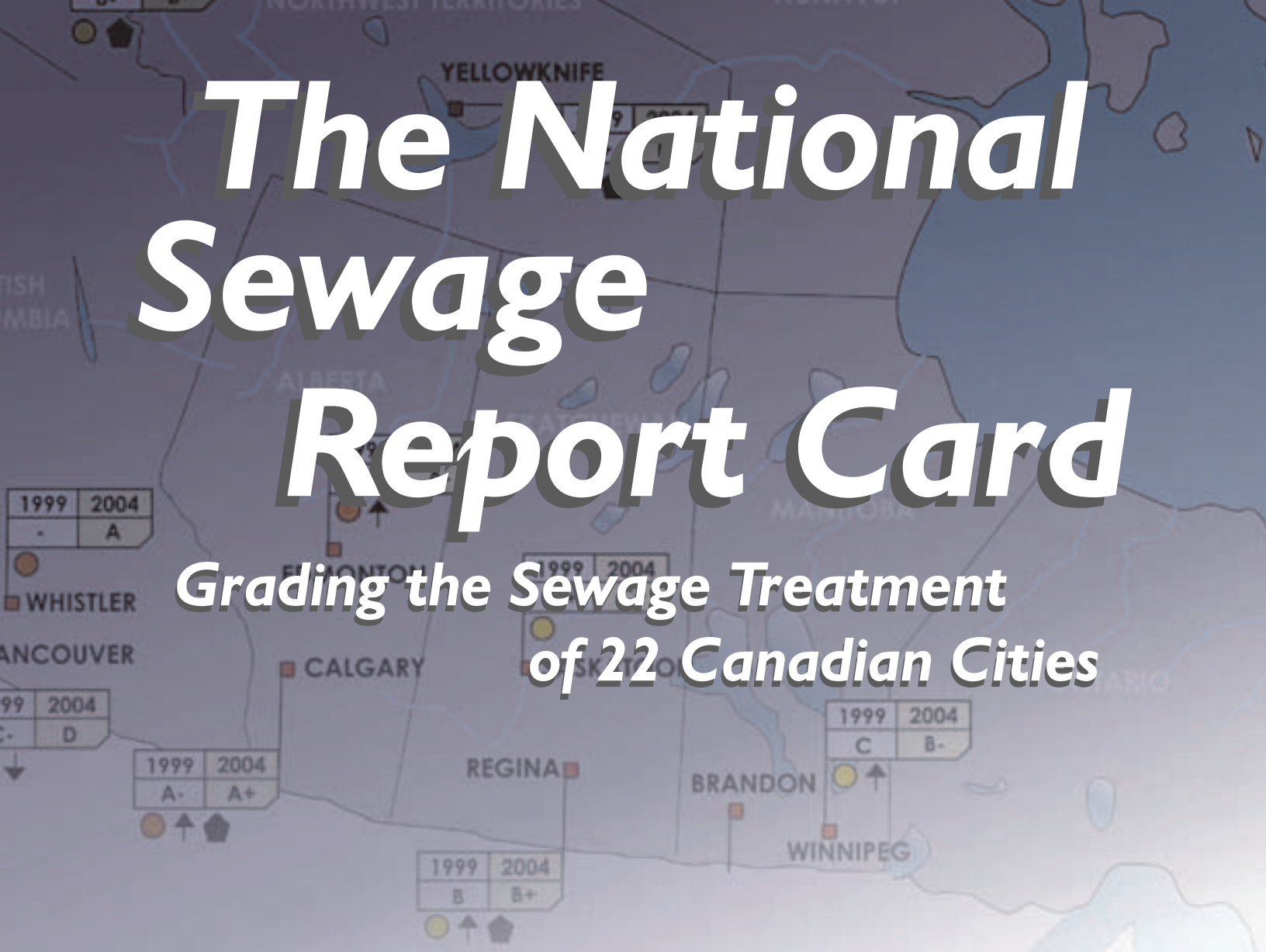


The National Sewage Report Card

Grading the Sewage Treatment of 22 Canadian Cities

A Sierra Legal Defence Fund Report

Prepared for the
Labour Environmental Alliance Society,
T Buck Suzuki Environmental Foundation,
and Georgia Strait Alliance

September 2004

number 3

Acknowledgements

This report was researched, authored and produced by Sierra Legal Defence Fund. Although the report was prepared for the Georgia Strait Alliance, Labour and Environmental Alliance Society and T Buck Suzuki Environmental Foundation, the opinions and facts stated herein are the responsibility of the authors.

Many individuals played an important part in producing this report. Thanks especially to Xenia Semeniuk, Susan Read, Ian Giesbrecht, Marta Pacheco, and Ana Isabel Agner who volunteered their time to assist in producing the report. Thanks also goes out to David Boyd, Mae Burrows, David Lane, Peter Ronald, Jim McIsaac, and Christianne Wilhelmson, for their review and comment on this report while in production and, to Monica Misra for her valuable desk-topping and formatting services.

Municipal and regional governments provided most of the information on the cities documented in this report. We thank staff from these governments for their co-operation; their assistance made it possible to compile the necessary information.

The support of many environmental groups across Canada has been vital to the success of this project. Their help in providing information and endorsing, publicising and distributing this report is greatly appreciated.

Sierra Legal Defence Fund is a charitable environmental organisation specialising in environmental litigation. Sierra Legal provides free legal services to public interest groups throughout Canada. Its goals are: to enhance public access to the legal system; to set important legal precedents that will strengthen existing laws; and to provide professional advice on the development of environmental legislation.

Publication of this report was made possible with the support of Mountain Equipment Co-op and the Vancouver Foundation.

Library and Archives Canada Cataloguing in Publication

The national sewage report card (Number three): Grading the Sewage Treatment of 22 Canadian cities.
(A Sierra Legal Defence Fund report)

ISBN 0-9733213-3-4

1. Sewage disposal—Canada—Evaluation. 2. Sewage disposal plants—Environmental aspects—Canada. I. Sierra Legal Defence Fund II. Series.

TD526.A1B65 2004 363.72'8'0971 C2004-905477-5

Table of Contents

Canada's Sewage Problem: Still Causing a Stink

When Sierra Legal Defence Fund published the first *National Sewage Report Card* in 1994, we said that the ongoing discharge of raw and poorly treated sewage into Canada's waters was a national disgrace. A decade later, the sewage continues to flow.

Our first report grew from an investigation into sewage effluent being released by the city of Vancouver into the local environment. The information obtained, particularly in regard to the volume of raw sewage that was being discharged, was so surprising that the Sierra Legal decided to investigate other urban centres across Canada.

That first report evaluated twenty cities, from Victoria to St. John's, assigning them a letter grade based on the quality of their sewage treatment as determined by various criteria, including level of sewage treatment, volume of raw sewage discharged, and compliance with permits and regulations. The report was updated five years later in 1999 when twenty-one cities were evaluated. Both reports revealed some shocking practices and violations, and although there has been substantial progress in some cities over the past decade, the lack of discernible progress in many cities was alarming.

Of the twenty-two cities documented in this report, five (Victoria, Saint John, Halifax, St. John's and Dawson City) continue to dump some or all of their sewage, raw and untreated directly into Canada's rivers, lakes and oceans - a total of 140 billion litres per year. Three other cities (Vancouver, Montreal, and Charlottetown) discharge some or all of their sewage after receiving only primary treatment, consisting of little more that the settling and skimming off of large debris. Together, these eight municipalities alone generate more than 3.0 billion litres of sewage effluent per day - nearly 40,000 litres every second. All of it is discharged with no, or only minimal, treatment.

Eight cities, (Vancouver, Edmonton, Toronto, Hamilton, and Montreal, among them), reported dumping an additional 42 billion litres of untreated sewage per year to our environment through treatment plant bypasses and combined sewer overflows. Quebec City, Charlottetown and St. John's all report that system overflows and combined sewer overflow events occur but they do not monitor the volumes discharged.

Victoria, Vancouver, Montreal, Saint John, Halifax, Charlottetown, St. John's and Dawson City continue to dump untreated, or minimally treated, sewage directly into our rivers, lakes and oceans every day. These eight municipalities alone generate more than 3.0 billion litres of minimally treated sewage per day — almost 40,000 litres every second.

The 900 billion litres of sewage effluent Montreal discharges per year to the St. Lawrence River receives only primary treatment. On a per capita basis, Montreal reportedly generates more sewage effluent per person (500,000 litres per person per year) than any other major city in Canada. This is more than twice the average of the 22 cities surveyed (243,000 - litres per person per year-). Only Dawson City comes close to Montreal in generating as much sewage per person (approximately 459,000 litres per person per year) and Dawson City's small population doubles in the summer due to tourism.

From Sea to Stinking Sea: Victoria, Vancouver, Montreal, Halifax, Charlottetown, St. John's, and Saint John

Canada generates over three trillion litres of sewage each year. Our sewage problems are comprehensive and countrywide — 'from sea to stinking sea'.

- Victoria continues to dump more than 34 billion litres of untreated sewage into the Strait of Juan de Fuca each year;
- In 2001 Vancouver discharged approximately 22 billion untreated litres of wastewater from combined sewer overflows into Georgia Strait and the Fraser River;
- Montreal continues to dump 900 billion litres of only primary treated sewage into the St. Lawrence River each year;
- Halifax has committed to construct advanced primary sewage treatment facilities in the coming years, but continues to dump 65.7 billion litres of raw sewage per year into the Atlantic Ocean; and
- Finally St. John's has committed to construct primary sewage treatment facilities but for now dumps 33 billion litres of raw sewage per year into the Atlantic Ocean.

Although Saint John, New Brunswick, has secondary sewage treatment at three of their four treatment plants, including their largest plant, the City reported that they annually discharge approximately 39% (6.6 billion litres) of their total annual sewage flow (16.6 billion litres) untreated to the Saint John River and the Bay of Fundy. This is because sewage treatment plants currently service only 62% of the city's population; this is the lowest percentage of the cities surveyed that have sewage treatment plants. However, with planned upgrades, it is anticipated that 100% of the population will be served by some form of sewage treatment (primarily or secondary) by the year 2010.

The only city in Canada that still discharges all of its sewage raw and has not taken steps to improve in a meaningful way is Victoria.

Yet, the news is not all bad.

Considerable advancements have been made in cities like Edmonton, Calgary, and Whistler, which are treating virtually all of their sewage to the tertiary level. Additionally, the communities of Halifax, St. John's and Dawson City have made commitments to upgrade their treatment systems in the coming years. In fact, St. John's is currently constructing new sewage treatment facilities and Halifax will commence construction of three new facilities this fall. Some Canadian communities such as Whistler, which was evaluated for the first time in this report, are making great efforts to address sewage despite the lower standards generally adopted in that region.

Although Environment Canada estimates that 85% of inland municipalities served by sewers receive secondary or advanced levels of treatments, our coastal communities continue to receive embarrassingly low levels of treatment. In British Columbia, 80% of the municipalities discharging sewage into Pacific coastal waters receive only primary treatment. On the Atlantic Coast and St. Lawrence estuary, approximately 18% of the population served by sewers receive primary treatment and a whopping 48% receive no treatment at all.

Most significantly, Canada lacks national standards for sewage treatment —instead this significant environmental health issue has been relegated to the haphazard standards of individual municipalities.

Why is sewage a problem?

The problem of inadequate sewage treatment in Canada is particularly disturbing when you consider what sewage really is — a foul mix of water, human waste, microorganisms, pathogens and a cocktail of toxic chemicals. If sewage really was simply human waste, it would be relatively simple to treat and transform into high quality fertilizer and water suitable for release back into the environment. However, typical municipal sewage contains hundreds of chemicals and toxic pollutants that enter the sewer system from households, businesses and industrial operations. In some systems, urban run-off is collected in the same pipes as domestic sewage, thus adding a new batch of harmful ingredients. When untreated or inadequately treated sewage is dumped or overflows into our rivers, lakes and oceans, it impairs those often fragile ecosystems. Additionally, some aspects of sewage treatment can themselves cause environmental harm.

Common Pollutants

The processing of human waste and other organic compounds in a municipal sewage system is always associated with these common pollutants: total suspended solids; biological oxygen demand (BOD); faecal coliform; bacteria and nutrients. These pollutants are used as indicators to measure the effectiveness of treatment levels and to set appropriate standards for treatment.

Typical municipal sewage contains hundreds of chemicals and toxic pollutants that enter the sewer system from households, businesses and industrial operations.

Suspended solids are tiny pieces of organic and inorganic matter that float in liquid sewage. When present in high concentrations, suspended solids can prevent sufficient sunlight from reaching underwater plant life and upset these delicate ecosystems. They can also settle out and coat gravel stream beds important to fish spawning. Toxic pollutants found in sewage effluent often bind to suspended solids and the accumulation of these particles on the river, lake, or ocean bottom, can smother bottom-dwelling organisms and create a toxic environment.

Biological Oxygen Demand (BOD) refers to the amount of oxygen that will be used up in the receiving waters when sewage effluent is added. When sewage is dumped into a body of water, the dissolved oxygen present in the water is depleted as a result of the biological activity involved in breaking down organic material in the sewage. The more organic material dumped into these waters, the more oxygen is used up, and the less is available to other aquatic life. When the dissolved oxygen reaches very low levels, aquatic organisms die.

Faecal coliform is a type of bacteria found in the intestinal tracts of warm-blooded mammals and is often used as an indicator for sewage contamination. Faecal coliform itself is not hazardous to humans; however, it provides an indication of the amount of faecal matter present, which may be contaminated with other pathogens, such as hepatitis B, cholera, and typhoid. Filter-feeding bivalve shellfish such as oysters, clams, and mussels tend to accumulate sewage bacteria in their tissue. Eating contaminated bivalves is known to cause illness in humans.

Contamination from sewage discharges has affected many Canadian shellfish industries, including those near Saint John and Victoria. When high levels of faecal coliform are present, swimming and other recreational uses of water are generally prohibited.

Southern Resident Killer Whales Among the Most Toxic Animals on Earth

Municipal sewage is a major source of toxic pollution, including PCBs. As a result of contamination from PCBs other persistent pollutants, the endangered Beluga whales of the St. Lawrence River and Southern Resident Killer Whales of Southern Georgia Strait are now considered among the most contaminated mammals on the planet. Harbour seals living in the Georgia Basin off the Pacific coast have also been found to have high levels of PCB contamination and have suffered problems with immune and reproductive failure. While sewage outfalls are only one of many sources of PCBs, they are a source under our control.

Nutrients predominately refer to the phosphorous and nitrogen present in wastewater effluent that comes from human waste, as well as detergents and fertilizers. An oversupply of nutrients can lead to a condition known as euthrophication which is caused by excessive algae blooms and growth of aquatic plants. Eutrophication degrades aquatic ecosystems in a number of ways: by depleting oxygen resulting in loss or decrease in some bottom dwelling invertebrates and fish species, and by reducing sunlight penetration affecting sea grasses and other plants that stabilize the bottom. Ultimately, euthrophication will result in the loss of diversity of plants and animals. A 2001 National Survey of Wastewater Treatment Plants conducted by Canadian Water and Wastewater Association found that of 738 facilities surveyed only 39 had treatment for nitrogen removal and 191 had treatment for phosphorous removal.

Other Toxic Pollutants

Today there are hundreds of toxic chemicals commonly found in municipal sewage effluent. These toxic substances are of major concern for a number of reasons. Most disturbingly, many do not break down and tend to persist in the environment for a very long time. Some heavy metals and synthetic chemicals also accumulate as they move up the food chain through a process known as bioaccumulation. These toxic chemicals play havoc with sea birds, mammals and other sensitive marine life and ultimately are consumed by humans through the fish and shellfish we eat.

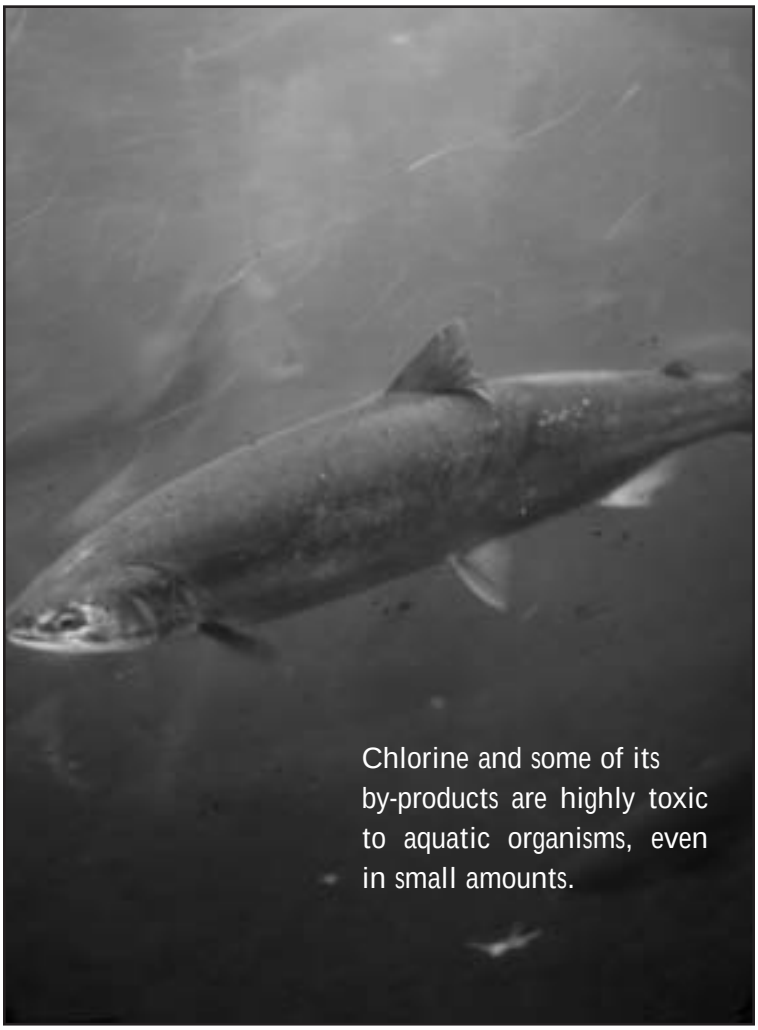
For example, documents obtained by Sierra Legal in 1996 show that over a two year period sewage outfalls serving the Capitol Regional District, which includes the City of Victoria, discharged approximately 2,920 tonnes of oil and grease, 9 tonnes of copper, 2.5 tonnes of cyanide, 1.3 tonnes of lead, 620 kg of silver, 74 kg of cadmium, 24 kg of mercury, 37 kg of toxic mutagenic and carcinogenic polycyclic aromatic hydrocarbons (PAHs) and 290 kg of potentially toxic halogenated compounds.

Testing done by the City of Toronto in 2003 on the final effluent from its sewage treatment plants found a soup of chemicals including twelve metals, six volatile organics, two extractable organics, grease, endocrine disrupting nonylphenols and nonylphenol ethoxylates, traces of dioxins and furans and a banned pesticide.

In August 2001 and February 2003, Sierra Legal arranged for independent sampling to be taken of wastewater from two sewage outfalls serving the City of Victoria. The results of these tests found toxic polychlorinated biphenyls (PCBs) in quantities that far exceeded international, national and provincial standards for PCBs in the aquatic environment.

Pollutants from the Disinfection process

When sewage effluent is released into receiving waters it is almost always contaminated with natural microorganisms and disease-causing pathogens. In small quantities, effluent becomes disinfected naturally as microorganisms die off and the organic matter decays. However, the huge volumes of sewage discharged by large communities prevent natural disinfection from occurring. Thus, municipal sewage treatment systems often use a synthetic disinfection process to eliminate many of the pathogens in sewage. While disinfection is intended to provide a health and environmental benefit, certain methods of disinfection can cause environmental harm.


Chlorine and some of its by-products are highly toxic to aquatic organisms, even in small amounts.

Chlorination is the most common disinfection method used in Canada today. This process uses chlorine to kill bacteria and microorganisms, such as faecal coliform. However, chlorine and some of its by-products are highly toxic to aquatic organisms, even in small amounts. Chlorinated wastewater effluent was officially designated as "toxic" under the *Canadian Environmental Protection Act* 1999. Despite this, many Canadian cities, including Toronto, Hamilton, Saskatoon, Ottawa, Charlottetown and Saint John, continue to disinfect their effluent with chlorine.

Of the alternative disinfection methods available, Ultra Violet (UV) disinfection is currently the most effective alternative to chlorination. UV disinfection uses the energy of ultraviolet rays to deactivate pathogenic organisms and does not have a known negative impact on the aquatic environment. Although it is currently a more expensive process than chlorination, cities like Calgary, Regina, Fredericton and Whitehorse have already adopted UV disinfection and it is hoped that the other municipalities will follow.

Ozone is also used to disinfect wastewater but is a generally more complex and costly technology compared to UV or chlorination. However it does not leave any harmful residual chemicals and has the advantage of raising dissolved oxygen levels in the wastewater effluent which benefits aquatic life.

Pollutants from sewer bypasses, overflows and storm sewers

Although effluent directly discharged from sewage treatment plants is the primary source of the toxic pollutants listed above, sewer overflows and bypasses and storm sewer systems commonly release raw, untreated sewage directly into the natural environment. In many systems these types of discharges occur regularly and can contain high levels of toxic pollutants.

Bypasses are used when a treatment facility is overloaded. Instead of allowing sewage to back up into basements and onto streets, the flow is deliberately redirected and discharged into the receiving waters without treatment. Bypasses also occur during high flow weather events such as spring snow melt and heavy rains and occur during routine maintenance activities when the treatment plant is temporarily out of operation and during power failures.

Documents obtained by Sierra Legal through freedom of information revealed that in the province of Ontario alone there were 144 sewage treatment plant bypass events in 2001. Many of these involved the release of hundreds of thousands of litres of raw sewage directly into the environment.

Combined Sewer Overflow Problems in Toronto Harbour

An investigation by Sierra Legal of an area of Toronto's harbour front in 2001 found E. coli levels 5,200 times above the acceptable provincial levels for recreational use. The area has been plagued by problems associated with combined sewer overflows and Sierra Legal requested that the provincial government investigate the E. coli laden discharges as a possible violation of federal and provincial law. Although charges were not laid against the city, the city subsequently committed funds and plans to clean up the overflow problem.

Combined Sewer System is one that carries sewage, storm water and urban run-off in the same pipe. During heavy rainfalls, the pipes fill up and the system can no longer accommodate the volume of sewage and storm water. The combined sewer overflow pipes dump the excess flow from the main sewer directly into the receiving waters. The City of Toronto has documented additional problems with "cross connections" where storm water pipes are mistakenly connected to sanitary sewer system and vice versa.

In Winnipeg, Hamilton, Montreal and Saint John at least 20% of the sewers are combined systems and Vancouver, Edmonton and Quebec City have at least 10% of their sewers combined with stormwater. Since the publication of the second Report Card in 1999, cities such as Toronto have reduced their combined sewer system from 27 to 16%. While this is an encouraging sign, seventeen of the twenty two cities surveyed still have combined sewer overflows.

Stormwater Sewers are intended to deal with urban run-off from precipitation. In this type of system, the stormwater is usually discharged directly into the receiving water. As a result, the various chemicals that run off our driveways and streets collect in storm drains and are released directly into local waterways.

Sewage Sludge

Sewage sludge, also known as biosolids, is the solid waste left over after sewage is treated and liquid effluent is removed. Sludge often contains a variety of toxic chemicals and therefore poses a problem of safe use or disposal. Sludge also contains

a number of valuable nutrients such as nitrogen, which is considered to be a resource.

Sludge disposal methods include: disposal at sea, in landfills, disposal as a fertilizer on agricultural land, use as infill material and incineration. Many of these disposal methods come with significant risk — none are known to be risk free. Incineration of sludge is particularly dangerous because toxic chemicals are released back into the environment as airborne particles. Spreading sludge on agricultural land can also be dangerous because these toxic chemicals are absorbed by crops and livestock, or contaminate watercourses through run off. Even in the case where sludge is tested before it is spread on agricultural land, the practice is risky because safety standards vary, and there is no testing for many chemicals.

Even in the case where sludge is tested before it is spread on agricultural land, the practice is risky because safety standards vary, and there is no testing for many chemicals.

Concern about the affects of sewage sludge disposal on agricultural land is growing and a number of European countries including Switzerland and Sweden and some American states such as Maryland, have passed laws that significantly limit disposal of biosolids on agricultural and grazing land. While it is possible to remove sludge from the environment by sealing it in properly contained landfills, there are costs and logistical concerns associated with that practice, as well as the loss of the beneficial nutrients found in sludge. There are some innovative approaches to the sludge problem being developed where sludge is used as infill in highly disturbed and barren land to encourage the growth of poplar trees, which remove toxic substances. While these developments in safer sludge disposal are encouraging this is still a significant problem which requires more research and development to properly address.

How is Sewage Treated in Canada?

Conventional sewage treatment is considered to include three basic levels: primary, secondary and tertiary. Each treatment level can be achieved by a number of different processes, but generally results in an increasing quality of effluent at the end of the pipe as you move from primary to tertiary treatment.

In 1999, Environment Canada reported that approximately 63% of the population in British Columbia served by sewers had secondary or tertiary treatment. In both Ontario and the Prairie provinces, over 94% of the sewered population had secondary or tertiary treatment. In Quebec, about 43% of the sewered population had primary treatment and about 49% had secondary or tertiary treatment.

Screening

Screening removes grit and solid material before sewage receives further treatment or is released into the environment. Screening makes sewage less offensive to the eye, but no less dangerous to the environment or human health. Screening does not significantly reduce the level of suspended solids, BOD, toxic pollutants, or microorganisms and pathogens.

Victoria and Dawson City use only screening before discharging their sewage, although Dawson City has designed a secondary sewage treatment facility and is awaiting an agreement on funding to proceed to construction.

According to Environment Canada data in the Atlantic provinces nearly half of the population serviced by sewer collection systems released untreated wastewater directly into inland and coastal waters after screening.

Primary treatment

Primary treatment is defined as a physical process through which the sewage flow is slowed down and the solids are separated from the liquids by settling. Settling most often occurs in settling tanks or sewage lagoons, during which time the heavier particles and solids in wastewater settle to the bottom forming what is referred to as sewage sludge. The sludge is removed from the bottom and disposed of in a variety of ways.

Conventional primary treatment generally removes 25-40% of BOD and 40-60% of total suspended solids. With the aid of chemicals, sedimentation can be accelerated, reducing these two contaminants by about 50% and 90% respectively. The settling process reduces faecal coliform levels by 45-55%.

Of the cities surveyed, only Charlottetown and Montreal rely solely on primary treatment. Saint John and Vancouver also use primary treatment at some of their treatment facilities. According to Environment Canada in 1999, approximately 19% of Canadians on sewer systems are serviced by only primary treatment.

Secondary treatment

Secondary treatment reduces the amount of suspended solids and BOD by breaking down the organic material present in the sewage. This is done by adding oxygen through mechanical aeration or using biological filters and layers of stones, gravel and sand. The additional oxygen activates the microorganisms present in the sewage, which break down present organic matter. Enhanced secondary treatment refers to secondary treatment with phosphorus and/or nitrogen removal.

Secondary treatment reduces BOD and suspended solids by 85-90% and removes 90-99% of coliform bacteria and can also remove significant amounts of other pollutants.
Fourteen of the cities surveyed in this report use secondary treatment at some or

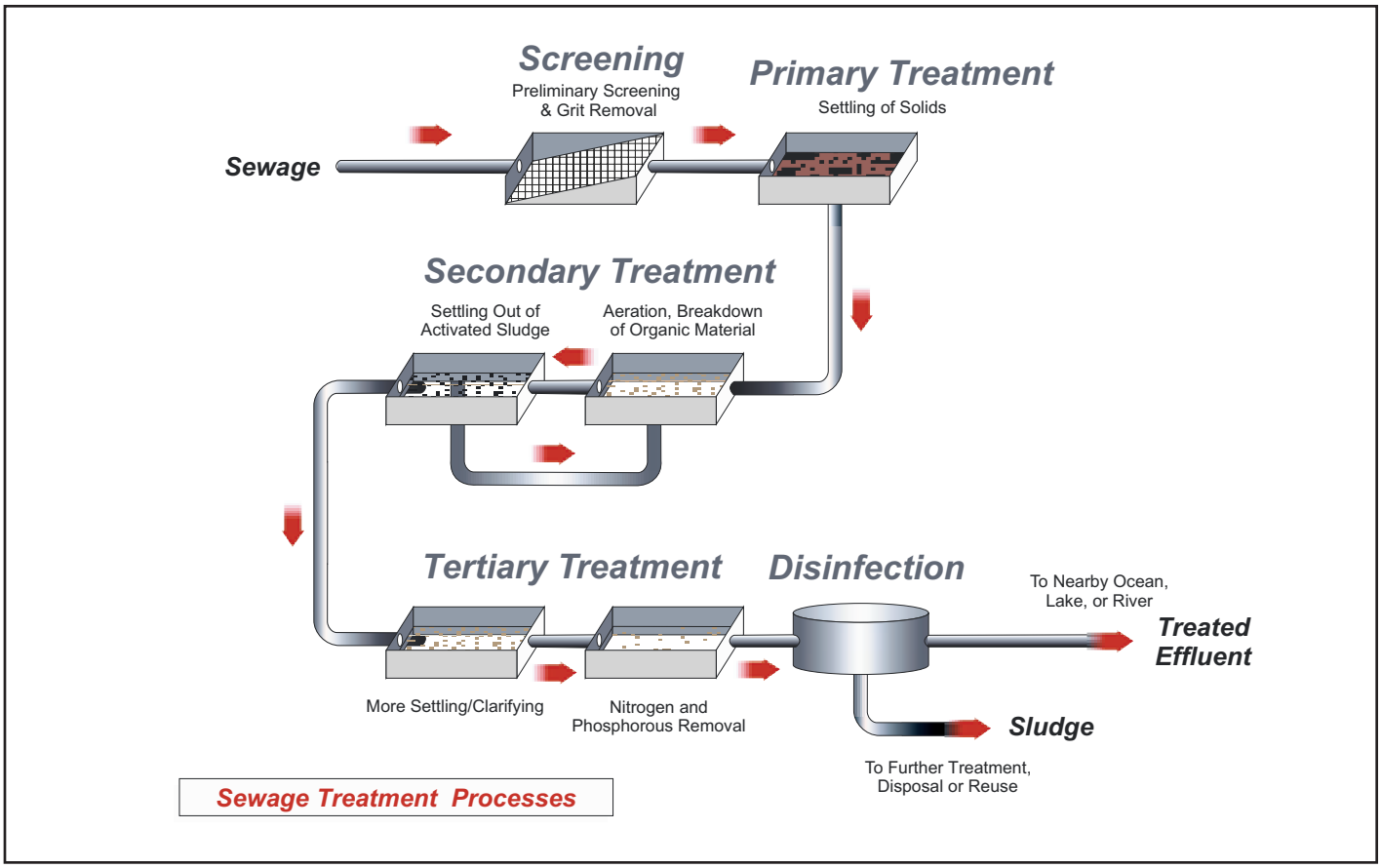
all of their plants. The cities of Dawson and Charlottetown plan to construct secondary treatment facilities. Environment Canada data shows that about 38% of Canadians on sewer systems are serviced by secondary treatment.

Tertiary Treatment

Tertiary treatment further reduces suspended solids, BOD, and other harmful substances such as nitrogen, ammonia, phosphorous, heavy metals and toxic pollutants. Technologies used in tertiary treatment depend on specific characteristics of the sewage. For example, additional clarifiers such as micro-strainers or sand filters can further remove suspended solids and reduce BOD. Some advanced forms of filtration can remove metals and other types of contaminants.

The most common methods of tertiary treatment include activated carbon and chemical oxidation. It is also possible, although very expensive, to remove dissolved inorganic substances using chemical precipitation, ion exchange, ultra-filtration, reverse osmosis or electro dialysis. However, the best "treatment" by far is to ensure that these toxic substances do not enter the sewage system in the first place.

Environment Canada data shows that approximately 40% of Canadians on sewer systems receive tertiary treatment. From the cities surveyed in this report, only Calgary, Whistler, and Edmonton treat all their sewage to a tertiary level. The City of Hamilton also has tertiary treatment at two of its three plants.



Sewage Treatment Processes

Alternative Technologies

There are many ways in which sewage can be treated other than by conventional physical-chemical or biological treatment processes. One innovative and environmentally sound alternative to conventional tertiary treatment is the use of constructed wetlands. Wetlands are capable of providing a very high level of sewage treatment without the use of chemicals or the need for heavy infrastructure investment. With wetland treatment, micro-organisms, plants, and insects that inhabit marsh environments work to purify the sewage flowing through them. Disinfection occurs naturally as harmful bacteria die off or are consumed. To avoid contamination of natural wetlands many North American communities are constructing wetland systems to reproduce the natural biological processes of marshes in a treatment facility.

The constructed wetland concept can be taken a step further and compacted into a series of greenhouses in a system known as *Solar Aquatics*. In this process, sewage effluent moves through a series of tanks while plants, butterflies and other bugs go to work on it. The result is drinking-quality effluent that can be reintroduced into the natural environment.

Unfortunately, longstanding resistance from municipalities and many professional engineers must be overcome before technologies such as this are embraced on a widespread basis.

To be effective however, alternative technologies must achieve the same standards as conventional treatment.

Sewage Regulation in Canada

The challenge of regulating sewage in Canada is that it falls under the jurisdiction or authority of many different levels of government. National, provincial, municipal, and in some cases even international laws and standards apply to sewage treatment. Far from creating a system of over-regulation however, this overlapping of duties and responsibilities has left Canada with a patchwork of laws and standards and which is exacerbated by governments' inability or reluctance to enforce existing pollution laws, and the failure to make the investments necessary to upgrade sewage treatment facilities.

Federal responsibility to protect fish bearing waters and control toxic substances

Canada has federal laws intended to protect fish bearing waters such as the *Fisheries Act*, and laws to control toxic substances, such as the *Canadian Environmental Protection Act*. The federal government could use these tools to enact legal standards for all wastewater effluent entering fish bearing waters, or to require the control or removal of specific toxic substances from wastewater. Instead the federal government has chosen to largely ignore the issue of sewage pollution. Canada has no legally binding federal legislation setting enforceable standards for sewage treatment.

By contrast, the European Union has adopted legally enforceable declarations requiring all urban communities to upgrade to secondary sewage treatment by December 31, 2005. The United States also has binding federal legislation in the *Clean Water Act*, which requires all cities to have the equivalent of secondary sewage treatment.

The Federal Guidelines for Effluent Quality and Wastewater Treatment at Federal Establishments in Canada suggest that all federal facilities aim for secondary sewage treatment - but these guidelines are not binding on anyone. Unfortunately, history has shown us that guidelines without enforceable targets and timelines, do not change behaviour or compel compliance.

While the federal government retains exclusive control over making national laws, it often shares the responsibility of enforcing laws with provincial governments — as is the case with the pollution prevention provisions of the *Fisheries Act*. The federal or provincial governments could use their law enforcing or "prosecutorial powers", under the *Fisheries Act* to prosecute municipalities depositing harmful effluent into fish bearing waters. Under the federal *Fisheries Act*, discharge of substances "deleterious to fish" into fish-bearing waters is a major offence punishable by fines of up to $1 million and/or imprisonment. Many Canadian municipalities are chronic offenders. Yet charges are rarely laid — at least against large municipal offenders such as Vancouver and Victoria. Recently, two smaller municipalities, Dawson City, Yukon and Iqualuit, Nunavut, were both convicted of violating these *Fisheries Act* provisions for discharging raw sewage that had only received screening.

Despite these few examples of sewage related charges the general trend is to not charge cities for pollution offences related to sewage. Of the twenty-two cities surveyed in this report only five (Edmonton, Winnipeg, Toronto, Ottawa, Dawson City) reported a sewage related charge during the 5 years since the last Report Card.

Sewage Treatment Plants among Nation's Top Polluters

According to Environment Canada's 2001 National Pollutant Release Inventory (NPRI), the top fifteen water polluters in Canada are all municipal sewage treatment plants. Pollutants released to water include common pollutants like nitrate, ammonia and, in lesser quantities mercury, copper, zinc, manganese and cadmium. Mercury once released into water bodies can be converted to a far more toxic form called methyl mercury, which bio-accumulates in fish that may ultimately be consumed by humans. Metals such as copper and cadmium can be toxic to aquatic life at low concentrations.

By no means is the NPRI a full list of pollutants released to surface water by municipal wastewater treatment plants. The NPRI data is limited by the fact that pollutant releases must only be reported if the total quantity released exceeds a set threshold. Thresholds can range from 10 tonnes to 5kg depending on the pollutant.

"PollutionWatch.org" reports that in 2001, almost 14 million kg of NPRI chemicals were "transferred" to sewer systems in Canada.

The provincial role in environmental management

While Provinces have the power to regulate sewage through a number of provincial waste management and environmental protection statutes, in recent years the trend has been towards downloading these responsibilities entirely to municipal governments. In many instances this has been done regardless of the municipality's ability to provide adequate treatment or adequately enforcement of regulatory provisions. Additionally, as Provinces are often compelled by law to share the cost of infrastructure upgrades such as new sewage treatment plants with local governments, they are often loath to prosecute these same entities as the only logical outcome of such prosecution would be a demand for system upgrades.

Toxic Chemicals Down the Drain

Harmful chemicals are introduced into the sewer system each time individuals or businesses pour them down the drain. Many household products including cosmetics, cleaning supplies and garden chemicals, contain substances that are toxic to fish and wildlife and can harm the environment. This problem is especially serious if you live in a municipality that does not treat its sewage. When you pour something down the drain, it will make its way right into your local waterways without any treatment.

Source protection and Sewer use bylaws

Canadian municipalities are generally responsible for regulating and operating sewage treatment facilities and sewer systems and ensuring that the effluent the systems discharge meet basic provincial and federal pollution standards. Recently the municipal regulatory focus has shifted to controlling what goes into the sewer, as opposed to what comes out the end of the pipe. This is principally done through locally enacted "sewer use bylaws", and to a lesser extent pollution prevention and water conservation initiatives.

Sewer use bylaws can be an effective tool in reducing the overall toxicity of sewage effluent and sludge, but their effectiveness generally depends on how strict the limits on pollutants are and how many pollutants are included. Sewer use bylaws generally prescribe acceptable concentrations of specific pollutants that can be released into the sewer system. If a business or industry releases wastewater or sewage into the system with pollutants in concentrations in excess of the prescribed limit, the municipality may prosecute the polluter and lay charges. However, most municipalities try and work together with the polluter to ensure that these types of releases do not continue to occur or can make agreements whereby the polluter pays a set fee for discharging quantities of pollutants in excess of the limit and is exempted from being charged.

In the absence of binding national standards, the pollutants dealt with by sewer use bylaws vary greatly. Newer bylaws tend to be comprehensive and include strict limits on a wide range of pollutants, such as the City of Toronto's. Whereas older bylaws tend to have fewer, weaker limits on pollutants.

Other important elements of effective sewer use bylaws are strong enforcement and monitoring. Regular monitoring, which is necessary to ensure that polluters are in compliance with the sewer use bylaws, requires funding to carry out testing and site visits. Sadly, municipalities rarely dedicate adequate resources to this kind of enforcement. For example, the City of Vancouver has in excess of two hundred enforcers for its parking bylaws, but only one enforcement officer dedicated to enforcing the sewer use bylaw for the entire city. The City of Toronto has 12 officers dedicated to enforcing the sewer use-by law through routine inspections and random sampling of industrial users. However, enforcement resources were not increased with the passage of the new stricter bylaw.

City of Toronto sewer use bylaw a model for all to follow.

In 2000 the City of Toronto adopted one of the toughest sewer use bylaws in Canada, which focuses on pollution prevention and has strict limits on many pollutants. The limits include 18 prohibited classes of chemicals, such as radioactive, acutely toxic, hazardous and ignitable wastes, fuel, pesticides, and 55 chemical concentration limits. Standards for discharge to a storm sewer are even more stringent. However a discharger can get special permission and pay a fee to discharge outside of these standards. The bylaw also contains requirements for pollution preventing planning by industry. Six officers are currently dedicated to enforcement of pollution prevention planning.

The Evaluation of Canadian Cities

In producing this third edition of the Sewage Report Card we compared twenty-two Canadian cities in terms of the quality of their sewage treatment and assigned each a letter grade between A and F. The cities appear in alphabetical order in the report.

The main criteria for these evaluations include: the level of sewage treatment provided, the volume of raw sewage discharged, and compliance with permits and regulations. Consideration was also given to the method of disinfection of effluent before entering receiving water, and method of sludge disposal, and the prevalence of combined sewer overflows.

There were basic standards which needed to be met in order to achieve certain grades. For example, a base grade of "D" was given for a city with basic primary sewage treatment, and a grade of "C" was set as the base grade for advanced primary. A grade of "B" required a minimum of secondary treatment. An "A" grade could only be achieved with tertiary treatment. Because of the risk posed by the discharge of untreated sewage into the environment, a city that merely screens its sewage received a failing grade.

Factors such as methods of sludge disposal, presence or absence of combined sewer overflows, method of disinfection, and toxicity testing of effluent and sludge caused the base grade to go up or down.

Grades also reflect a city's commitment to continual improvement, and evidence of effective measures taken since our last Report Card. Where no discernible progress was made in the five years since the last Report Card, cities were downgraded. There are many instances in which the city has through a planning process committed to upgrades. Planning alone did increase grades, as did steps towards implementation, but fewer marks were given in these instances than would be given had that work already been completed.

This type of evaluation necessarily involves a degree of subjectivity, for which the authors take full responsibility.

Research Methods

Most of the data on sewage treatment in the individual cities was obtained through a questionnaire sent to municipal or regional governments, follow-up interviews, and, in some cases, through additional written or verbal requests for specific information.

Along with their responses to the questionnaire, some cities sent detailed technical information on their sewage facilities and on receiving water quality.

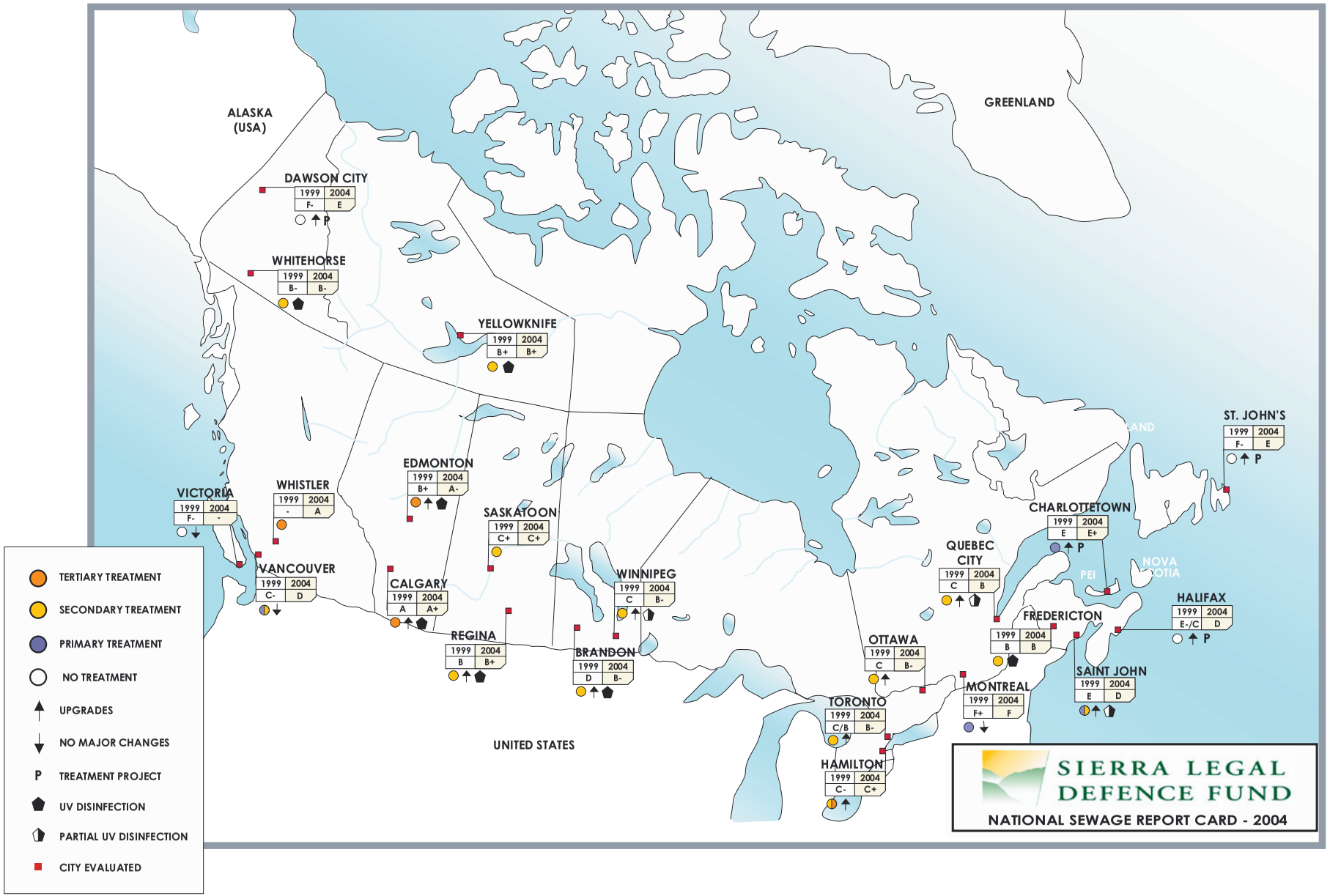
The government body responsible for sewage treatment in each city was given an opportunity to identify inaccuracies in the data compiled. Many responded with corrections and comments. The environmental groups listed as sources of information for particular cities were also invited to inspect the information for accuracy and to comment on the draft evaluations. However, where errors or inaccuracies occur, these are the sole responsibility of Sierra Legal.

Contacts

A member of the local government agency responsible for sewage treatment and a relevant local environmental group are listed on the evaluation page for each city. The address and phone number of the government representatives are provided to help readers voice their concerns or learn more about the issue of sewage treatment. The environmental groups listed are involved in or concerned about sewage issues, and are often able to provide further details of local issues.

Excremental Progress at a Glance

City	Summary	1999 Grade	+/-	2004 Grade
Brandon	Implemented 100% secondary treatment and UV disinfection. Combined overflow of up to 2.8 million litres per year.	D	+	B-
Calgary	UV disinfection added to 100% tertiary treatment. Additional upgrades in the works ($250 million).	A	+	A+
Charlottetown	Primary treatment only. Volume of discharges not monitored. Plans to upgrade to secondary by 2006.	E	+	E+
Dawson City	Still discharging one billion litres of raw sewage per year. Await funding for upgrade to secondary treatment.	F-	+	E
Edmonton	Upgraded to 100% tertiary treatment and UV disinfection	B+	+	A-
Fredericton	Secondary treatment with UV disinfection. No major improvements since 1999. Low percentage of CSOs.	B	NC	B
Halifax	More than 65 billion litres of raw sewage discharged each year. Regional plants provide secondary or tertiary treatment.	E-/C	+	D
Hamilton	Upgrades to secondary and tertiary treatment. Discharges 5.9 billion litres of raw sewage each year. Only 88% of population served.	C-	+	C+
Montreal	Primary treatment only. No discernible progress made.	F+	-	F
Ottawa	Secondary treatment. Seasonal chlorine disinfection, no dechlorination. Overflow system controls installed.	C	+	B-
Quebec City	Secondary treatment with seasonal UV disinfection. Combined sewer overflow events reduced.	C	+	B
Regina	Enhanced secondary treatment with expanded UV disinfection. Extensive upgrades planned.	B	+	B+
Saint John	Reduction in combined sewers. Primary and secondary treatment. Almost 40% of population still do not receive treatment.	E	+	D
Saskatoon	100 % secondary treatment. Minimal changes since 1999.	C+	NC	C+
St. John's	More than 33 billion litres of raw sewage discharged.Primary sewage treatment plant under construction.	F-	+	E
Toronto	Toughest Sewer-Use Bylaw in country. Secondary treatment. Still discharge 9.9 billion litres of untreated sewage and run-off.	C/B	+	B-
Vancouver	Up to 22 billion litres of combined overflows each year. Upgrades to 100% secondary treatment won't be completed until 2030.	C-	-	D
Victoria	Preliminary screening, no treatment. More than 34 billion litres of raw sewage still discharged each year.	F-	-	Suspended
Whitehorse	Secondary Treatment. Minimal progress since 1999. Efforts under way to reduce volumes of sewage. No raw sewage discharges.	B-	NC	B-
Winnipeg	100% secondary treatment. Reduced number of combined sewers, still one billion litres of combined sewer overflow per year.	C	+	B-
Whistler	100% tertiary treatment.	-		A
Yellowknife	100% secondary treatment with natural UV disinfection. Only minor changes since 1999.	B+	NC	B+


ALASKA (USA)
GREENLAND
UNITED STATES
DAWSON CITY
1999 2004
F- E
P
WHITEHORSE
1999 2004
B- B-
YELLOWKNIFE
1999 2004
B+ B+
EDMONTON
1999 2004
B+ A-
SASKATOON
1999 2004
C+ C+
VICTORIA
1999 2004
F- -
WHISTLER
1999 2004
- A
VANCOUVER
1999 2004
C- D
CALGARY
1999 2004
A A+
REGINA
1999 2004
B B+
WINNIPEG
1999 2004
C B-
BRANDON
1999 2004
D B-
OTTAWA
1999 2004
C B-
TORONTO
1999 2004
C/B B-
HAMILTON
1999 2004
C- C+
MONTREAL
1999 2004
F+ F
QUEBEC CITY
1999 2004
C B
FREDERICTON
1999 2004
B B
CHARLOTTETOWN
1999 2004
E E+
P
PEI
NOVA SCOTIA
HALIFAX
1999 2004
E-/C D
P
SAINT JOHN
1999 2004
E D
ST. JOHN'S
1999 2004
F- E
P
TERTIARY TREATMENT
SECONDARY TREATMENT
PRIMARY TREATMENT
NO TREATMENT
UPGRADES
NO MAJOR CHANGES
P TREATMENT PROJECT
UV DISINFECTION
PARTIAL UV DISINFECTION
CITY EVALUATED
SIERRA LEGAL DEFENCE FUND
NATIONAL SEWAGE REPORT CARD - 2004

Brandon

2004 GRADE:

B-

1999: D

FOR MORE INFORMATION CONTACT

Manitoba Eco-Network
2-70 Albert Street
Winnipeg, Manitoba
R3B 1E7
Tel: (204) 947-6511
E-mail:
mbeconet@mts.net

Population:	39,716
% of population served by sewage treatment plants:	100%
Volume generated:	Approximately 6.5 billion litres per year
Treatment:	Brandon has separate municipal and industrial wastewater treatment facilities. Municipal facility has secondary treatment followed by UV disinfection. Industrial facility uses anaerobic treatment followed by aerobic treatment and UV disinfection.
Raw Sewage Discharged:	No estimate provided — see annual overflows
Receiving Water:	Assiniboine River
Permits:	Manitoba's *Environment Act* requires each treatment plant be licensed in accordance with provincial Water Quality Standards, Objectives, and Guidelines. The City of Brandon currently holds four licences under the Act for the operation and the release of effluent from its municipal and industrial treatment plants and the disposal of biosolids from both plants.
Combined Sewer %:	Approximately 30%
Overflows Annually:	Due to large rainfall events and spring run-off, Brandon's combined sewer system discharged overflows of 2.85 million litres in 2002 and 1 million litres in 2003.
Toxicity Testing:	Acute Lethality Toxicity testing is a license requirement only for the Industrial Treatment Facility.
Sludge Disposal:	Biosolids generated at the municipal facility are stored and stabilized in an earthen lagoon cell and held in isolation for a minimum of 12 months as per the *Environment Act* license. The solids are then applied to agricultural land by injection. Biosolids generated at the industrial facility and extracted from the anaerobic reactor in the spring and fall of each year and are also land applied.

Sewage-related Pollution Charges: None

Changes Since 1999: Municipal WWTP: UV Disinfection and a Scum Removal System were added to the municipal treatment plant in 2001. An engineering study is currently in progress to evaluate methods for phosphorous and nitrogen reduction and meeting the requirements of the Federal Government's pollution prevention plan. The implementation of this plan will begin within the next 4 years.

A pilot study has also been undertaken to explore sand filtration and ozone disinfection for the industrial waste stream. The industrial treatment plant was commissioned in September 1999 but has had problems with high temperature discharge and very high nitrate, phosphate and salt levels.

Additional Facts: Design faults in the municipal sewage plant have created serious problems that have yet to be addressed. The plant continues to regularly discharge to an antiquated sewage lagoon system. The city has proposed diverting municipal effluents to the newer industrial treatment plant.

WHY THIS GRADE?

+ Expanded UV disinfection program
+ Implemented 100% secondary sewage treatment for municipal and industrial effluent
+ Total volume of sewage generated has decreased from 8 to 6.5 billion litres per year since 1999
+ Considering tertiary treatment options like sand filtration and ozone disinfection
- Both municipal and industrial sewage plants have had serious operational problems
- Combined sewer overflow discharges of up to 2.85 million litres per year
- Sludge disposed of on agricultural lands

TO VOICE YOUR CONCERNS CONTACT

Ian Christiansen
City of Brandon
410 9th Street
Brandon, Manitoba
R7A 6A2
Tel: (204) 729-2202

Calgary

2004 GRADE:

A+

1999: A

FOR MORE INFORMATION CONTACT

Clean Calgary Association
100-3811 Edmonton Trail NE
Calgary, Alberta
T2E 3P5
Tel: (403) 230-1443
Email:
natalie@cleancalgary.com

Population:	918,382
% of population served by sewage treatment plants:	100%
Volume generated:	164 billion litres in 2003
Treatment:	100% tertiary with ultraviolet (UV) disinfection
Raw Sewage Discharged:	None
Receiving Water:	Bow River
Permits:	Licences-to-Operate issued and renewed every 5 years to the City of Calgary by Alberta Environment.
Combined Sewer %:	None
Overflows Annually:	None
Toxicity Testing:	In accordance with Alberta Environment's requirements, both Calgary's treated wastewater effluents and biosolids must undergo regular toxicity testing, as mandated by the Licenses-to-Operate
Sludge Disposal:	Sludge produced at both treatment plants are treated with the anaerobic digestion process. The treated sludge is then pumped to the off-site Shepard Sludge Lagoons for gravity settling, thickening, and additional biological treatment. In the summer months (May-October), biosolids are transported to farmlands and injected into the soil, in accordance with Alberta Environment's specified application rates and guidelines.
Sewage-related Pollution Charges:	None
Changes Since 1999:	Since 1999 improvements have been made to further improve the stability and efficiency of the various treatment processes. A third state-of-the-art wastewater treatment plant is currently under design and is scheduled to be commissioned in early 2007 to serve the growing population in southern Calgary. The City has also approved $250,000,000 in further upgrades.

Additional Facts:

The effluent and biosolids standards, specified in the Licences-to-Operate, are among the most stringent in North America. Calgary has also enacted a Sewer Service Bylaw which regulates industrial discharges and includes provisions for monitoring and enforcement.

Why this Grade?

+ Consistent improvement shown since 1999

+ 100% tertiary treatment

+ All systems in compliance with permits

+ An additional $250,000,000 in planned sewage infrastructure works

- Sewage sludge applied to farmlands

TO VOICE YOUR CONCERNS CONTACT

Mr. Wolf Keller
Director of Calgary
Wastewater Utilities and
Environmental Protection
The City of Calgary
PO Box 2100
Station M
Calgary, Alberta
T2P 2M5
Tel: (403) 268-5735

Charlottetown

2004 GRADE:

E+

1999: E

FOR MORE INFORMATION CONTACT

PEI
Environmental Network
126 Richmond Street
Charlottetown, PEI
C1A 1H9
Tel: (902) 566-4696
E-mail: peien@isn.net

Population:	33,180
% of population served by sewage treatment plants:	Approximately 98%
Volume generated:	8 billion litres per year
Treatment:	Primary treatment, seasonal chlorine disinfection (May to December), no de-chlorination.
Raw Sewage Discharged:	Charlottetown does not monitor.
Receiving Water:	Hillsborough River
Permits:	No permits are held or required. No provincial regulations for sewage plant discharges.
Combined Sewer %:	10%
Overflows Annually:	Not measured
Toxicity Testing:	City monitors weekly for pH, biochemical oxygen demand, total suspended solids, settled solids removal, and residual chlorine. Daily test for chlorine residuals during disinfection period. No microbiological tests done.
Sludge Disposal:	Applied to dormant land for future agricultural use. No testing done for heavy metals or other toxic pollutants.
Sewage-related Pollution Charges:	None
Changes Since 1999:	No discernable changes since 1999

Additional Facts:

In 2004 the City plans to separate 50% of the combined sewers. Upgrading of treatment plants to secondary treatment with UV disinfection is expected to be complete by 2006. After the plant is upgraded, the City will accept sewage from outside sources, including private septage systems and small rural community wastewater treatment plants.

Digester gas is used to power a generator which provides electricity (50-65% of requirement) for the plant.

Why this Grade?

+ City upgrading facilities to Secondary Treatment with UV disinfection by 2006

+ Planned reduction in percentage of combined sewers

+ Biogas co-generation project in place

- No discernible changes since 1999

- Primary treated sewage still being discharged

- Raw sewage still being discharged but amounts not monitored

- Sludge disposed of on agricultural land without testing

TO VOICE YOUR CONCERNS CONTACT

Craig Walker,
Utility Manager
Charlottetown Water and Sewer Utility Corporation
199 Queen Street
P.O. Box 98
Charlottetown, PEI
C1A 2T3
Tel: (902) 566-4170
Email: peien@isn.net

*

Joe Coady, Director of Public Services
P.O. Box 98
Charlottetown, PEI
C1A 2T3
Tel: (902) 566-5548

Dawson City

2004 GRADE:

E

1999: F-

FOR MORE INFORMATION CONTACT

Yukon Conservation Society
P.O. Box 4163
302 Hawkins Street
Whitehorse, Yukon
Y1A 3T3
Tel: (867) 668-5678
E-mail: ycs@ycs.yk.ca

Population:	2020 in winter (can double in summer with tourists and seasonal workers)
% of population served by sewage treatment plants:	80%
Volume generated:	Approximately 1 billion litres per year
Treatment:	Preliminary screening (0.75 mm rotostrainers).
Raw Sewage Discharged:	Approximately 1 billion litres per year.
Receiving Water:	Yukon River
Permits:	Yukon Territory Water Licence states that secondary treatment facility must be built by 2004.
Combined Sewer %:	None
Overflows Annually:	None
Toxicity Testing:	Regular 96hrLC50 bioassay toxicity testing. Effluent occasionally fails bioassay tests during summer months (June - August)
Sludge Disposal:	No sludge recovered
Sewage-related Pollution Charges:	In August 2000, the City of Dawson was charged under Section 36(3) the federal *Fisheries Act* for depositing a deleterious substance into the Yukon River. The City plead guilty to the charge and was sentenced to pay a $5000 fine and build a secondary treatment facility by September 2004. An additional $5000 fine will be assessed every month after that date until a facility is built.
Changes Since 1999:	Permit requirement to build secondary sewage treatment plant by 2002 amended and extended to 2004. Detailed design of the facility is completed, however the City is currently working with the Yukon Territorial Government to secure the necessary funding. Water meters were installed in 2002 in an effort to conserve water and reduce flows to sewer system.

WHY THIS GRADE?

+ City has taken steps to design a secondary sewage treatment plant, however construction is dependent on funding from several sources

+ Water metering introduced as a means to reduce volume of flows to sewage system

- Few discernible changes since 1999

- All sewage discharged with no treatment other than screening

- City charged under federal *Fisheries Act*

TO VOICE YOUR CONCERNS CONTACT

Mayor Glen Everitte
Box 308
Dawson City, Yukon
Y0B 1G0
Tel: (867) 993-7400

Edmonton

2004 GRADE:

A-

1999: B+

FOR MORE INFORMATION CONTACT

Toxics Watch
10511 Saskatchewan Drive
Edmonton, Alberta
T6E 4S1
Tel: (780) 439-1912
E-mail:
toxwatch@yahoo.com

Population:	685,700 (2003 estimate)
% of population served by sewage treatment plants:	99.6% (approximately 1,000 homes served by septic tanks)
Volume generated:	94 billion litres per year
Treatment:	Tertiary treatment that includes Biological Nutrient Removal and ultraviolet disinfection. Fine-bubble diffusion is used in the treatment process to increase oxygen transfer efficiency.
Raw Sewage Discharged:	None —See annual overflows
Receiving Water:	North Saskatchewan River
Permits:	The City of Edmonton's sewage system is regulated as part of the wider "drainage system" by a Licence-to-Operate issued by Alberta Environment.
Combined Sewer %:	16%
Overflows Annually:	From 2000 to 2002, Edmonton experienced on average 38 days per year of diluted, untreated sewage overflows that discharged an average annual total volume of more than 1.6 billion litres to the North Saskatchewan River.
Toxicity Testing:	Effluent tested for chronic and acute toxicity on a quarterly basis. Includes 96-hr static toxicity test using rainbow trout, 48-hr static toxicity using *Daphnia magna*, and the 15-min Microtox test using luminescent bacteria. Chronic toxicity testing includes the 7-day *Ceriodaphnia dubia* and fathead minnow's survival and reproductive impairment tests, and the 76-hr *Selenastrum spp*. growth inhibition test. The results of these toxicity tests show that, with full BNR treatment, final effluent from the wastewater treatment plant is not toxic.
Sludge Disposal:	Biosolids are applied to surrounding farmland as a soil conditioner; or combined with municipal solid waste at Edmonton's Composting Facility to produce a commercial grade compost used for land

reclamation. Compost is also made available to the public as a retail product. Average annual transfers of biosolids are 5,000 and 15,000 dry tonnes to farmland and Edmonton's Composting Facility, respectively.

Sewage-related Pollution Charges: Yes. The City of Edmonton was charged by Alberta Environment officers in 2001 for failing to report a sewage release within 24 hours of the incident.

Changes Since 1999: All drainage services, including sewage treatment have been working towards an ISO 14001 registration for 2004. Facility upgrades include improved efficiency of secondary treatment though upgrading with biological nutrient removal. Retrofitting of secondary treatment for biological nutrient removal through enhanced aeration completed in 2002, which reduced nutrient loading to the North Saskatchewan River. Enhanced grit removal and screening through the use of finer screens has improved biosolids removal. There are plans to expand advanced secondary treatment by 2005. Facilities are under construction to reduce CSOs during wet weather. Research is ongoing on new treatment methods including the construction of the Wastewater Management Centre of Excellence including model pilot plant, state of the art laboratory facilities, classrooms and offices.

WHY THIS GRADE?

+ Met commitment to move to 100% tertiary treatment
+ Significant upgrades since 1999
+ Move towards greenhouse gas reduction strategy and biogas cogeneration
+ Emphasis on Public Education
- Combined sewage overflows of more than 1.6 billion litres each year
- Charged for failing to report spill
- Sewage sludge disposed of on farmland

TO VOICE YOUR CONCERNS CONTACT

City of Edmonton
Drainage Call Center:
(780) 496-1717

Citizens' Action Center:
(780) 496-8200

Edmonton City Hall
1 Sir Winston
Churchill Square
Edmonton, Alberta
T5J 2R7
Tel: (780) 496-8100

Fredericton

2004 GRADE:

B

1999: B

FOR MORE INFORMATION CONTACT

Conservation Council of New Brunswick
180 St. John St.
Fredericton, NB
E3B 4A9
Tel: (506) 458-8747
E-mail:
ccnb@nb.aibn.com

*

ACAP Saint John
P.O. Box 6878 Stn A
Saint John, NB
E2L 4S3
Tel: (506) 652-2227
Email: acapsj@fundy.net

Population:	47,500
% of population served by sewage treatment plants:	98%
Volume generated:	6.79 billion litres (plant), 400 million litres (lagoons)
Treatment:	Secondary treatment with UV disinfection
Raw Sewage Discharged:	460 million litres
Receiving Water:	St. John River
Permits:	Fredericton holds New Brunswick Department of the Environment Certificates of Approval for all treatment facilities.
Combined Sewer %:	Less than 5%
Overflows Annually:	460 million litres of combined sewer overflows in 2003
Toxicity Testing:	Effluent is tested by the provincial Department of Environment once a year for conventional pollutants (suspended solids, biological oxygen demand). Plant tested for conventional pollutants daily. Lagoons tested for conventional pollutants monthly. Sludge testing done by an independent lab, quarterly for phosphorus and nitrogen, occasionally for phenols and metals. The Research and Productivity Council tests sludge monthly for metals and conventional pollutants.
Sludge Disposal:	Biosolids are used for mine reclamation and sod farming or mixed with wood chips or potting soil.
Sewage-related Pollution Charges:	None
Changes Since 1999:	Changes include more energy-efficient blowers for the aeration system and more efficient grinders for the pre-treatment system.

Additional Facts: The City continues to take steps to reduce the percentage of combined sewer/storm water infrastructures.

WHY THIS GRADE?

+ 100% secondary treatment

+ UV disinfection

+ In compliance with permits

+ Small overall percentage of combined sewers

- No discernible improvements since 1999

- Some agricultural applications for sewage sludges

- Significant amounts of raw sewage still being discharged

TO VOICE YOUR CONCERNS CONTACT

Mayor Brad Woodside
PO Box 130
Fredericton,
New Brunswick
E3B 4Y7
Tel: (506) 460-2020

Halifax

Regional Municipality

2004 GRADE:

D

1999: E/C

FOR MORE INFORMATION CONTACT

Ecology Action Centre
1568 Argyle Street
Suite 31
Halifax, Nova Scotia
B3J 2B3
Tel: (902) 429-2202
E-mail:
eac@ecologyaction.ca

Population:	354,000 (includes: the cities of Halifax (100,000) and Dartmouth (70,000), town of Bedford (12,000) and the county of Halifax (172,000).
% of population served by sewage treatment plants:	Halifax/Dartmouth, 0; remainder of HRM, 100% (43% central sewage plants, 57% on-site septic/field bed systems).
Volume generated:	68.2 billion litres annually (does not include rural on-site sewage).
Treatment:	No treatment in Halifax/Dartmouth. Primary treatment at Eastern Passage and Bedford/Sackville treatment plants. Secondary treatment at Aerotech Park, North Preston, Middle Musquodoboit, Springfield Lake, and Uplands Park plants and enhanced secondary at Lakeside-Timberlea plant. Tertiary treatment at Lively and Fall River plants.
Raw Sewage Discharged:	65.7 billion litres annually
Receiving Water:	Halifax Harbour (saltwater) and a number of inland fresh water bodies
Permits:	All HRM treatment facilities operate under Nova Scotia Department of the Environment approval permits. Federal EA approvals and provincial permits have been obtained for the Harbour Solutions Project, to provide treatment for Halifax-Dartmouth.
Combined Sewer %:	30%
Overflows Annually:	All Halifax/Dartmouth sewage is discharged raw and untreated through 40 outfall pipes. Bedford facility has a surge tank.
Toxicity Testing:	Treatment facilities regularly undergo discharge effluent testing for chemical/biological parameters, including faecal coliform and Microtox toxicity testing. Sludge to be composted is tested for heavy metals.

Sludge Disposal: Recovered sewage sludge from treatment plants is disposed of at Aerotech sludge lagoon. Every 2 years, the sludge is removed from the lagoon, de-watered and composted.

Sewage-related Pollution Charges: None

Changes Since 1999: The Halifax Harbour Solutions Project, a $330 million project to provide advanced-primary level treatment for all untreated outfalls in Halifax-Dartmouth, has begun planning the construction of three new treatment plants in late 2004. The treatment plant designs are expected to accommodate upgrade to secondary-level treatment if required.

WHY THIS GRADE?

+ Construction of advanced primary treatment plants for Halifax/Dartmouth expected in begin in late 2004

+ Most regional treatment plants provide secondary or tertiary treatment

- 65.7 billion litres of raw sewage still discharged each year

- Only considering advanced primary treatment for Halifax

- No sewer use bylaw

TO VOICE YOUR CONCERNS CONTACT

Mayor Peter Kelly
Halifax Regional Municipality
PO Box 1749
Halifax, Nova Scotia
B3J 3A5
Tel: (902) 490-4010

*

Maurice Lloyd
Halifax Harbour Solutions Project Chief Administrative Office
5251 Duke Street
4th Floor
PO Box 1749
Halifax, Nova Scotia
B3J 3A5
Tel: (902) 490-4549

Hamilton-Wentworth

Regional Municipality

2004 GRADE:

C+

1999: C-

FOR MORE INFORMATION CONTACT

Environment Hamilton
1130 Barton Street East
Suite 207
Hamilton, ON
L8H 7P9
Tel: (905) 549-0900
Email:
contactus@environmenthamilton.org

Population:	490,270 (2001 census)
% of population served by sewage treatment plants:	88%
Volume generated:	134 billion litres each year
Treatment:	Hamilton is served by three treatment plants. The Woodward Avenue treatment plant provides secondary treatment and the Main and King Street plants provide tertiary treatment. Seasonal chlorine disinfection is provided at the Woodward and King plants (May 15 to October 15). Year round chlorine disinfection is provided at the Main Street plant.
Raw Sewage Discharged:	Approximately 5.9 billion litres
Receiving Water:	Hamilton Harbour (Woodward); Cootes Paradise via Desjardins Canal (King Street); Grindstone Creek (Main Street)
Permits:	The three treatment plants hold Certificates of Approval outlining effluent quality from the Ontario Ministry of Environment.
Combined Sewer %:	Approximately 24%
Overflows Annually:	On average, there are 41 CSO events per year. The City's combined sewer overflow system is equipped with underground storage tanks that intercept overflows. The stored effluent is pumped to treatment plant and treated prior to discharge.
Toxicity Testing:	Microtox toxicity testing is performed on influent and effluent at least once per month at Woodward Avenue. Conventional testing is performed regularly on effluent at all three plants. No toxicity testing is performed on biosolids, although regularly monitoring is provided for heavy metals and nutrient levels.

Sludge Disposal: Sludge produced in the primary and secondary clarifiers at all plants undergo two-stage anaerobic digestion followed by dewatering. Treated biosolids are applied to approved agricultural lands or stored. Digester gas produced by the treatment process is stored used to fuel plant generators during peak periods.

Sewage-related Pollution Charges: None

Changes Since 1999: Extensive upgrades at all plants since 1999. Improvements to the City's combined sewer system have reduced the proportion of combined sewers from 35 to 24% of the total system. The City has developed a Master Plan to control the remaining combined sewer outfalls. Municipal Class Environmental Assessment (June 2000 edition). Feasibility studies have been completed regarding dechlorination at the three wastewater treatment plants. Either UV disinfection or chlorination/dechlorination will be implemented in the next year or two. Public education and awareness programs are ongoing through Public Information Centres, festivals, environment days and numerous pamphlets and brochures.

WHY THIS GRADE?

+ Extensive upgrades at all plants and implementation of tertiary treatment at two plants
+ Reduction in proportion of combined sewers
+ Introduction of toxicity testing on influents and effluents
+ Use of underground storage tanks to contain overflows
- Continues to discharge 5.9 billion litres of raw sewage each year
- Chlorine disinfection with no de-chlorination
- Sewage sludge applied to agricultural lands

TO VOICE YOUR CONCERNS CONTACT

City of Hamilton
Public Works Department
Water & Wastewater Division
Water & Wastewater Treatment Section
55 John Street North
6th Floor
Hamilton, Ontario
L8R 3M8
Tel: (905) 546-2140
Fax: (905) 546-4491

Montréal

Communauté métropolitaine de Montréal (CMM)

2004 GRADE:

F

1999: F+

FOR MORE INFORMATION CONTACT

Great Lakes United
4525 Rue DeRouen
Montréal, Québec
H1V 1H1
E-mail:
genevieve@glu.org

Population:	1.8 million
% of population served by sewage treatment plants:	100%
Volume generated:	900 billion litres
Treatment:	Chemically aided primary treatment, phosphate removal; no disinfection
Raw Sewage Discharged:	3.6 billion litres are discharged each year
Receiving Water:	St. Lawrence River
Permits:	No provincial permits required as the power to regulate water pollution is delegated to the CMM.
Combined Sewer %:	About 66%
Overflows Annually:	81 CSO events in 2002
Toxicity Testing:	Effluent is not routinely tested. The City began a study in 2003 to determine the effects of municipal sewage effluents on the immune and thyroid functions of rainbow trout.
Sludge Disposal:	De-watered, incinerated, ash taken to landfill
Sewage-related Pollution Charges:	None
Changes Since 1999:	No major changes. In 2002, a multi-stakeholder committee was created to address pollution concerns.
Additional Facts:	In the future, the multi-stakeholder committee will concentrate their efforts on reducing the number of combined sewer overflows to the surrounding rivers and on reducing the number of illegal or improper residential sanitary connections to storm sewers.

Why this Grade?

- 3.6 billion litres of raw sewage are still being discharged each year
- No discernable progress made on treatment in past five years
- Consistent failure to address systemic problems and decay of infrastructure
- High proportion of combined sewers
- No disinfection
- Sludge incinerated

TO VOICE YOUR CONCERNS CONTACT

Richard Fontaine
Assistant Director
Waste Water Treatment Plant
City of Montreal
12001, Maurice-Duplessis
Montreal, Quebec
H1C 1V3
Tel: (514) 280-3706

Ottawa

2004 GRADE:

B-

1999: C

FOR MORE INFORMATION CONTACT

Friends of the Earth Canada
206-260 St. Patrick Street,
Ottawa ON
K1N 5K5
Tel: (613) 241-0085
Email:
foe@foecanada.org

*

Sierra Club of Canada
#412 - 1 Nicholas Street
Ottawa, Ontario
K1N 7B7
Tel: (613) 241-4611
E-mail: sierra@web.net

Population:	775,000 (2001 census)
% of population served by sewage treatment plants:	90% (10 % on private septic systems, septage is processed at treatment plant)
Volume generated:	157 billion litres of sewage treated in 2002
Treatment:	Activated sludge secondary treatment with phosphorus removal and seasonal chlorine disinfection (May 16 - November 15).
Raw Sewage Discharged:	No raw sewage discharged in past 5 years
Receiving Water:	Treated effluent is discharged to the Ottawa River
Permits:	Discharge of treated wastewater to the natural environment requires a Certificate of Approval from the Ontario Ministry of Environment. Companies hauling wastewater or septage must have Certificates of Approval issued by the Ministry for disposal at Ottawa's treatment plant.
Combined Sewer %:	Approximately 8% of the total area is serviced by combined sewers
Overflows Annually:	There were no treatment plant bypasses or overflows from 1999 to mid-November 2003
Toxicity Testing:	The municipality regularly tests biosolids for organic compounds, metals, nitrogen and phosphorus, as well as for a variety of other parameters to ensure compliance with provincial guidelines.
Sludge Disposal:	Recovered sludge undergoes anaerobic digestion to convert volatile organic matter into methane and carbon dioxide. This gas is used on-site as fuel to generate electrical and thermal energy. The remaining stabilized biosolids are composted with other solid wastes, used as daily cover material in landfill operations, or used in quarry reclamation projects.

Sewage-related Pollution Charges: None since 1999

Changes Since 1999: Biosolids are no longer applied to agricultural land. A diversion pumping system was constructed to reduce flow in the combined sewer system during rain events in order to reduce the potential for overflows.

Additional Facts: The City is investigating methods for reducing mercury levels in sewage. An on-going Environmental Effects Monitoring program is planned for 2004. The design of a combined sewer overflow storage tunnel is underway that will ensure that the City complies with Ministry of Environment guideline.

WHY THIS GRADE?

+ 100% secondary treatment

+ Sewage sludge no longer spread on agricultural land

+ Diversion pumping system built to control system overflows

+ No treatment plant by-passes or overflows in 5 years

- Only seasonal chlorine disinfection

- Sewage effluents not tested for toxicity

TO VOICE YOUR CONCERNS CONTACT

City of Ottawa
110 Laurier Avenue
Ottawa, Ontario
K2P 2L7
Tel: (613) 580-2424

Quebec City

Quebec Urban Community (QUC)

2004 GRADE:

B

1999: C

FOR MORE INFORMATION CONTACT

Ami(e)s de la terre de Québec
1085, Av. De Salaberry
suite 212
Québec, QC
G1R 2V7
Tel: (418) 524-2744
E-mail:
atquebec@clic.net

Population:	515,000
% of population served by sewage treatment plants:	97%
Volume generated:	Approximately 130 billion litres per year
Treatment:	Secondary treatment with seasonal UV disinfection (Summer only)
Raw Sewage Discharged:	No data provided
Receiving Water:	St. Lawrence River
Permits:	No provincial permits required as the power to regulate water pollution is delegated to the QUC.
Combined Sewer %:	20%
Overflows Annually:	Approximately 50 combined sewer overflow events each year. Efforts underway to reduce overflows to less than 5 events per year by 2008
Toxicity Testing:	None done on a regular basis
Sludge Disposal:	Incineration
Sewage-related Pollution Charges:	None
Changes Since 1999:	Installation of real-time control and retention tanks for combined sewer system in select parts of City. Retained combined sewer overflows are now sent to the treatment plant and no longer discharged untreated.
Additional Facts:	The operation and maintenance staff in charge of the Quebec City wastewater treatment plant and sewer network operation obtained in 2001 the ISO 14001 certification.

All environmental impacts of the operations are considered and managed under a global environmental management system applicable to all aspects of wastewater operations.

Why this Grade?

+ Secondary treatment at all plants

+ Seasonal UV disinfection

+ Efforts to CSO discharges

- Combined sewer overflow events still occur regularly and volume not monitored

- Incineration of sludge

- No toxicity testing

- Raw sewage discharges not being monitored or quantified

TO VOICE YOUR CONCERNS CONTACT

M. Normand Chatigny
Conseiller municipal in charge of infrastructures
P.O. Box 700 Haute Ville
Québec, Québec
G1R 4S9
Tel: (418) 641-6411
Email:
normand.chatigny@ville.quebec.qc.ca

*

M. Daniel Lessard
Director, Water and wastewater treatment
P.O.Box 700, Haute Ville
Québec, Québec
G1R 4S9
Tel: (418) 641-6411 ext, 8560
Email:
daniel.lessard@ville.quebec.qc.ca

Regina

2004 GRADE:

B+

1999: B

FOR MORE INFORMATION CONTACT

Saskatchewan Environmental Society
P.O. Box 1372
Saskatoon, Saskatchewan
S7K 3N9
Tel: (306) 665-1915
E-mail: info@environmentalsociety.ca

Population:	187,429
% of population served by sewage treatment plants:	100%
Volume generated:	26.4 billion litres per year
Treatment:	Enhanced secondary treatment with phosphorus removal and seasonal UV disinfection (April to - November). As of winter 2002, the UV plant has been running year round on a trial basis.
Raw Sewage Discharged:	No data provided since 1998.
Receiving Water:	Wascana Creek, a tributary of the Qu'Appelle River
Permits:	Regina holds a Permit to Operate issued by Saskatchewan Environment and Resource Management
Combined Sewer %:	Less than 1%
Overflows Annually:	During storm situations, sewage treatment plants process storm water overflow
Toxicity Testing:	Effluent tested twice a year for heavy metals and other toxics. Biosolids are tested annually by Saskatchewan Research Council Laboratories for herbicides, insecticides and other toxic substances.
Sludge Disposal:	Anaerobic digestion followed by de-watering. Sludge from secondary system, along with alum sludge from phosphorous removal stage, stockpiled on site. Biosolids applied to agricultural land in 2000, 2001 and 2002 as trial project.
Sewage-related Pollution Charges:	None
Changes Since 1999:	Trial expansion of UV treatment. A comprehensive STP planning study was initiated in 2002 to identify both long and short- term sewage treatment upgrades.

Additional Facts:

Methane gas produced by bacteria in digesters used to mix digester contents and to fire boiler in primary treatment plant. Excess gas flared off in summer.

Why this Grade?

+ Seasonal UV disinfection program expanded

+ Advanced planning for sewage upgrades

+ Biogas cogeneration project in place

+ Low percentage of CSOs

- Combined system overflows allowing raw sewage to enter environment

- No new infrastructure works built since 1999

- Move towards disposal of sewage sludge on agricultural lands

TO VOICE YOUR CONCERNS CONTACT

Mayor Pat Fiacco
PO Box 1790
Regina, Saskatchewan
S4P 3C8
Tel: (306)-777-7340

Saskatoon

2004 GRADE:

C+

1999: C+

FOR MORE INFORMATION CONTACT

Saskatchewan Environmental Society
P.O. Box 1372
Saskatoon, Saskatchewan
S7K 3N9
Tel: (306) 665-1915
E-mail: info@environmentalsociety.ca

Population:	Approximately 220,000
% of population served by sewage treatment plants:	100%
Volume generated:	30 billion litres per year
Treatment:	Secondary treatment with bio-nutrients removal and chlorine disinfection. Anaerobic digestion of solids.
Raw Sewage Discharged:	Sewage spills result in approximately 40,000 litres of raw sewage being discharged each year.
Receiving Water:	South Saskatchewan River
Permits:	Permits to Operate issued by Saskatchewan Environment & Public Safety for all facilities.
Combined Sewer %:	None. During storm situations, sewage treatment plants process storm water overflows
Overflows Annually:	None
Toxicity Testing:	Sludge is routinely tested onsite for heavy metal contamination, viruses and microorganisms.
Sludge Disposal:	Most of the recovered sludge disposed on agricultural fields through liquid injection.
Sewage-related Pollution Charges:	None
Changes Since 1999:	None
Additional Facts:	While the population of Saskatoon increased by 20,000 since 1999, the total volume of sewage generated increased from 18 to 30 billion litres per year.

Why this Grade?

+ No raw sewage discharged

+ 100% secondary sewage treatment

+ No combined sewers

- No discernible changes since 1999

- Continued use of chlorine disinfection with no de-chlorination

- Dramatic increase in per capita volume of sewage discharged since 1999

- Sewage sludge disposed of on agricultural lands

TO VOICE YOUR CONCERNS CONTACT

Mayor Don Atchison
222 Third Avenue North
Saskatoon,
Saskatchewan
S7K 0J5
Tel: (306) 975-3240

Saint John

2004 GRADE:

D

1999: E

FOR MORE INFORMATION CONTACT

ACAP Saint John
P.O. Box 6878 Stn A
Saint John, NB
E2L 4S3
Tel: (506) 652-2227
Email:
acapsj@fundy.net

*

Conservation Council of New Brunswick
180 St. John St.
Fredericton, NB
E3B 4A9
Tel: (506) 458-8747
E-mail:
ccnb@nb.aibn.com

Population:	69,000
% of population served by sewage treatment plants:	62%
Volume generated:	16.6 billion litres per year
Treatment:	One facility provides primary treatment with aerated lagoons and polishing ponds, and three facilities provide secondary treatment. One plant uses chlorine disinfection and another uses UV disinfection.
Raw Sewage Discharged:	Approximately 6.6 billion litres of untreated effluent discharged each year
Receiving Water:	St. John River and Bay of Fundy
Permits:	Certificates of Approval of Operation issued by provincial Department of the Environment.
Combined Sewer %:	46%
Overflows Annually:	Combined sewer overflows occur during peak precipitation events.
Toxicity Testing:	The City conducts regular testing for pH, temperature, suspended solids, BOD, chlorine, dissolved oxygen, and priority heavy metals. Regular testing of sludge for heavy metals, pH, phosphorus and nitrogen.
Sludge Disposal:	Thickened sludge generated at two plants is taken to the Lancaster treatment facility for further digestion. At the Millidgeville facility, primary and secondary sludge is de-watered and used as a component in topsoil mixtures. Legally, these products must be labelled as containing municipal sludge.
Sewage-related Pollution Charges:	None
Changes Since 1999:	Greater capacity at the Millidgeville plant has increased the percentage of population served by treatment plants from 47% to 62%. The proportion of combined sewers has decreased from 75% to

46% of the total system. Preliminary designs have been completed for a new secondary treatment facility with a deep water outfall.

Additional Facts:

The City plans to increase the percentage of population served by treatment plants to 79% in 2005-2006 and 100% by the year 2010.

Why this Grade?

+ Increased proportion of population being serviced by treatment plants since 1999 (47 to 62%)

+ Reduced percentage of combined sewers since 1999 (from 75% to 46%)

+ UV disinfection at largest treatment plant

- Significant percentage of population still not served by treatment plants

- 6.6 billion litres of untreated effluent discharged each year

- Chlorine disinfection at one plant; no disinfection at two others.

- Sewage sludge used as mix for topsoil

TO VOICE YOUR CONCERNS CONTACT

Common Clerk
PO Box 1971, City Hall
Saint John,
New Brunswick
E2L 4L1
Tel: (506) 658-2912

St. John's

2004 GRADE:

E

1999: F-

FOR MORE INFORMATION CONTACT

St. John's Harbour
ACAP
6 Bruce Street
Mount Pearl, NL
A1N 4T3
Tel: (709) 747-4973
Email:
stjacap@nf.aibn.com

Population:	Approximately 100,000
% of population served by sewage treatment plants:	0
Volume generated:	Approximately 33.2 billion litres each year
Treatment:	None
Raw Sewage Discharged:	Approximately 33.2 billion litres each year
Receiving Water:	St. John's Harbour
Permits:	Present Provincial Regulations do not require St. John's to obtain a permit for its sewerage system. It does not meet provincial Water and Sewer Regulations for biological oxygen demand and suspended solids.
Combined Sewer %:	Approximately 20%
Overflows Annually:	Yes. No data available.
Toxicity Testing:	Periodic testing is done for faecal coliform of receiving water as well as toxicity testing of effluent.
Sludge Disposal:	Not applicable.
Sewage-related Pollution Charges:	None
Changes Since 1999:	Primary treatment plant being constructed with anticipated completion in 2007.
Additional Facts:	St. John's has secured funding for Phase 2 of the multi- phase St. John's Clean-Up Project, which ultimately strives to provide secondary treatment.

Why this Grade?

+ Primary sewage treatment plant under construction. Anticipated completion 2007

- Sewage still being discharged raw

- No Sewer Use Bylaws

- Saint John's harbour remains degraded by sewage effluents. Major health concerns

TO VOICE YOUR CONCERNS CONTACT

City of St. John's
Department of
Engineering
PO Box 908
St John's, Newfoundland
A1C 5M2
Tel: (709) 576-8258 or
(709) 576-8613

Toronto

2004 GRADE:

B-

1999: C/B

WHY THIS GRADE?

+ Significant reduction in proportion of combined sewers since 1999

+ Updated, comprehensive sewer use bylaw is currently one of the strongest in Canada

+ Incineration of sewage sludge was abolished in 2002

+ Water use reduction plan in effect

- Continued release of 9.9 billion litres of raw sewage and run-off each year

- Chlorine disinfection, no de-chlorination

- City fined for lack of timely response to spill

Population:	Approximately 2,500,000
% of population served by sewage treatment plants:	100%
Volume generated:	Approximately 455 billion litres per year.
Treatment:	100% secondary treatment with phosphorous removal, chlorine disinfection and biosolids stabilization.
Raw Sewage Discharged:	Approximately 9.9 billion litres of untreated sewage and runoff is discharged into receiving waters each year.
Receiving Water:	Three plants discharge 443 billion litres per year into Lake Ontario, one plant discharges 12 billion litres per year into the Don River.
Permits:	Provincial Certificates of Approval outlining operating conditions and effluent quality have been issued for the Ashbridges Bay, Humber and Highland Creek plants; North Toronto plant operates on Ministry of Environment guidelines.
Combined Sewer %:	Approximately 16%
Overflows Annually:	In 2002, there were 13 by-pass events at the Ashbridges Bay plant in which 1.25 billion litres of sewage were discharged with only primary treatment and chlorine disinfection. The Humber plant had 4 by-pass events totalling 134 million litres. Combined sewer overflow events occur 30-50 times per year.
Toxicity Testing:	Under the City's Sewer Use By-Law, toxicity testing is regularly done on raw sewage discharge samples for toxic organics and heavy metals, as well as on stabilised sewage sludge as quality control measures prior to its land application (heavy metals, E Coli counts, etc.) The Ministry of Environment performs periodic acute toxicity testing on effluent.

Sludge Disposal:

In 2002, a total of 61,813 dry tonnes of biosolid material was separated from the sewage treatment process at the City's four plants. These residuals were disposed of through incineration (55%), land filling (30%), agricultural land application (8%), and production of fertilizer pellets (7%). Incinerators at the Ashbridges Bay plant were shut down in December 2002.

Sewage-related Pollution Charges:

Yes. The City was fined $40,000 by the Ministry of the Environment for discharging sewage into Lake Ontario in July 1999.

Changes Since 1999:

The City updated its Sewer Use Bylaw to include mandatory requirements for pollution prevention plans and organics assessment for industrial users. Stricter discharge limits have resulted in mercury reductions of 41%, due largely to the introduction of amalgam separators by the dental industry. A Biosolids and Residuals Master Planning process was launched to prepare a new long-term plan for managing treatment process residuals generated at both wastewater and water plants. In addition, the incinerators at the Ashbridges Bay plant were shut down in December 2002. The City's Wet Weather Flow Management Master Plan was approved to reduce and ultimately eliminate the adverse effects of combined sewer overflows. The City also reduced the proportion of combined sewers from 27% to 16% since 1999. A Water Efficiency Master Plan was approved with the aim to achieve a 15% reduction in the City's average day water demand by the year 2013.

FOR MORE INFORMATION CONTACT

Toronto Environmental Alliance
201 - 30 Duncan Street
Toronto, ON
M5V 2C3
Tel: (416) 596.0345
Email: shelley@torontoenvironment.org

TO VOICE YOUR CONCERN

Water & Wastewater Services Division
Metro Hall, Station 1180, 18th Floor
55 John Street
Toronto, Ontario
M5V 3C6
Tel: (416) 392-8230

*

Mayor David Miller
Toronto City Hall
2nd Floor
100 Queen Street West
Toronto, Ontario
M5H 2N2

Vancouver

(Greater Vancouver Regional District - GVRD)

2004 GRADE:

D

1999: C

FOR MORE INFORMATION CONTACT

T Buck Suzuki Environmental Foundation
First floor - 326 12th Street
New Westminster, BC
V3M 4H6
Tel: (604) 519-3635
Email:
info@bucksuzuki.org

*

Georgia Strait Alliance
607-207 West Hastings Street
Vancouver, BC
V6B 1H7
Tel: (604) 633-0530
Email:
gsa@georgiastrait.org

Population:	More than 2 million
% of population served by sewage treatment plants:	Approximately 96%
Volume generated:	Approximately 444 billion litres in 2002
Treatment:	The GVRD operates five treatment plants in the region. Three of the plants, Annacis Island, Lulu Island, and North-west Langley, provide secondary treatment for effluent discharged to the Fraser River. Two plants, Iona Island and Lions Gate, provide primary treatment for effluent discharged to the marine environment.
Raw Sewage Discharged:	See annual overflows
Receiving Water:	Fraser River, Georgia Strait and Burrard Inlet
Permits:	Sewage throughout the GVRD is regulated under a 25 year Liquid Waste Management Plan issued by the provincial Ministry of Water Land and Air Protection in 2002 pursuant to the British Columbia Waste Management Act. Each treatment plant also has an Operating Certificate issued by the Ministry.
Combined Sewer %:	Approximately 13%
Overflows Annually:	For the outfalls monitored by the GVRD in 2001 there were 173 days with rainfall which resulted in up to 125 combined sewer overflow events. These overflows totalled more than 22 billion litres in 2001 and more than 15 billion litres in 2002. The volume represents a mixture of 80 to 90 percent storm water and 10 to 20 percent wastewater.
Toxicity Testing:	Toxicity testing is undertaken on effluent on a monthly basis at all plants. The results are reported to the provincial and federal regulatory agencies. Toxicity Identification Evaluations (TIE studies) have been undertaken to determine the cause of failed toxicity tests.

Sludge Disposal: Biosolids are recycled for use in mine and gravel pit reclamation, landfill covers, silviculture, and range land in accordance with provincial legislation. This program has been in place for more than 10 years.

Changes Since 1999: The 2002 LWMP is the most significant change and contains a number of conditions imposed by the Province to upgrade sewage treatment plants. Such conditions include a requirement that full secondary treatment must be in place at the Iona Island STP by 2020 and by 2030 at the Lions Gate STP. Engineering work is currently underway on a facility plan to identify needed upgrades. The facility plan work will be completed in 2004. LWMP commitments also include the elimination of CSOs in the region through sewer separation and storage projects. This is supposed to be completed by 2012.

WHY THIS GRADE?

+ Secondary treatment at all plants discharging to the Fraser River

+ LWMP imposes conditions on the GVRD to upgrade facilities

- 146 billion litres of sewage is discharged to the Fraser River and Georgia Strait with only primary treatment

- Up to 22 billion litres of Combined Sewer Overflow is discharged into Georgia Strait each year

- Planned upgrades will not be completed for at least the next 25 years under the current LWMP

- No discernible process changes since 1999

- Sewage sludge used for agricultural purposes

TO VOICE YOUR CONCERNS CONTACT

Manager,
Policy and Planning
Greater Vancouver
Regional District
Tel: (604) 432-6379
Fax: (604) 436-6811
Email:
Ken.Cameron@gvrd.bc.ca

Victoria

(Capital Regional District - CRD)

2004 GRADE:

Suspended

1999: F-

FOR MORE INFORMATION CONTACT

Georgia Strait Alliance
12 Centennial Square
Victoria, BC
V8W 1P7
Tel: (250) 381-8321
Email:
gsa@georgiastrait.org

*

T Buck Suzuki
Environmental
Foundation
200-661
East Burnside Road,
Victoria, BC V8T 2X9
Tel: (250) 360-1398
Email:
info@bucksuzuki.org

Population:	Approximately 326,000 (2001 Census data)
% of population served by sewage treatment plants:	Approximately 80%
Volume generated:	Approximately 37.8 billion litres per year
Treatment:	The CRD operates 2 large sewage handling facilities that service the Core Area and 6 smaller sewage treatement plants in outlying areas. The two largest plants (Macaulay and Clover Point) provide only screening of solids larger than 6 millimetres and discharge more than 90% of total flow. The remaining flow receives primary treatment at one facility and secondary treatment at 5 plants. Seasonal disinfection is provided using chlorine.
Raw Sewage Discharged:	34.2 billion litres each year
Receiving Water:	Strait of Juan de Fuca primarily, and the Strait of Georgia
Permits:	The City of Victoria is regulated as part of the CRD under a 25 year Liquid Waste Management Plan issued for the CRD's Core Area in 2003. The Core Area LWMP was issued by the provincial Ministry of Water, Land and Air Protection persuant to provisions in the *Waste Management Act*. The Core Area LWMP complements the CRD's Saanich Peninsula LWMP approved in 1996.
Combined Sewer %:	No trunk sewers are combined. 2 small systems in Oak Bay are combined.
Overflows Annually:	Presently approximately 200-300 million litres per year of overflows and by-passes occur during moderate to heavy rainfall events.
Toxicity Testing:	Effluent toxicity testing is conducted for two of the secondary treatment facilities in the Gulf islands by the CRD as part of requirements under the BC *Waste*

Management Act. No toxicity testing is required for the effluents from Clover or Macaulay.

Sludge Disposal: Some recovered sludge is converted into class A biosolids and is used in mine reclamation and for compost.

Sewage-related Pollution Charges: In February 1999, a private prosecution was laid by Sierra Legal Defence Fund against the CRD for violation of the Federal Fisheries Act. The charge was taken over by the BC Attorney General's office and was stayed.

Changes Since 1999: The 25 year Core Area LWMP was issued in 2003. The plan does not include schedules for upgrading treatment levels at the CRD's 2 largest sewage outfalls, at Clover Point and Macaulay Point, despite requests from successive provincial and federal governments to upgrade these facilities to at least primary treatment within a reasonable timeframe. In 2003, the CRD expanded its regionally source control program.

WHY THIS GRADE?

+ Expanded Regional Source Control Program

- More than 34 billion litres of raw sewage is discharged each year

- The city's 25 year LWMP does not include a commitment to upgrade treatment levels at the two main plants

- No discernible infrastructure changes since 1999

TO VOICE YOUR CONCERNS CONTACT

David Cubberly, Chair,
CRD Environment Committee
PO Box 1000
524 Yates Street
Victoria, BC
V8W 2S6
Tel: (250) 360-3229
Email:
chair@crd.bc.ca

Whistler

2004 GRADE:

A

1999: N/A

FOR MORE INFORMATION CONTACT

Association of Whistler Area Residents for the Environment (AWARE)
PO Box 1370
Whistler, BC
V0N 1B0
Tel: (604) 932-4457
Email: aware@direct.ca

Population:	Variable, depending on number of visitors and season, Approximately 9,900 permanent residents, 10,500 resident employees, 3,300 commuting employees. Average winter season overnight population: 31,700
% of population served by sewage treatment plants:	Approximately 100%.
Volume generated:	Approximately 4 billion litres per year
Treatment:	100% tertiary treatment using ferrous chloride for phosphorus removal and autothermal aerobic digestion process (ATAD) for solids stabilization.
Raw Sewage Discharged:	None
Receiving Water:	Cheakamus River
Permits:	Operational Certificate issued under the provisions of the Waste Management Act The Ministry of Water, Land and Air Protection are responsible for authorizing the discharge.
Combined Sewer %:	None
Overflows Annually:	None
Toxicity Testing:	96hrLC50 bioassay testing is carried out twice per year on the treated effluent, as required by Operational Certificate Toxicity testing to increase to monthly for a consecutive 12-month period if one toxicity result fails.
Sludge Disposal:	The wastewater plant is designed to produce a pasteurised (Class A) product. The estimated quantity of treated biosolids produced at the Whistler wastewater treatment plant during 1999 was approximately 800 to 850 dry tonnes. The Whistler WWTP employs a batch-feed autothermal themophilic aerobic digester (ATAD) for treatment of waste solids. This high temperature treatment process is designed to pasteurise as well as stabilize the waste solids. Pasteurisation of biosolids destroys disease-causing organisms. The plan is to use dewatered biosolids

from the Whistler WWTP for cover at the municipal landfill. Dewatered biosolids are currently being stockpiled at the landfill for this purpose.

Sewage-related Pollution Charges: None

Additional Facts: The municipality is engaged in a number of initiatives that include watershed management, water conservation, sewage collection, treatment and environmental monitoring and planning.

Why this Grade?

+ 100% tertiary treatment

+ Sewage sludge not disposed of on agricultural land

+ No overflows to system

+ No raw sewage discharges

+ Rigid effluent toxicity testing required

- Question as to whether the system will handle influx of people for 2010 Winter olympics

TO VOICE YOUR CONCERNS CONTACT

Resort Municipality of Whistler Engineering Department
Resort Municipality of Whistler
4325 Blackcomb Way
Whistler, BC
V0N 1B4
Tel: (604)935-8190
Email:
engineers@whistler.ca

Whitehorse

2004 GRADE:

B-

1999: B-

FOR MORE INFORMATION CONTACT

Yukon Conservation Society
P.O. Box 4163
302 Hawkins Street
Whitehorse, Yukon
Y1A 3T3
Tel: (867) 668-5678
E-mail: ycs@ycs.yk.ca

Population:	19,058
% of population served by sewage treatment plants:	85%
Volume generated:	5.8 billion litres per year (4.68 billion litres in 2002).
Treatment:	Primary lagoons, followed by secondary treatment in constructed, non-aerated lagoons and natural long-term storage where natural UV disinfection should occur. Small lagoon system servicing 800-person subdivision uses wetland type treatment with no discharge.
Raw Sewage Discharged:	None
Receiving Water:	Yukon River
Permits:	Yukon Territory Water Licence. In 2003 the City was granted a 15 year water licence permitting the long-term discharge of treated effluents to Pot Hole Lake. Additional treatment is carried out as the treated effluent migrates approximately 1 kilometre through sands and gravel to Yukon River.
Combined Sewer %:	No data from 2003
Overflows Annually:	No data from 1999. System has not overflowed since 1996. However, in Fall 2003 the City discharged 3.24 million cubic metres of treated effluent over a three-month period to the ground water via Pot Hole Lake. This volume is similar to the volume discharged in 2002
Toxicity Testing:	Testing for conventional pollutants conducted on treated effluent prior to 2003 discharge and is conducted on a regular basis during treatment process ad during the discharge period.
Sludge Disposal:	No sludge recovered

Sewage-related Pollution Charges: None

Changes Since 1999: Bleeder reduction programs, to help reduce the volume of water to the system, are ongoing.

Additional Facts: Whitehorse has taken steps to minimize the input of effluent into the Yukon River system, but needs to evaluate the longevity of its current system. Specifically, the use Pot Hole Lake requires continual soil percolation testing and, eventually, it will become saturated. A long-term solution to the dependency on Pot Hole Lake will be required.

WHY THIS GRADE?

+ Secondary treatment at all plants

+ Natural UV disinfection

+ No raw sewage discharges

+ Progress being taken to reduce volume of water to the system

- Minimal progress since 1999

TO VOICE YOUR CONCERNS CONTACT

Mayor Katherine Watson
2121 Second Avenue
Whitehorse, Yukon
Y1A 1C2
Tel: (867) 668-8626

Winnipeg

2004 GRADE:

B-

1999: C

FOR MORE INFORMATION CONTACT

Manitoba Eco-Network
2-70 Albert Street,
Winnipeg, Manitoba
R3B 1E7
Tel: (204) 947-6511
E-mail:
men@web.net

Population:	631,200
% of population served by sewage treatment plants:	98.5% (1.5% private waste disposal)
Volume generated:	133 billion litres
Treatment:	100% Secondary treatment and seasonal UV disinfection at one plant.
Raw Sewage Discharged:	The City discharges an estimated 1 billion litres of raw sewage each year through combined overflows
Receiving Water:	Red River (two plants), Assiniboine River (one plant)
Permits:	Manitoba's *Environment Act* requires each treatment plant be licensed in accordance with provincial Water Quality Standards, Objectives, and Guidelines. Licensing review of all three wastewater treatment plants is in progress, with staged or partial licenses currently in place. New licenses will establish performance requirements and provide for implementation of 2003 Clean Environment Commission recommendations are expected to be finalized in 2004.
Combined Sewer %:	Approximately 27%
Overflows Annually:	Typically there are 18 combined sewer overflow events each year that discharge an estimated 4.8 billion litres of overflow, including 1.0 billion litres of raw sewage and 3.76 billion litres of land drainage runoff.
Toxicity Testing:	The City routinely tests effluent for conventional pollutants as set out in provincial licence requirements and occasionally performs priority pollutant scans. Weekly composite sludge sampling results are submitted each year to the Province.
Sludge Disposal:	Sludge from Winnipeg's three wastewater treatment plants and septage from neighbouring municipalities are treated by anaerobic digestion, followed by de-watering. The resulting biosolids are applied to

agricultural fields consistent with terms and conditions of a provincial Environmental License. The University of Manitoba Agriculture Department has also conducted tests for parameters such as heavy metals, PCBs, pH in agricultural plots where biosolids have been applied for the last 15 years.

Sewage-related Pollution Charges: Yes. On September 16, 2002 a mechanical failure caused a spill of approximately 427 million litres of untreated wastewater to be spilled into the Red Rived. As a result of the spill, charges were laid against the city under the federal Fisheries Act on May 26, 2003.

Changes Since 1999: The City implemented UV disinfection at one plant during summer months and has significantly reduced combined sewer overflows since 1999 (from 40 to 27% of total system). It has also undertaken comprehensive long and short-term planning exercises to improve overall collection and treatment.

Additional Facts: The City plans to provide UV disinfection during the summer months at all treatment plants by summer 2006. It is currently working towards meeting recommendations brought forward at public hearings held in 2003 to review the City's sewage treatment system. The City is also engaged in long-term planning regarding treatment plant upgrades, including plans to implement tertiary treatment and disinfection, and mitigation of combined sewer overflows.

WHY THIS GRADE?

+ Implementation of CSO strategies has resulted in significant reduction in percentage of CSOs
+ 100% secondary treatment
+ Planned long-term upgrades including move towards tertiary treatment
+ Bi-weekly monitoring of the receiving environment
+ Seasonal UV disinfection and plans to expand to all plants
- Combined sewer overflows discharge 4.8 billion litres each year, including 1.0 billion litres of raw sewage
- Charged for sewage-related spill
- Sewage sludge applied to agricultural lands

TO VOICE YOUR CONCERNS CONTACT

Mayor Sam Katz
2nd Floor, Council Building
510 Main Street
Winnipeg, Manitoba
R3B 1B9
Tel: (204) 986-2171

Yellowknife

2004 GRADE:

B+

1999: B+

FOR MORE INFORMATION CONTACT

Ecology North
5013- 51th Street
Yellowknife, NT
X1A 1S5
Tel: (867) 873-6019
E-mail:
econorth@ssimicro.com

Population:	Approximately 19,000
% of population served by sewage treatment plants:	100%
Volume generated:	3 billion litres per year
Treatment:	Secondary treatment involving lagoons and wetlands, UV disinfection occurs naturally in non-winter months; discharged once a year, usually late summer or autumn.
Raw Sewage Discharged:	0
Receiving Water:	Great Slave Lake
Permits:	Yellowknife holds a North West Territories Water Board licence, which sets parameters for testing for faecal coliform, biological oxygen demand, suspended solids, oil and grease, and pH.
Combined Sewer %:	None
Overflows Annually:	Since 2001, overflow of the lagoon has occurred during the spring (May-June).
Toxicity Testing:	Testing done for substances listed under Permits once a month by Taiga Environmental Laboratory, Department of Indian Affairs and Northern Development (DIAND). During annual discharge, which takes 3-4 weeks, testing done every two weeks, beginning two weeks prior to discharge and continuing for a month afterwards.
Sludge Disposal:	Taken to sewage lagoon
Sewage-related Pollution Charges:	None
Changes Since 1999:	Have started using bio-bricks in the City's lift stations to reduce organic build-up and odour at both the lagoons and the lift stations.

Additional Facts:

The current sewage lagoon has been used since 1980 and, with reduced volumes (see below), could last another 20 years. The city carries out regular leak detection on its force mains.

Why this Grade?

+ 100% secondary treatment, plus holding lagoons and wetlands

+ Natural UV disinfection

+ Sludge not spread on agricultural lands

+ No raw sewage discharges

- No Sewer Use Bylaw

- Only minor changes since 1999

TO VOICE YOUR CONCERNS CONTACT

Mayor Gord Van Tighem

Or

Greg Kehoe, Director of Public Works
City of Yellowknife
P.O. Box 580
Yellowknife, NWT
X1A 2N4
Tel: (867) 920-5693

Conclusion

The average Canadian generates approximately 63,000 litres of sewage each year. This report shows just how much of that waste is poorly treated or completely untreated. The casual assumption that whatever we pour down the drain and flush down the toilet is suitably treated before being released into the environment is false. Sewage treatment is a collective responsibility, since the problem originates with every one of us. A society as wealthy as Canada can surely afford to adequately treat its own waste.

Public demands play an important role in ensuring that money is spent where it is urgently needed and that our laws are strictly enforced. Concerned citizens, once aware of the appalling lack of adequate sewage treatment, may be motivated to create the public pressure necessary to make this issue a top priority. We feel that the following recommendations, if taken together, could collectively address many of the problems posed by sewage in Canada today:

- We must ensure that all communities in Canada have access to effective sewage treatment that ensures that the environment and human health are protected from contamination from sewage effluent and sludge.

- We must take a holistic approach to sewage treatment and address the problem of harmful contaminants before they get in the sewer system. We must do this by eliminating or restricting the use of toxic pollutants generally in Canada, and also specifically prohibiting their disposal in the sewage system. These limits should be updated as scientific testing and monitoring methods improve and new studies reveal the effects of various chemicals.

- We must have legally enforceable national standards for sewage treatment in Canada. Standards should be enforced consistently and equitably throughout the country.

- Federal and Provincial governments must make available appropriate funds to ensure proper treatment facilities are built in all communities in Canada. We cannot place the entire burden of sewage treatment facility construction on municipal governments — many of which are not permitted to incur debt. Federal infrastructure funding should be contingent on municipalities meeting specified sustainability criteria.

■ We must ensure that resources are made available for research and development of safer sewage treatments including effective methods for safe biosolids disposal. We must ensure safe disposal of sewage sludge, and prohibit the use or sale of sludge contaminated with persistent organic pollutants and other chemicals hazardous to the environment or human health.

■ We must ensure that our method of sewage treatment does not itself create an environmental hazard — chlorinated disinfection of effluent must be phased out and replaced with safer alternatives.

■ We must ensure that raw sewage no longer flows into receiving waters due to combined sewer overflows, or untreated storm waters.

■ We must lower the legal and institutional barriers to the development and the implementation of alternative technologies for sewage treatment that may prove to be more cost effective or efficient than conventional physical-chemical treatment plants.

■ We must each take responsibility for what goes down our respective drains and demand that the governments of all municipalities do the same.

References
Supporting Materials

Boyd David R, Unnatural Law, Vancouver 2003 UBC Press, pp. 243-245

Canadian Water and Wastewater Association (CWWA). 2001. National Survey of Wastewater Treatment Plants. www.cwwa.ca/pdf_files/freepub_wastewaterreport.PDF

Capital Regional District , 1992 "Capital Regional District Source Sampling Project", Consultants report prepared for the CRD by Thurber Environmental Consultants Ltd., dated June 10, 1992.

City of Toronto, 2003. City of Toronto *WWTPs annual 24hrs performance evaluation study*. Received via e-mail on May 31, 2004 from Tibor Haasz, Manager, WWQ, City of Toronto

Environment Canada. April 1976. Guidelines for Effluent Quality and Wastewater Treatment at Federal Establishments EPS-1-EC-76-1.

Environment Canada. 2001.The State of Municipal Wastewater Effluents in Canada. www.ec.gc.ca/soer-ree

Environment Canada. 2002. National Pollutant Release Inventory Guidance Manual for the Wastewater Sector
www.ec.gc.ca/pdb/npri/2002guidance/WW2002/WW_2002_e.cfm

Environmental Defence Canada, the Canadian Environmental Law Association and the Canadian Institute for Environmental Law and Policy.Pollutionwatch at www.pollutionwatch.org

Sierra Legal Defence Fund. 1994. The National Sewage Report Card: Rating the Treatment Methods and Discharges of 20 Canadian Cities. ISBN 0-9698351-0-8

Sierra Legal Defence Fund. 1999. The National Sewage Report Card (Number two): Rating the Treatment Methods and Discharges of 21 Canadian Cities. ISBN 0-9698351-2-4

BRANDON

Dykman, Liz. Coordinator, Manitoba Eco Network. Written communications
Paton, Bill. Dr., Brandon University. Written communications.
Pulak, Patrick. EIT, Chief Operator, City of Brandon. Written communications

CALGARY

Do, Paul, Senior Process Engineer, Bonnybrook Wastewater Treatment Plant, Calgary. Written and personal communications.
Kitagawa, Myles. Toxics Watch Society of Alberta. Written communications
Odd, Natalie, Clean Calgary Association. Written communications

CHARLOTTETOWN

Hawkins, Susan. Coordinator. Prince Edward Island Eco-Net de l'lis-du-Prince Edouard. Written and personal communications.
Van Omme, Herman, Public Services, City of Charlottetown. Written communications.

DAWSON CITY

Carlson, Norm. City of Dawson. Written and personal communications.
Yukon Conservation Society. Written and personal communications.

EDMONTON

Gyarek, Lyndon, Ph.D. P.Eng. Senior Environmental Planner, Strategic Planning, Drainage Division, Asset Management and Public Works. Written communications.
Malesavic, Liliana, P.Eng, Environmental Engineer, Strategic Planning. Written communications.
Miyagawa, Russ. Toxics Watch Society of Alberta, Edmonton. Written communications.

FREDERICTON

Coon, David. Conservation Council of New Brunswick. Written communications
Grant, Robert. Fredericton Area Pollution Control Commission. Written communications.

HALIFAX REGIONAL MUNICIPALITY

Tony Blouin, PhD, Manager of Environmental Performance, Environmental Management Services, Halifax Regional Municipality. Written communications
Ecology Action Centre. Written and personal communications.

HAMILTON-WENTWORTH REGIONAL MUNICIPALITY

Karen Lanto, Data and Communications Clerk, Water and Wastewater Treatment, Public Works Department. Written communications.

MONTREAL URBAN COMMUNITY

Langevin, Patrice. Ing. Superintendent, Wastewater Treatment Plant, Montreal. Written communications.

OTTAWA-CARLETON REGIONAL MUNICIPALITY

McCartney, David.W. P.Eng.. Manager, Wastewaterand Drainage Services, City of Ottawa. Written communications.
Von Mirbach, Martin. Sierra Club of Canada. Written and personal communications.

QUEBEC CITY

Brosseau, Hervé Directeur général adjoint, Infrastructures et équipements, ville de Quebec. Written and personal communications.
Duchesneau, Sylvie, ville de Quebec. Written communications.

REGINA

Miller, Brian E. P.Eng,. Manager, Wastewater Treatment Plant. Written communications.
Saskatchewan Environmental Society. Written and personal communications.

SASKATOON

Jones, Louise. Board Member, Saskatchewan Environmental Society. Written communications.
Sedgewick, Tim. Operations Manager, Wastewater Treatment, Water and Wastewater Treatment Branch, Utility Services Department, City of Saskatoon. Written communications.

SAINT JOHN

Harvey, Dan. C.E.E., Operations Manager, Environmental Protection, City of St. John. Written communications.

ST. JOHN'S

Baird, Diana. Co-executive Director, St. John's Harbour ACAP. Written communications.
Barry, John P. P.Eng. Dept. of Engineering, City of St. John's. Written communications.

TORONTO

City of Toronto. Draft Sewer Use By-law, Draft # 4. April 1999.
Di Gironimo, Lou. Director, Wastewater Treatment, Water and Wastewater Services Division, City of Toronto. Written communications.
Findlay, Rick, Pollution Probe. Written communications.
Petrie, Shelley. Executive Director, Toronto Environmental Alliance. Written and personal communications.
Shinn, Karey, Public Committee for Safe Sewage Treatment in Metropolitan Toronto. Written and personal communications.

VANCOUVER - GREATER VANCOUVER REGIONAL DISTRICT

Burrows, Mae. Director, Labour and Environmental Alliance Society. Written and personal communications.
Cameron, Ken. Manager, Policy and Planning, Greater Vancouver Regional District. Written communications.
Greater Vancouver Regional District Liquid Waste Management Plan, February 2001.
Lane, David. Director, T. Buck Suzuki Environmental Foundation. Personal communication.
Wilhelmson, Christianne. Clean Air and Water Program Coordinator, Georgia Strait Alliance. Written and personal communication.

VICTORIA - VICTORIA METROPOLITAN AREA OF CAPITAL REGIONAL DISTRICT

McDonnell, Seamus. Director of Engineering, Capital Regional District. Personal communication.

McIsaac, Jim. Victoria Campaign Coordinator, T. Buck Suzuki Environmental Foundation. Written and personal communications.
Mills, Tara. Project Coordinator, Capital Regional District, Environmental Services. Written communications.
Zahynecz, Igor R. P.Eng, General Manager, Environmental Services. Written communication.

WHISTLER

Barnett, Brian G. P.Eng, General Manager, Engineering and Public Works. Written and personal communications.

WHITEHORSE

Cleghorn. Christine.Yukon Conservation Society. Written and personal communications.
Jones, David. Acting Director, Yukon Conservation Society. Written communications.
Shipman Larry, City of Whitehorse. Written communication.

WINNIPEG

Manitoba Eco-Network. Written and personal communications.
Szoke, Nicholas T. P.Eng. Senior Planning Engineer - Wastewater Facilities, City of Winnipeg, Water and Waste Dept. Engineering Division. Written communications.

YELLOWKNIFE

Ecology North. Written and personal communications.
Roste, Jennifer. Municipal Works Engineer, City of Yellowknife. Written communications.

Legislation

City of Toronto By-law No. 457-2000, *By-law to Regulate the Discharge of Sewage and Land Drainage* (6 July 2000), Available online: <http://www.toronto.ca/legdocs/bylaws/2000/law0457.pdf>; See also, Toronto Muncipal City Code Chapter 681. http://www.city.toronto.on.ca/legdocs/municode/1184_681.pdf

Convention on the Law of the Sea, 10 December 1982, Art. 207: Pollution from Land Based Sources

European Union *Urban Waste Water Treatment Directive*, 91/271/EEC, Article 4

Federal Water Pollution Control Act (Clean Water Act), 33 U.S.C. §§ 1251-1387, October 18, 1972, as amended

Order Adding Toxic Substances to Schedule I to the Canadian Environmental Protection Act, Canada Gazette Part II, 17 March 1999, p. 688

R. v. City of Iqualuit (8 August) Nunavut Court of Justice

File No: 08-01-693)
R. v. Dawson (City of), 2003 YKTC 16

State of Maryland. 1998. Water Quality Improvement Act, 1998

Stockholm Convention on Persistent Organic Pollutants, May 22, 2001, 40 I.L.M. 532. <http://www.pops.int/documents/convtext/convtext_en.pdf>

RELEVANT WEB LINKS

Solar aquatics: http://www.epa.gov/owm/mtb/living_machine.pdf
Switzerland's ban sludge deposits: www.olympus.net/community.oec/sldgbl.htm
Denmark and Sweden ban on sludge deposits: www.resource-eet.com/n3foodsaf.htm
Environment Canada *Fisheries Act* charges:
http://www.ec.gc.ca/press/2004/040429_n_e.htm;
http://www.ec.gc.ca/press/2003/030527_n_e.htm

Sierra Legal Defence Fund

Vancouver Head Office:

Suite 214-131 Water Street
Vancouver, British Columbia
V6B 4M3

Tel: (604) 685-5618
Email: sldf@sierralegal.org
Web Site: www.sierralegal.org

Ontario Office:

30 St. Patrick Street, Suite 900
Toronto, Ontario
M5T 3A3

Tel: (416) 368-7533
Fax: (416) 363-2746
E-mail: sldfon@sierralegal.org

Contents printed on recycled, clorine-free paper.