.0
07-Nov-01	D	2560.0	240.0	102.0	142.0	144.0	957.0	175.0	563.0	432.0	465.0
Max		2560.0	265.0	102.0	149.0	144.0	1060.0	175.0	644.0	432.0	465.0
3rd Quart		2080.0	257.0	95.5	147.0	123.0	957.0	159.0	583.3	266.0	323.0
Median		2070.0	240.0	68.9	142.0	118.0	711.0	155.0	525.5	251.0	301.0
Avg		1896.0	231.8	78.7	131.9	121.8	687.4	148.0	515.0	282.0	331.2
1st Quart		1480.0	228.0	63.6	126.0	114.0	389.0	137.0	457.3	234.0	292.0
Min		1290.0	169.0	63.5	95.5	110.0	320.0	114.0	365.0	227.0	275.0

Appendix B

Bronte Creek 2001 Data - TEMPERATURE (°C)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	15.0	13.5	14.5	15.0	14.0	12.0	13.0	15.0	13.0	15.0
04-Jul-01	D	18.0	18.0	19.0		18.0	16.0	18.0	20.0	20.0	21.0
18-Jul-01	D	18.0	17.0	19.0	21.0	18.0	16.0	18.0	19.0	19.0	21.0
14-Aug-01	D	16.0	18.0	19.0	22.0	17.0	16.5	19.0		19.5	23.0
07-Nov-01	D	9.0	9.0	8.5	9.0	9.0	10.0	9.3	8.5	8.2	9.2
Max		18.0	18.0	19.0	22.0	18.0	16.5	19.0	20.0	20.0	23.0
3rd Quart		18.0	18.0	19.0	21.3	18.0	16.0	18.0	19.3	19.5	21.0
Median		16.0	17.0	19.0	18.0	17.0	16.0	18.0	17.0	19.0	21.0
Avg		15.2	15.1	16.0	16.8	15.2	14.1	15.5	15.6	15.9	17.8
1st Quart		15.0	13.5	14.5	13.5	14.0	12.0	13.0	13.4	13.0	15.0
Min		9.0	9.0	8.5	9.0	9.0	10.0	9.3	8.5	8.2	9.2

Bronte Creek 2001 Data - TITANIUM (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	0.391	0.516	0.273	0.380	0.642	0.663	0.221	1.340	0.015	0.073
04-Jul-01	D	0.226	0.726	0.454	0.664	0.555	0.509	0.956	0.727	0.031	0.380
18-Jul-01	D	0.205	0.619	0.569	1.490	0.519	0.258	0.520	0.317	0.095	0.177
14-Aug-01	D	0.196	0.768	0.550	2.620	0.618	0.585	0.763		0.033	1.280
07-Nov-01	D	0.717	0.784	0.498	0.366	0.882	1.340	0.134	0.896	0.642	0.287
Max		0.717	0.784	0.569	2.620	0.882	1.340	0.956	1.340	0.642	1.280
3rd Quart		0.391	0.768	0.550	1.490	0.642	0.663	0.763	1.007	0.095	0.380
Median		0.226	0.726	0.498	0.664	0.618	0.585	0.520	0.812	0.033	0.287
Avg		0.347	0.683	0.469	1.104	0.643	0.671	0.519	0.820	0.163	0.439
1st Quart		0.205	0.619	0.454	0.380	0.555	0.509	0.221	0.625	0.031	0.177
Min		0.196	0.516	0.273	0.366	0.519	0.258	0.134	0.317	0.015	0.073

Bronte Creek 2001 Data - SOLIDS; DISSOLVED (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	Data Not Available									
04-Jul-01	D										
18-Jul-01	D										
14-Aug-01	D										
07-Nov-01	D										
Max											
3rd Quart											
Median											
Avg											
1st Quart											
Min											

Bronte Creek 2001 Data - SOLIDS; SUSPENDED (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	Data Not Available									
04-Jul-01	D										
18-Jul-01	D										
14-Aug-01	D										
07-Nov-01	D										
Max											
3rd Quart											
Median											
Avg											
1st Quart											
Min											

Appendix B

Bronte Creek 2001 Data - SOLIDS; TOTAL (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	Data Not Available									
04-Jul-01	D										
18-Jul-01	D										
14-Aug-01	D										
07-Nov-01	D										
Max											
3rd Quart											
Median											
Avg											
1st Quart											
Min											

Bronte Creek 2001 Data - TURBIDITY (FTU)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	1.69	1.99	2.11	5.12	1.95	1.78	4.37	2.02	2.80	1.80
04-Jul-01	D	5.27	1.59	4.02	5.99	1.95	21.80	4.37	2.44	2.44	2.16
18-Jul-01	D	2.11	2.16	8.29	9.16	1.09	1.70	3.79	2.01	2.21	1.87
14-Aug-01	D	7.63	2.01	5.31	22.50	1.06	0.56	4.46		1.97	21.90
07-Nov-01	D	0.75	0.81	0.84	2.60	0.35	0.28	1.90	4.31	0.74	2.17
Max		7.63	2.16	8.29	22.50	1.95	21.80	4.46	4.31	2.80	21.90
3rd Quart		5.27	2.01	5.31	9.16	1.95	1.78	4.37	2.91	2.44	2.17
Median		2.11	1.99	4.02	5.99	1.09	1.70	4.37	2.23	2.21	2.16
Avg		3.49	1.71	4.11	9.07	1.28	5.22	3.78	2.70	2.03	5.98
1st Quart		1.69	1.59	2.11	5.12	1.06	0.56	3.79	2.02	1.97	1.87
Min		0.75	0.81	0.84	2.60	0.35	0.28	1.90	2.01	0.74	1.80

Bronte Creek 2001 Data - VANADIUM (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	0.269	0.028	0.170	0.197	0.094	0.107	0.075	0.386	0.127	0.035
04-Jul-01	D	0.026	0.014	0.434	0.823	0.441	0.276	0.283	0.177	0.026	0.197
18-Jul-01	D	0.670	0.156	0.552	0.611	0.156	0.080	0.586	0.518	0.493	0.679
14-Aug-01	D	0.099	0.213	1.340	1.640	0.069	0.058	0.277		0.523	0.703
07-Nov-01	D	0.353	0.130	0.502	0.374	0.367	0.229	0.091	0.673	0.091	0.284
Max		0.670	0.213	1.340	1.640	0.441	0.276	0.586	0.673	0.523	0.703
3rd Quart		0.353	0.156	0.552	0.823	0.367	0.229	0.283	0.557	0.493	0.679
Median		0.269	0.130	0.502	0.611	0.156	0.107	0.277	0.452	0.127	0.284
Avg		0.283	0.108	0.600	0.729	0.225	0.150	0.262	0.439	0.252	0.380
1st Quart		0.099	0.028	0.434	0.374	0.094	0.080	0.091	0.334	0.091	0.197
Min		0.026	0.014	0.170	0.197	0.069	0.058	0.075	0.177	0.026	0.035

Bronte Creek 2001 Data - ZINC (mg/l)											
DATE	E	SAMPLING STATIONS									
		S1	B3	M1	F1	K1	C1	L1	I1	B2	B1
30-Apr-01	D	27.50	22.50	10.60	1.44	1.59	3.01	1.12	0.39	5.81	2.45
04-Jul-01	D	28.90	10.30	12.60	0.97	1.19	13.20	0.05	0.51	1.98	0.71
18-Jul-01	D	22.30	11.30	31.10	1.76	0.89	4.38	0.77	0.71	1.85	1.42
14-Aug-01	D	53.70	6.69	22.10	3.25	0.50	1.02	0.60		1.36	5.10
07-Nov-01	D	69.70	43.90	5.25	1.34	0.76	2.07	0.26	1.45	2.46	4.59
Max		69.70	43.90	31.10	3.25	1.59	13.20	1.12	1.45	5.81	5.10
3rd Quart		53.70	22.50	22.10	1.76	1.19	4.38	0.77	0.89	2.46	4.59
Median		28.90	11.30	12.60	1.44	0.89	3.01	0.60	0.61	1.98	2.45
Avg		40.42	18.94	16.33	1.75	0.99	4.74	0.56	0.76	2.69	2.85
1st Quart		27.50	10.30	10.60	1.34	0.76	2.07	0.26	0.48	1.85	1.42
Min		22.30	6.69	5.25	0.97	0.50	1.02	0.05	0.39	1.36	0.71