RESEARCH REPORT

Regulatory Barriers to On-site Water Reuse

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REGULATORY BARRIERS TO ON-SITE WATER REUSE

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NOTE: **DISPONIBLE AUSSI EN FRANÇAIS SOUS LE TITRE:**

Obstacles posés par la réglementation à la réutilisation de l'eau locale

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Abstract

This report represents the results of an investigation into the existence of regulatory barriers to the implementation of on-site water reuse in Canada. The report explores the barriers which are present in health and environmental regulations, as well as in plumbing/building codes and municipal By-laws. Regulatory barriers are outlined at the national level and within each province or territory, with municipal examples provided. The report concludes that there are no absolute regulatory barriers to on-site water reuse in Canada. The implications of perceived barriers are discussed.

Résumé

Le présent rapport est le fruit d'une enquête sur les obstacles posés par la réglementation à la mise en oeuvre de programmes de réutilisation de l'eau locale au Canada. Les auteurs se sont penchés sur la réglementation en matière de santé et d'environnement, ainsi que sur les codes de plomberie et du bâtiment, et les règlements municipaux. Ces obstacles sont décrits au niveau national et par province ou territoire, avec quelques exemples municipaux à l'appui. Le rapport conclut qu'il n'existe pas d'obstacle absolu à la réutilisation de l'eau locale au Canada. On y discute aussi des conséquences des obstacles perçus.

Executive Summary

Overview

The use of on-site and small community water reuse technology offers great potential as a water conservation measure and for reducing water distribution and collection infrastructure needs. This report represents the results of an investigation into the existence of regulatory barriers to the implementation of on-site water reuse in Canada. The report explores the barriers which are present in health and environmental regulations, as well as in plumbing/building codes and municipal By-laws. Regulatory barriers are outlined at the national level and within each province or territory, with municipal examples provided.

While a number of regulations were identified as *potential* barriers, the report concludes that there are no absolute regulatory barriers to on-site water reuse in Canada. The implications of perceived barriers are discussed.

Potential Barriers at the National Level

The report identifies three instruments at the national level which may have some impact upon the acceptance of on-site water reuse. These are the *Guidelines for Canadian Drinking Water Quality*, the *Guidelines for Canadian Recreational Water Quality* and the *National Plumbing Code of Canada - 1995*. The water quality guidelines (both drinking and recreational) may impede the implementation of on-site water reuse technology by imposing unrealistic or inappropriate quality standards. The *National Plumbing Code* presents more concrete barriers through various provisions which designate that every water distribution system will be connected to a potable water supply, and prohibit the discharge of non-potable water through outlets such as faucets or lavatories.

Barriers Identified at the Provincial and Territorial Level

Health officials within each of the provinces and territories expressed similar concerns about the safety of on-site water reuse applications. The storage of effluent on-site, appropriate levels of treatment, defining water quality parameters and the microbiological safety of reclaimed water were some of the health-related concerns brought up repeatedly. While these are not dealt with specifically in any existing Canadian legislation, they are legitimate concerns, and Public Health officials have the power (under provincial and territorial *Public Health Acts*) to deny any application of on-site water reuse until they are assured it poses no threat.

From a technical perspective, the barriers in the *National Plumbing Code* are carried over in the provinces and territories through their respective *Plumbing Codes*. These barriers can be overcome, however, as provisions are made within the *Codes* to allow a degree of innovation and alternative systems. At the municipal level, certain By-laws related to sewage disposal could be interpreted as barriers to on-site water reuse.

Conclusions

Ironically, the results of the report indicate that the most significant barrier to the implementation of on-site water reuse may be the lack of regulations and guidance across the country. Proponents indicated that guidance within provisions of the *Plumbing Code* would facilitate the acceptance of on-site reuse technology within their jurisdictions. In particular, documented proof of the safety of on-site systems with regard to public health would be of great benefit. No absolute regulatory barriers to on-site water reuse could be identified. Obstacles are instead created largely by attitudes and perception. The solution may lie in creating a Code of Good Practice and documenting case studies in order to provide guidance and confidence to decision-makers.

Regulatory Barriers to On-Site Water Reuse

1.0 Introduction

Water demand management, water conservation and water use efficiency are recognized by most Canadian jurisdictions as achievable and laudable environmental and economic objectives. The use of water efficient devices, combined with water conservation practices, reduces demand on the available water supply and can create capacity within the existing water treatment and distribution infrastructure. To date, water conservation and efficiency objectives have been met by metering consumption and adjusting water rates to discourage excessive use. Plumbing retrofits using efficient devices (low-flow toilets and showerheads, faucet aerators) have also contributed significantly to water conservation programs. In terms of the "Three R's" (Reduce, Reuse and Recycle), these techniques all act to "*Reduce*" water consumption.

The second and third of the three "R's", *Reuse* and *Recycle*, have been largely ignored. The use of on-site and small community water reuse[1] technology offers great potential as a water conservation measure, and for reducing infrastructure expansion needs. There are applications of residential on-site water reuse in place: the Canada Mortgage and Housing Corporation's (CMHC) Toronto Healthy House and the Ottawa Conservation Co-op are two examples. Others can be found in commercial and industrial facilities such as hotels and laundries. However, on-site reuse of water is neither a widespread nor a well-known option in Canada.

As with any new or innovative concept, key factors in the successful establishment of on-site water reuse include existing regulations, health protection, past experience, and economics. CMHC's Research Division is conducting a number of studies in order to fully understand the issues surrounding water conservation in residential buildings through reuse and alternative treatment technologies. As part of that research program, this report explores the existence of national, provincial and municipal level regulatory barriers to the implementation of on-site water reuse technologies. Regulatory agencies may be concerned with various issues surrounding human health, the environment, plumbing codes, building codes and land use, any or all of which can have an impact on on-site water reuse. By identifying existing regulatory barriers to on-site water reuse in Canada, proponents of reuse technology may be better able to address these obstacles through research and education.

It is not suggested that on-site reuse of water will become widespread in Canada. The application of this as a means of water conservation, even assuming all regulatory and attitudinal barriers are removed, will depend on economics - what is the cost of reusing new external water vs. the cost of capturing and reusing water already within the system. A profound barrier to on-site reuse may be that the cost of water delivered to a site and the charges applied for the removal of wastewater represent only a fraction of the full costs of providing the service.

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[1] Existing literature uses the terms *reuse, recycle* and *reclaim* inconsistently when dealing with water (a parallel study under CMHC's research program is attempting to define and differentiate between the terms). For the purposes of this report, water *reuse* will be the term used.

Different barriers may apply to specific intended purposes of reused water such as sanitation (toilet flushing), bathing, wash water, or irrigation, all of which are potential second uses for captured and treated household effluent. The regulatory barriers to on-site water reuse are examined here first at the national level, followed by an exploration of each province and territory. Some examples of hurdles at the municipal level are also provided.

2.0 Methodology

The first step in the process was to alert a number of individuals in the industry and in government across Canada to the project and solicit their initial input. These individuals were asked to identify key contacts in their respective agencies and jurisdictions.

A preliminary review of the available Canadian water reuse literature revealed that, while authors make general references to the existence of regulatory barriers, none are specifically mentioned. This made it difficult to design a questionnaire which would address specific regulatory barriers, as none could be identified. For this reason, the questionnaire was based instead on the identification of possible types of on-site reuse, and the potential obstacles to water reuse were assumed intuitively to fall into four main regulatory areas of health, environment, plumbing/building codes, and municipal by-laws. Four potential categories of reuse were identified: *Potable* (drinking and cooking), *Human Contact* (bathing, house cleaning), *Indirect Uses* (toilet flushing),and *Irrigation*. A tabular format was adopted to facilitate the recording and review of responses and findings into the main categories (see Appendix 1).

In principle, all four of the regulatory streams described above relate to the issue of water reuse. All four types of agencies (health, environment, housing standards and municipal affairs) were targeted, along with a number of municipalities that were identified through the initial (and subsequent) contacts. It was also assumed that water reuse was a current issue being dealt with by the respective agencies. In practice it soon became evident that, with few exceptions, water reuse is mainly a conceptual and potential future issue, rather than a current technical or procedural one. This fact, combined with the short time frame available for information gathering , militated against a mail-out survey. The procedure therefore became one of directly contacting (by telephone, fax, and electronic mail) individuals in each federal, provincial/territorial or municipal jurisdiction with either direct responsibilities in this area, or some experience and interest in it. References to relevant legislation, regulations, and background documents were requested.

As a general rule, the detailed breakdown of possible reuses as described in the questionnaire proved irrelevant, with only one potential type of reuse (toilet and urinal flushing) initially having any chance of being widely approved given current regulatory constraints and health protection concerns.

The agencies and individuals contacted are listed in Appendix 2 , complete with addresses, telephone and fax numbers, and e-mail addresses where available.

3.0 Regulatory Barriers to On-Site Water Reuse: General Results

The overall and very encouraging impression from the research and interviews is that the subject of water re-use is meeting with great (and favourable) interest. This is not to deny the reservations and caution of regulatory staff with respect to many details (technical, operational, safety and economics), but to indicate that they consider this initiative a fitting one in light of the crucial overall objective of ensuring a safe and sustainable water supply. Water reuse is seen as a potential solution rather than as a threat, and this positive attitude will make all the difference in overcoming both the real and perceived difficulties in exploiting the full potential of on-site water re-use. It must be noted, however, that direct pipe-to-pipe potable reuse, where treated effluent is redistributed into the potable water system, is simply not practised, nor even considered a desirable objective. A higher quality water source for drinking is considered essential by all parties consulted.

It is clear from the responses received that the on-site water re-use most likely to be considered for approval in the immediate future is that of "greywater" (from sinks, tubs, showers, washing) for toilet and urinal flushing. Since toilet flushing constitutes 30% of typical indoor household use (Environment Canada, 1995), having it supplied by recycled water will reduce water demand and sewage outflow by the same proportion.

A further encouraging aspect is that there is **no outright prohibition** of on-site water re-use; in fact, the term does not appear in any regulation surveyed. A number of jurisdictions have By-laws or Codes which define all "used" household water (both greywater and blackwater) as "sewage" , and direct that all sewage must be discharged to the municipal sewer system or to a private sewage disposal system. However, since these By-laws do not specifically prohibit recirculation of some or all of the wastewater before discharge, they are open to an interpretation that would be favourable to water reuse applications.

The *National Plumbing Code* (and provincial codes based on it) provides for alternate systems, such as dual water distribution systems within sites. Most health regulations, because they already require case-by-case approval, are inherently capable of some flexibility in the means of meeting required standards. These points will be explored in greater detail in the pages to follow.

3.1 Barriers at the National Level

Three instruments at the national level which either have some impact upon or may act as potential impediments to the implementation of on-site water reuse are the *Guidelines for Canadian Drinking Water Quality*, (Health Canada, 1996) the *Guidelines for Canadian Recreational Water Quality* (Health and Welfare Canada, 1992) and the *National Plumbing Code of Canada -1995* (National Research Council of Canada, 1995).

3.1(a) The *Guidelines for Canadian Drinking Water Quality*

In general, the application of the *Guidelines for Canadian Drinking Water Quality*[2] has meant that every water outlet in a Canadian household (faucet, toilet, hose bib, etc.) discharges water that meets the high quality standards necessary to ensure safe potable water. There is a temptation to insist that every outlet must discharge this quality of water. Yet using existing drinking water standards to "define" safe water reuse applications may not be appropriate (AWWA 1996), since the water produced in a reuse system is generally not intended for drinking or cooking purposes. Drinking water standards assume in most cases that the best available water source will be used for all purposes, and attempt to provide for the highest quality of water achievable.

Additional research is needed to establish guidelines and standards for water reuse which are more appropriate for the intended applications. Table 1 compares Canadian drinking water and recreational water quality guidelines to the U.S. EPA's *Guidelines for Water Reuse* (U.S. EPA 1992) intended for unrestricted urban uses. If health agencies attempt to apply drinking water quality guidelines to the effluent produced by on-site water reuse systems, it is unlikely that a reuse system will be permitted, as on-site reuse will generally not result in water that consistently meets such stringent guidelines.

Table 1: Comparison of Selected Water Quality Parameters

Parameter	Canadian Drinking Water Quality[a]	Canadian Recreational Water Quality[b]	U.S. EPA Reclaimed Water Quality[c]
pH	6.5 - 8.5	6.5 - 8.5	6 - 9
NTU[d]	≤ 1[e]	≤ 50	≤ 2
Fecal Coliform	No detectable[f] *E.coli* / 100 mL	200 *E.Coli*/100 mL	No detectable[g] Fecal Coliform / 100 mL

[a] Health Canada, 1996
[b] Health and Welfare Canada, 1992
[c] U.S. EPA, 1992
[d] NTU = nephelometric turbidity unit
[e] Water entering distribution system
[f] No sample should contain fecal coliforms
[g] Based on a 7-day median value. Should not exceed 14 fecal coli/100 mL in any sample.

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[2] The Federal-Provincial Subcommittee on Drinking Water, established in 1986 by the Federal-Provincial Committee on Environmental and Occupational Health, revises and updates the *Guidelines for Canadian Drinking Water Quality* (the *Guidelines*) on a continuing basis. The *Guidelines* are prepared following a thorough review of the scientific, technical and medical literature on water quality parameters; the guidelines and recommendations are intended to apply to all drinking water supplies, both public and private. Many existing provincial water quality objectives or regulations are based on the *Guidelines*.

3.1 (b) The *Guidelines for Canadian Recreational Water Quality*

The *Guidelines for Canadian Recreational Water Quality* are intended to apply to surface waters in Canada that are used for contact recreational purposes (defined as any activity involving the intentional immersion or accidental immersion of the body, including the head). These guidelines are based on indicators of hygienic quality, water quality from recreational areas in various parts of Canada and pertinent epidemiological studies.

The water produced by an on-site water reuse system may be intended for a variety of non-potable uses such as toilet flushing, bathing, showering, clothes washing and landscape watering; there are no established Canadian guidelines for these possible uses of treated household effluent. The recreational water quality guidelines set out a limited number of quality parameters for bathing and swimming water which may be somewhat applicable to water reuse in the absence of specific reuse guidelines (refer to Table 1). The guidelines recommend indicator organisms to deal with infections transmitted by pathogenic microorganisms, which are a primary health concern with water reuse. Certainly the applicable recreational guidelines can be considered as an absolute minimum water quality standard to be met by any implementation of reuse technology.

3.1 (c) The *National Plumbing Code of Canada - 1995*

Two provisions of the *National Plumbing Code* are stated in a manner that can be interpreted to preclude on-site water reuse. The relevant sub-sections are reproduced below:

Provisions of the *National Plumbing Code - 1995*

1.6.3. Water Distribution Systems

1) Every water distribution system shall be connected to a public water main or a *private potable water supply system.*

7.3.2. Outlets

1) An outlet from a non-*potable water system* shall not be located where it can discharge into
   a) a sink or lavatory
   b) a *fixture* into which an outlet from a *potable water system* is discharged, or
   c) a *fixture* that is used for the preparation, handling or dispensing of food, drink or products that are intended for human consumption.

An on-site water reuse system would directly contravene both of these plumbing code requirements, as components of the water distribution system would necessarily be connected to a non-potable water supply and some outlets from the non-potable system would discharge into the fixtures described in **7.3.2.** . However, Appendix A of the *National Plumbing Code* (the *NPC*) does include a provision which would allow discharge from a non-potable system into such outlets on the basis of acceptable past performance. In addition, **Section 1.4 - Equivalents** specifically allows alternate materials, appliances, systems, equipment, methods of design and construction procedures, if there is evidence that the proposed equivalent will provide the level of performance required by the *Code*, and this equivalence is demonstrated by past performance, test or evaluation. The latter provision builds some flexibility into the *Code*, and may be interpreted to allow consideration of on-site water reuse technology.

The *NPC* may prove to be more of a barrier by NOT defining the special plumbing requirements necessary or desirable for on-site water reuse systems. Without the guidance provided by established codes and regulations, officials are often reluctant to permit the implementation of an innovative technology.

A number of the agencies surveyed identified certain technical requirements which, if addressed in the *NPC*, would facilitate the implementation of an on-site water reuse system. These technical issues include (among others):

- colour coding of pipe material to identify water reuse plumbing components;
- guidance on appropriate backflow preventers specific to reuse systems;
- guidance on cross-connection prevention specific to reuse systems;
- pressure differences between potable and non-potable systems; and
- location of water reuse pipes within a building.

U.S. case studies and plumbing code requirements outline other technical issues which must be addressed. Examples are specific warning and identification signs (eg: CAUTION, RECLAIMED WATER - DO NOT DRINK), a back-up connection to the potable water system, location of outlets for non-potable water (Reitz and Redlin, 1996), as well as considerations specific to irrigation systems on private lots such as subsurface irrigation field requirements, and definitions of sensitive areas to be protected(Farwell 1993).

The degree to which the existing *NPC* provisions act as a barrier to on-site water reuse technology will depend largely upon the interpretation of the *Code* by individual agencies. **Sections 1.6.3.** and **7.3.2.** could be applied to block a reuse project, while **Section 1.4** and **Appendix A-7.3.2.** could be used to approve a project. It would be beneficial to the implementation of reuse technologies for the *Code* to be used to provide further guidance on reuse plumbing requirements. Assuming that the *NPC* provisions are retained in the respective provincial *Plumbing Codes*, experience with them anywhere in Canada could then be readily shared across the country and accelerate the transfer of innovative technology and systems.

3.2 Barriers at the Provincial and Territorial Level

3.2.(a) Alberta

The Professional and Technical Services Division of Alberta Labour indicated that the *1995 NPC* (expected to be adopted as the *Alberta Plumbing Code* by late September 1997) is the main regulatory barrier to on-site water reuse in Alberta.

Based on the provisions of the *NPC* (as discussed in Section 3.1(c)), and the definition within the *NPC* of all liquids that enter a drainage system as sewage, the implementation of on-site water reuse is likely to meet with some resistance in Alberta. The *Alberta Plumbing Code* makes no distinction between greywater and black water, and directs that all sewage must be directed to a public sewer or into an approved Private Sewage Treatment and Disposal System.

The Alberta Labour Department's position is that in so far as the *NPC* does not provide for installing equipment to collect wastewater from fixtures (sinks, tubs and showers) for the purpose of recycling it for reuse in water closets or other purposes, on-site reuse of water cannot be considered in Alberta. An important clarification is warranted with regard to the *NPC:* while the Code does not provide specifically for water reuse plumbing requirements, **Section 1.4** clearly guards against any interpretation that the NPC prevents innovative approaches. It simply puts the burden of proof on the applicant, which is where the concerns described below come into full play.

The other barriers to on-site water reuse in the province of Alberta are expressed mainly as public health concerns rather than specific regulations, concerns which would have to be resolved before a project could gain approval. Public Health authorities in Alberta, as in the rest of Canada, have a mandated responsibility to protect public health. Some of the issues which must be addressed are:

- No standard has been established for the equipment needed and the quality of water produced when recycling wastewater[3];
- Will there be a danger from "recycled" viruses and bacteria?
- How is the effluent to be safely stored and how will it be delivered to the appropriate fixtures?;
- What happens to the excess effluent if the storage facility is full?;
- In case of shortage, how will make-up water be introduced, and how will protection from cross-connections be dealt with?;
- How is the recycled liquid (with scum produced from soaps, cleaning compounds, etc.) to be dealt with (levels of treatment) ?
- How are any odours associated with recycling these liquids to be handled?
- How are the long-term maintenance of the associated storage, delivery equipment and water closets to be addressed?

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[3] There is in fact an existing standard for water reuse equipment, *NSF 41 - 1990 - Wastewater Recycle/Reuse and Water Conservation Devices* (NSF, 1990).

These are essential and practical concerns that have applicability anywhere in Canada and were bought up by several other agencies. The answers to these process, equipment and health related questions will be dependent upon the type of on-site system planned and the intended second uses of the effluent produced.

One particular regulatory tool which may further the cause of on-site water reuse rather than acting as a barrier is Alberta's new *Water Act* (awaiting proclamation). The new legislation includes a water conservation guideline, which could be used by local authorities or the provincial government to specify the reuse of water as a water conservation measure.

At the municipal level, City of Calgary officials again cited the *NPC* as a barrier, but noted that the main concern would be ensuring that the non-potable system is isolated from the potable water system. Given this assurance, an on-site system is likely to meet with few objections from municipal approving authorities. However, municipal officials indicated that they would defer to the opinion/approval of Public Health officials in this type of situation.

3.1 (b) British Columbia

British Columbia (BC) is actively pursuing the regulation of water reuse through a number of initiatives.

One important initiative was the proposed amendment to the *BC Plumbing Code,* developed in 1995 by the firm of Hill Murray & Associates Inc.. The proposal was to permit the installation and use of dual water distribution systems (potable and non-potable) in all occupancy classifications. At a February 22, 1995 meeting, the *BC Plumbing Code* Advisory Committee recommended acceptance of the amendment in principle to the Building Standards Branch of the BC Ministry of Municipal Affairs, and the latter informed the proponent that the amendment would be included in the revision package to be issued in 1997.

In response to the above initiative, the Building Standards Branch (BSB) confirmed that local building and plumbing officials have the authority under Subsection 1.4 of the *BC Plumbing Code* (which corresponds to the same section in the *NPC*) to approve water reuse systems. The BSB recommended that water reuse systems be designed and installed in conformance with AWWA Manual M24 (AWWA, 1983) and NSF Standard No. 41, *"Wastewater Recycle/Reuse and Water Conservation Devices"*(NSF 1990) [4], and that a registered professional engineer be responsible for the design and inspection of water reuse systems. It is encouraging to note that the BSB thanked the proponent for "advancing this very important issue with local government, the Ministry of Municipal Affairs and the Ministry of Health".

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[4] In response to this recommendation, the proponent revised the proposed amendment accordingly and re-submitted in July 1995 (refer to Appendix 3). Unfortunately, the Building Standards Branch was subsequently dissolved.

BC is in the process of updating its 1992 *BC Plumbing Code* (based on the 1990 *NPC*) in conformity with the *1995 NPC*. The process is guided by a significant policy direction that reduces the "made in BC" plumbing code adaptations to a minimum. Changes will only be made to address unique BC needs. This policy decision to refrain from introducing "made in BC" changes to the technical provisions of the *NPC* suggests that the proposed water reuse amendment is unlikely to be incorporated into the 1998 *BC Plumbing Code.* However, any proposed changes to the *BC Building and Plumbing Code* that do not meet the criteria of addressing unique BC conditions will be forwarded to the Canadian Codes Centre for consideration for the next edition of the *National Building and Plumbing Codes,* scheduled for late 2001. It is not clear whether BC or the other provinces or territories would champion the adoption of specific water reuse system provisions in the *NPC,* although most proponents agree that more concrete guidance is needed before on-site water reuse systems can gain widespread acceptance as a technology.

A second initiative of note is the *"Policy - Innovative Designs and Technology New to British Columbia with respect to On-site Sewage Disposal"* administered by the BC Ministry of Health (see Appendix 3). The overall purpose of the policy is to encourage alternative technology in place of standard on-site sewage disposal systems and increase knowledge of certain new approaches. This policy could be a useful tool in promoting the acceptance of innovative on-site water reuse systems, as water reuse directly affects wastewater treatment processes and the quantity of effluent discharged, which in turn affects on-site sewage disposal requirements. The policy is a procedural guide for the review of innovative systems and provides suggestions on the submission of information to the local health units. In the first two major applications of this policy (a 300-pupil elementary school and a new provincial government building), on-site water reuse is incorporated as a significant element of their systems[5], to such an extent that potable water is needed only for drinking purposes (5% of total water use) and all other water uses (95%) are satisfied by recycled water.

The system in each of these cases provides such a high degree of treatment that all used water (greywater and blackwater) is captured, treated and reused. This is in contrast to the general assumption by most parties that only the outflow from so-called "greywater fixtures" (sinks, taps, fountains, showers, laundry machines, dishwashers) can be safely reused. As several informed respondents pointed out , blackwater is in fact a much easier and more predictable substance to treat (that is, biologically) than greywater, which can be a highly variable mix of many chemical substances. Overcoming the general prejudice against the reuse of blackwater (which is a reaction based largely on the aesthetics of the effluent's origins) would eliminate an important barrier to the success of water reuse systems.

Possibly the most important BC initiative from a reuse perspective is the on-going development of a new municipal sewage regulation, *Municipal Sewage Regulation - Draft 3.1,* which will authorize a broad spectrum of uses for highly treated wastewater ranging

[5] The system mentioned is the Cycle-Let® Recycling Treatment System designed by Hill, Murray & Associates, Inc. (Hill et al , 1995).

from agricultural irrigation and toilet flushing, to snowmaking and stream augmentation. The draft regulation sets out categories and permitted uses for reclaimed water as well as effluent quality requirements and treatment requirements (refer to Appendix 3). This legislation, which will regulate municipal water reuse, may serve as a guide to the future implementation of on-site water reuse. It is the most comprehensive Canadian example of formal water reuse legislation identified (legislation in Alberta and Saskatchewan, for example, allows water reuse for irrigation purposes only).

Some BC municipalities have the power to pass by-laws which could either encourage or inhibit on-site water reuse. For example, the City of Vancouver's charter allows the Council to make by-laws regulating the installation or alteration of plumbing and heating facilities, including the materials to be used and all means of connections with sewers and water mains *(Vancouver Charter, Part IX, S. 306).* The City of Vernon, BC, has been reusing treated municipal water for irrigation since 1977. The water quality parameters and uses are set out in the municipality's wastewater treatment operating certificate (issued under Chapter 482, Part 2 (10) of the province's *Waste Management Act, RSBC 1996*). Since water reuse is practised extensively at the municipal level, it is likely that a well-designed on-site system would meet with regulatory approval in this city.

3.2 (c) Manitoba

Manitoba uses the 1995 *NPC*, with a few provincial amendments. The barriers inherent in the *NPC* as discussed earlier apply here (see 3.1 (c)).

No other specifically legislated barriers to on-site water reuse were identified in Manitoba regulations. As in most provinces, no sewage may be drained or pumped from any building except into a private sewage disposal system or a common or public sewer (*Private Sewage Disposal Systems and Privies Regulations; Manitoba Regulation 95/88R; S.7*). Section 20 of this Regulation enables "the installation of a private sewage disposal system not specified in this regulation subject to such terms and conditions as the Minister may require." This fairly typical "escape " clause is valuable in terms of gaining approval for an on-site reuse system but means that a special effort is required, from the applicant and the staff acting to advise or on behalf of the Minister, for every application.

Manitoba Health, through its Public Health Officers, has consultation and regulatory responsibilities relevant to the administration of the *Public Health Act (1987)* and other public health issues; an on-site water reuse system would be subject to the approval of Public Health officials under *S. 330/88, Water Supplies* and *S. 331/88, Water Works, Sewerage and Sewage Disposal.* Health authorities in Manitoba indicated that they would have to be satisfied that an on-site reuse system would pose no public health danger (the concerns outlined in 3.2 (a) apply here).

At the municipal level, the City of Winnipeg defines "wastewater" as all spent water from a community (*Winnipeg Sewer By-law No. 7070/97, Part 1).* The by-law further directs that all wastewater must be directed to a sewer (*Part 4, S. 11*). This By-law, as with the provincial sewage disposal regulation, could be interpreted to provide a barrier to on-site reuse of water.

3.2 (d) New Brunswick

New Brunswick has adopted the 1995 *NPC* with a few provincial amendments as of July 28, 1997. The barriers which exist in the *NPC* as described on 3.1(c) apply in New Brunswick.

General Health Regulation 88-200 requires wastewater to be directed to a public or private sewer. The regulation does not mention water reuse and does not specifically prevent it. However, an interpretation of the regulation would be required to ensure that reuse would not contribute to the formation of a nuisance. The proponent would have to demonstrate to the satisfaction of New Brunswick Health that the reuse technology was viable and consistent with good public health.

3.2 (e) Newfoundland

At present, there is no provincially mandated plumbing code in Newfoundland. However, the *NPC* is referred to in provincial fire safety regulations and various other pieces of legislation. The creation of province-wide regulations for buildings based on the *NPC* is under active discussion, with the earliest date of implementation being late Fall 1997. The City of St. John's has adopted the 1995 *NPC* since July 1996. Again, the barriers which exist in the *NPC* as described on 3.1(c) apply in St. John's.

There are no barriers to water reuse under legislation or regulations administered by the Department of Environment and Labour in Newfoundland and Labrador. The standard health concerns as previously described are applicable here as well (eg. the prevention of cross-connections between potable and reuse water piping, the importance of maintenance, and potential odour problems).

3.2 (f) Northwest Territories

No legislative barriers to on-site water reuse were identified. The *Public Water Supply Regulations* (under the *NT Public Health Act*) and the *General Sanitation Act* essentially state that if something is a health hazard, it cannot be approved. In other words, a particular system has to be proven to be safe and reliable. On-site water reuse has particular relevance in the Northwest Territories because of the water supply problems in remote communities and the high cost of transporting water. The Northwest Territories Housing Corporation (NWTHC), for example, owns 3,700 homes which presently rely on an extremely costly trucked-in water supply. The NWTHC spends $15 million a year on truck haulage for water service and sewage removal for Commission-owned homes.

The NWTHC is proceeding with a trial project involving ten houses which will take advantage of water reuse technology developed for the Toronto Healthy House (refer to 3.2(h)). The original equipment design has been adapted to be produced as three modular units, which can be easily transported to the Northwest Territories and fitted together on-site. All grey and black water is combined and treated together in this system and is of a high enough quality to be used for showers and baths as well as laundry, irrigation and toilet flushing.

3.2 (g) Nova Scotia

Again, no specific legislative barriers to on-site water reuse were identified. However, since all wastewater has to be discharged into a septic tank or other treatment system (a standard requirement in all jurisdictions), it is an open question whether the reuse before such final discharge is automatically allowed. In any case, Section 30 of the new (June 10, 1997) *Regulations Respecting On-site Sewage Disposal Systems 97-297* provides for the approval of innovative systems, subject to terms and conditions regarding design, installation, compliance monitoring, possible replacement and financing or other security.

Health officials would have to be satisfied with the safety of any on-site water reuse system. It is interesting that the new Regulations incorporate all relevant health, environmental and municipal requirements, and are administered by one office. Another important step towards consistency and streamlined administration is that it replaces the regulations of twenty-three separate Boards of Health.

3.2 (h) Ontario

The *Ontario Plumbing Code* includes provisions of the *1995 NPC* which are considered relevant for Ontario. The *Ontario Plumbing Code* (*OPC*) states, as does the *NPC*, that "no non-potable water shall be supplied to any plumbing fixtures *where a supply of potable water is available*". This effectively prohibits water reuse. An amendment was proposed in August 1996 to **Subsection 7.1.6.3** of the *OPC* that would allow non-potable water to be used for flushing sanitary units or the priming of traps, where a supply of potable water is unavailable or insufficient (see Appendix 3). However, the proposed amendment has come to a standstill until a way is found to resolve the concerns of the Ontario Branch of the Canadian Institute of Health Inspectors. This is an apt demonstration of how effectively Public Health officials can oppose the implementation of an on-site water reuse system if they are not convinced of its safety.

Ontario's *Sewage Systems Regulation 358, R.R.O 1990,* incorporates design criteria for on-site sewage systems. One aspect of this regulation may act as a disincentive, rather than a barrier, to on-site water reuse by its requirements for Class 6 Proprietary Aerobic Sewage Systems. Section 10, paragraph 2, regulates the size of a disposal field for septic tank effluent. Reusing water can result in a significant reduction in the size of disposal field required. The implications of this are that in new construction, less land is required than for a standard system, while for existing buildings, the life of an existing disposal field can be extended. In the case of new construction, the regulation currently makes no provision to recognize a reduced field size; this may act as a disincentive to implementing on-site water reuse.[6]

There is evidence that on-site reuse systems can be approved in Ontario, if only on the basis of experimental technology. Water reuse is very much part of the Toronto Healthy

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[6] This situation seems to have been remedied with an amendment to *Regulation 358* published on Oct. 2, 1997 in The Ontario Gazette. The amendment allows for the construction of septic systems that incorporate new technology that use less land (*Ontario Regulation 370/97*).

House, where all wastewater is fully treated to a standard which is just short of drinking water standards. In the Toronto Healthy House, fresh water is used at the sinks and by the dishwasher. All other fixtures use "clear, sparkling treated wastewater"; increased use of water at these fixtures only increases the number of times that wastewater is reused. The project was developed with the close cooperation of the City of Toronto Public Health Department and the provincial Ministry of Health and the Ministry of Energy and Environment, and the latter are still involved by doing laboratory work in connection with performance monitoring. Another example is the "Conservation Co-op" in Ottawa which has an experimental system that collects and treats the greywater from eight apartment units. The treated greywater is redistributed to the toilets as flush water.

3.2 (i) Prince Edward Island

The legislation which might affect the implementation of on-site water reuse was identified by the Prince Edward Island Environmental Health Department as being the *Plumbing Code*, the *Sewage Disposal Regulations*, and the *Environment Protection Act* (by its definition of a contaminant) and possibly the *Public Health Act*. The relevant Plumbing Code provisions have already been outlined. The other *Acts* identified will affect on-site water reuse only through their general provisions, and do not specifically deal with the subject.

3.2 (j) Québec

The *Code de plomberie du Québec (Québec Plumbing Code)* is being updated in conformance with the *1995 NPC*. The City of Montreal and some other municipalities in the area follow the *1995 NPC* directly; the barriers implicit in the *Code* apply.

The ministère de l'Environnement et de la Faune (Ministry of Environment and Wildlife) indicated that it has no jurisdiction within buildings, and administers no regulations that impact upon the quality of water produced by in-home water treatment devices. The implication was that the Ministry would treat an on-site water reuse system as an in-home water treatment device. The *Loi sur la qualité de l'environnement (Quality of the Environment Act), S. 22*, indirectly affects any uses of wastewater in that it makes general reference to the quality of wastewater with regard to environmental protection. This clause might prove applicable if irrigation were a proposed use for the effluent produced by a reuse system.

3.2 (k) Saskatchewan

Saskatchewan has adopted the 1990 *NPC* with twenty-six provincial amendments. As of late 1997, there are no plans to adopt the 1995 *NPC*. Sask Health reported that there are sections within its *Plumbing and Drainage Regulations* that would prevent water reuse, but did not provide clarification on the specific wording that might pose a problem.

3.2 (l) Yukon

The 1995 NPC has been adopted in the Yukon since the beginning of 1997. There is no other legislation inhibiting the reuse of water in the Yukon, provided that there is no intention of providing water for drinking or cooking applications, and there is no possibility of a cross-connection with the potable water system in a building. On the other hand, there are no provisions or incentives for water reuse.

4.0 Discussion

It has been demonstrated that on-site water re-use is potentially regulated by health and environment agencies, municipal by-laws and codes. An assessment of the relevant regulations mentioned in this report reveals that there are few absolute barriers to on-site water use in Canada for individual buildings. With the exception of restrictions and water quality parameters related to the irrigation of agricultural crops, water reuse is not mentioned in any existing regulations; under such conditions, on-site water reuse is neither expressly allowed nor prohibited. This leaves the use and perhaps the permitting of such systems up to individual interpretation. The general practice is to be referred to one agency, usually Health, or to the individual (sometimes responsible for a coordinated health and environment approval) who would have the primary role in dealing with an application for such a system.

Environmental regulations are of secondary importance in on-site applications, since they do not affect the internal process of re-use. They come into play when irrigation is a proposed use of the reclaimed water. Municipal regulations are rarely directly relevant, except for a fairly standard By-law which, like the *NPC*, directs that all sewage be discharged to a municipal or private sewage treatment system.

Health concerns will continue to be the most significant barrier to on-site water reuse. While on-site reuse is not expressly prohibited under the various *Public Health Acts*, Public Health authorities have the power to refuse an application for such a system if they feel that it will be a threat to human health. As mentioned in Section 3.2(a), proponents of a particular on-site reuse system will have to work diligently in order to satisfy the legitimate concerns of Health officials.

Across the country, regulatory agencies are structured to deal with individual on-site water reuse system applications on a case-by-case basis. This case-by-case procedure has its advantages, as it is flexible enough to allow experimentation with new systems while ensuring that public health is protected through the close scrutiny of each application. However, it also has the less desirable result of being highly dependent upon the permit granting agencies' level of knowledge and acceptance of the concept, and may result in varying approval or non-approval of the same system in different jurisdictions. The lack of water reuse regulations or specifications may prove to be the most significant obstruction to the implementation of reuse technologies within homes. With the guidance provided by established codes and regulations, officials may be less reluctant to accept on-site water reuse as a viable option.

Of interest is a purely speculative Metro Toronto scenario for achieving a major reduction in overall water demand by incorporating residential water reuse throughout the entire system. However, Metro Toronto proponents have reluctantly concluded that widespread residential water reuse in Canada's largest city is not currently possible, as on-site systems would not comply with *Part 7 (Plumbing)* of the *Ontario Building Code* as discussed in section 3.2(h) of this report. A proposal to amend the relevant Code sections could resolve the difficulties encountered. Mass implementation of on-site reuse technology would

require measures that are ready-made and work under all situations. While house-by-house adaptations are inevitable, a program on this scale would necessarily preclude case-by-case approvals.

Realistically, a broad opening of regulations to enable water reuse systems is unlikely and perhaps unnecessary. As long as existing regulations are sufficiently open to some degree of innovation, there are no absolute barriers to on-site water reuse. There will remain however, administrative obstacles based on individual attitudes, interpretations and other factors which in themselves can pose significant barriers. The solution may well be to distill the successful experiences into a Code of Practice and case studies to provide guidance and confidence to decision-makers facing approval of on-site re-use systems that practical and safe systems do exist.

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MUNICIPAL BY-LAWS AFFECTING THE IMPLEMENTATION OF WATER REUSE TECHNOLOGY IN RESIDENTIAL BUILDINGS

SURVEY FILLED IN BY:

Name: .....
Department: .....
Address: .....
City: ..... Postal Code: .....
Tel: ( ) ..... Fax: ( ) .....
E-mail: .....

	BUILDING OR PLUMBING CODE (Reference to the specific provision of the code is requested)	**COMMENTS / EXPLANATION**
Potable uses (eg: drinking, cooking, dish washing)		
Human Contact (eg: bathing, house cleaning, showering)		
Indirect Use (eg: toilet flushing, clothes washing)		
Irrigation of private food crops (vegetable gardens, fruit trees, etc.)		
Irrigation of lawns		

Over...

Please describe any other requirements or reservations that your department may have, which although not specifically legislated, may present a barrier to the implementation of on-site water reuse technology in residential buildings:

PROVINCIAL REGULATIONS AFFECTING THE IMPLEMENTATION OF WATER REUSE TECHNOLOGY IN RESIDENTIAL BUILDINGS

SURVEY FILLED IN BY:

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Department: .....
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	HEALTH REGULATIONS (Reference to the specific provision of the regulation is requested)	**COMMENTS / EXPLANATION**
Potable uses (eg: drinking, cooking, dish washing)		
Human Contact (eg: bathing, house cleaning, showering)		
Indirect Use (eg: toilet flushing, clothes washing)		
Irrigation of private food crops (vegetable gardens, fruit trees, etc.)		
Irrigation of lawns		

Over...

Please describe any other requirements or reservations that your department may have, which although not specifically legislated, may present a barrier to the implementation of on-site water reuse technology in residential buildings:

PROVINCIAL REGULATIONS AFFECTING THE IMPLEMENTATION OF WATER REUSE TECHNOLOGY IN RESIDENTIAL BUILDINGS

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Name: .....
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	ENVIRONMENTAL REGULATIONS (Reference to the specific provision of the regulation is requested)	**COMMENTS / EXPLANATION**
Potable uses (eg: drinking, cooking, dish washing)		
Human Contact (eg: bathing, house cleaning, showering)		
Indirect Use (eg: toilet flushing, clothes washing)		
Irrigation of private food crops (vegetable gardens, fruit trees, etc.)		
Irrigation of lawns		

Over...

Please describe any other requirements or reservations that your department may have, which although not specifically legislated, may present a barrier to the implementation of on-site water reuse technology in residential buildings:

PROVINCIAL REGULATIONS AFFECTING THE IMPLEMENTATION OF WATER REUSE TECHNOLOGY IN RESIDENTIAL BUILDINGS

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	BUILDING OR PLUMBING CODE (Reference to the specific provision of the code is requested)	**COMMENTS / EXPLANATION**
Potable uses (eg: drinking, cooking, dish washing)		
Human Contact (eg: bathing, house cleaning, showering)		
Indirect Use (eg: toilet flushing, clothes washing)		
Irrigation of private food crops (vegetable gardens, fruit trees, etc.)		
Irrigation of lawns		

Over...

Please describe any other requirements or reservations that your department may have, which although not specifically legislated, may present a barrier to the implementation of on-site water reuse technology in residential buildings:

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BC PLUMBING CODE AMENDMENT

Submitted by
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Recycled Waste Water Systems

References: **AWWA Manual M24** (Dual Water Systems)
NSF Standard No. 41 (Relating to Wastewater Recycle/Reuse and Water Conservation Devices)

Definitions

Dual Water Systems - plumbing distribution systems employing both potable and non-potable water in keeping with the principles of AWWA Manual M24 (Dual Water Systems).

Recycled Waste Water - water recovered from black and grey water sources that has been treated and disinfected through a process certified under NSF Standard number 41 (Relating to Wastewater Recycle/Reuse and Water Conservation Devices) to remove the contaminants to a level acceptable to the *authority having jurisdiction* to permit re-use in non-potable applications.

Text

1. **Design of Recycled Waste Water Systems:**

   a. All systems employing the use of *recycled waste water* shall be designed and stamped by a member of the Association of Professional Engineers and Geoscientists of BC or be of a pre-approved design acceptable to the *authority having jurisdiction*

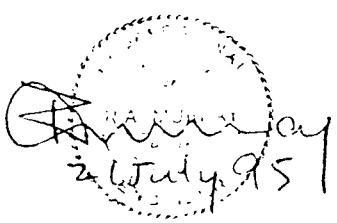
   b. Plans and specifications for the installation of *dual water* or *recycled waste water* systems shall be submitted to the *authority having jurisdiction*

2. **Installation of Recycled Waste Water Plumbing Systems:**

   a. Installation of *Recycled Waste Water Systems* shall be completed only by a person holding:

      (1) a BC tradesman's qualification certification as a plumber, or

      (2) be an indentured apprentice supervised by a journeyman possessing a BC tradesman's qualification certification as a plumber.



3. **Testing:**

   a. In addition to the requirements of Section 3.7 Testing of Potable Water Systems, *Recycled Waste Water* systems shall also be subjected to testing to ensure it is free of contaminants as specified by the *authority having jurisdiction*.

   b. *Recycled Waste Water* shall be effluent from a treatment plant certified under NSF Standard No. 41 and shall meet the discharge criteria for contaminants as specified by the *local, regional and provincial authorities having jurisdiction*.

4. **Connections to Potable Water Systems:**

   a. *Recycled Waste Water* systems shall not be connected to a potable water system

5. **Materials**

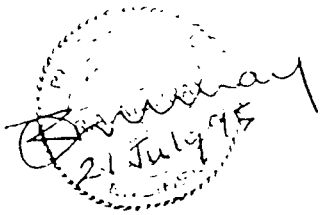
   a. All materials employed in the distribution of recycled water shall conform to the requirements of Section 2 of the BC Plumbing Code.

6. **Identification:**

   a. All piping and fixtures employed in the distribution of recycled water shall be marked in such a manner as to minimize the risk of mistakenly taking the water as being potable. Marking shall be permanent, distinct and easily recognized.

   b. All piping shall be marked "RECYCLED WATER - UNSAFE FOR DRINKING" at intervals not exceeding 30 cm.

   c. All valves, fixtures and appurtenances shall be colour coded or otherwise marked to differentiate reclaimed water from potable water. Valves, fixtures and appurtenances shall be marked with the following label (or equivalent acceptable to the *authority having jurisdiction*):



d. Where hose bibs are provided on potable and *recycled waste water* systems, differential sizes shall be used to preclude the interchange of hoses. Hoses used in the distribution of recycled waste water shall be identified as per paragraph 6a through 6c. Once used for the distribution of recycled waste water, hoses shall not be subsequently used for the purposes of potable water distribution.

7. **Location:**

a. *Recycled Waste Water* outlets shall not be located where they may discharge into fixtures used for a purpose related to the preparation, handling or dispensing of food, drink, or products that are intended for human consumption except as prescribed in Appendix A (A-7.3.2)

b. Potable and *recycled waste water* mains shall be separated as far apart as conditions permit, both horizontally and vertically. Special encasement shall be placed around *recycled waste water* lines at all points where they cross over, under or closely parallel to potable water lines.

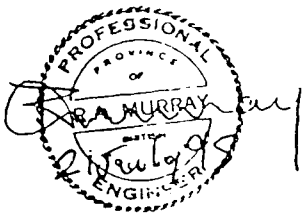
c. Special encasement shall be placed around *recycled waste water* piping in the vicinity of food handling or preparation areas.

d. Unencased *Recycled Waste Water* piping shall not be located:

(1) where food is prepared in a food processing plant,

(2) above food handling equipment,

(3) above a non-pressurized *potable* water tank, or



(4) above a cover of a pressurized *potable* water tank.

e. Adequate means of notification shall be provided to inform the public that reclaimed water is being used. Such notification shall include the posting of conspicuous warning signs with proper wording of sufficient size to be clearly read.

8. **Contamination Prevention:**

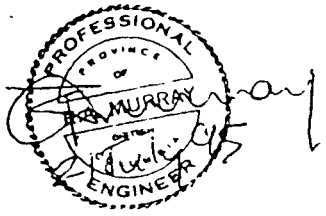
a. Every residence or facility served by a *recycled waste water* system shall have fitted on the potable water system a backflow prevention device consisting of a reduced pressure backflow prevention device or a double check valve assembly, depending on the degree of potential hazard. The back flow protection device shall conform to the standards listed in section 2.9.9.(1).

9. **Operation of Valves:**

a. All *recycled waste water* valves shall be of the type that can only be operated by authorized personnel

In addition, Section 7 should be amended to include the following exclusion:

This section does not apply to *Recycled Waste Water* Systems



Topic

Policy - Innovative Designs and Technologies New to British Columbia with respect to On-site Sewage Disposal (hereafter referred to as "Systems")

Background

This document will serve as a guide to local health units and other interested parties. It establishes a procedure for the review of "systems" and provides suggestions on the submission of information to the local health units.

This policy will allow the installation of a limited number of specific on-site treatment and disposal systems, provided supportive theory and/or applied research exists. These guidelines are not intended to provide for original research. Instead, they are to be used to increase the familiarity with the systems and/or provide additional performance information.

Approval authority for the application, installation, use and monitoring of any "systems" is still vested with the local Medical Health Officer or Environmental Health Officer (the Health Officer). The Health Officer will require monitoring of performance of all "systems" which he/she approves in a manner and with a frequency as established by this policy.

Alternative technology to standard on-site sewage disposal systems is needed. It is the intent that this policy be used to increase our knowledge of certain new or innovative approaches. **It is not intended to serve as a method to circumvent the requirements of the Sewage Disposal Regulation or proven sewage disposal practices.** Consideration should be given to those proposals that offer the opportunity to obtain sufficient data which can be used for the development of alternative sewage disposal systems. In particular, those systems which may benefit significant numbers of people within British Columbia should be considered.

Policy

I. Application

A "system" may be considered where:

1. It is proposed to correct a failing system and neither a conventional septic tank system, a conventional package treatment plant system or an alternate system currently in use ("current systems") is feasible, and the only solution and back-up, if the experiment proves unsuccessful, is a holding tank. or

2. It is proposed for new construction where it has been determined that a current system could be installed that meets all requirements of the Sewage Disposal Regulation or current sewage disposal practices. The area suitable for the current system must be protected for future use by a restrictive covenant. or

3. It is proposed where there is an existing properly functioning system and the device/system is proposed in order to demonstrate a technology and/or gather treatment or performance data. In such cases, the existing system serves as the back-up and should be capable of being placed back in service following the test period or if the "system" proves unsuccessful. or

4. It is proposed that the "system" will be operated, maintained, and monitored by a local or regional government under a bylaw approved by the Ministry of Health. This bylaw must also contain a section which assures that the local or regional government will take responsibility for correcting the failing system if it fails to meet the terms and conditions of the permit or if the test proves unsuccessful.

Note: 1. Throughout the remainder of this document the term "current system means:
   a. Conventional Septic Tank System
   b. Conventional Package Treatment Plant System
   c. Alternate System currently in use.

2. All permits issued under the Sewage Disposal Regulation, including ones under this policy, will be appealable to the Environmental Appeal Board when the necessary legislation is enacted.

II. Proposal

An applicant for approval of a "system" must submit a proposal to the Chief Environmental Health Officer of the local Health Unit. This proposal will form the terms and conditions of the permit as well as the terms and conditions of the authorization under which the "system" shall be operated, used and covered. This document must be signed by the applicant stating that the applicant is prepared to be bound by the terms and conditions of the permit and the terms and conditions attached to the authorization to use the system. The Chief in consultation with the Senior Public Health Engineer and Manager, Environmental Contaminants/Waste Disposal, will review the proposal, determine whether or not sufficient supportive theory/applied research exists, and evaluate the adequacy of the proposal. The Medical Health Officer for the area will be made aware of the development of the proposal. A report will also be made to the Union Board of Health.

At a minimum the proposal should include:

1. A description of the hypothesis or intended objective. What is the proposed "system" intending to prove or disprove?

2. The supportive theory and/or applied research that suggests the hypothesis or intended objective is realistic and reasonable and has technical merit. The research should be scientifically valid, including having controls, and prove or support the theory.

    a. This information should be confined mainly to technical aspects and should include background information, engineering data, performance results, and field data.

    b. Supporting data should include performance information concerning microbiological and chemical effluent constituents.

    c. Properly documented testing results from regulatory agencies are generally acceptable unless there are refuting facts. Testimonials from other provinces and states and individuals may not be considered as supporting theory or applied research.

3. Detailed project protocol - National Sanitation Foundation (NSF) Criteria C-9: Evaluation of Special Processes, Components, or Devices Used in Treating Wastewater may be of assistance in developing the protocol. It is included as Appendix 1. The following items, at a minimum, should be included in the protocol:

   a. Sources of wastewater/types of facilities.
   b. Desired usage patterns.
   c. Site conditions, including soils, climate, groundwater and topography. The conditions should be common enough to benefit large number of people or a large area.
   d. Specific testing, observations, and monitoring to be done that speak to the hypothesis or intended objective. This should include parameters, methodology, frequency, and duration.

4. Provision that an Environmental Health Officer will have a right of access for the purposes of inspection, sampling, and monitoring at all reasonable times.

5. Provision that if the applicant proposes to sell the property, he or she will advise the prospective purchaser of the "system" and that as a condition of sale, the purchaser will be required to agree to and sign the original proposal and submit a copy to the local Health Unit.

III. System Installations

1. This section offers suggested criteria for developing or reviewing a "system" application. It is provided to ensure a consistent approach to evaluation and that adequate reporting, monitoring, and test data are generated and collected. Not all activities are universally appropriate. Also, certain conditions may require special attention which cannot be addressed in this policy.

2. Before permits may be issued, the procedure outlined in Section II must be completed. The application must also meet the criteria established in Section I.

3. Each installation must meet the conditions of the proposal approved by the Chief Environmental Health Officer. Other factors to be considered include:

    a. Assurance that zoning, planning, and building requirements are satisfied.

    b. Availability of resources for monitoring, sample collection and laboratory testing.

    c. Availability of legal access to the property for inspection and monitoring purposes.

    d. Medical Health Officer, and Union Board of Health have been notified.

4. Recorded Agreement - The recorded agreement is an important part in the approval of experimental systems. It should be well thought out and must form part of the terms and conditions of both the permit to construct and the authorization to use as required.

The elements that could be included in the recorded agreement which would then form part of the Terms and Conditions of the Permit and the Authorization to use are:

1. A statement holding the health unit and the Province harmless and free of liability regarding the functioning of the experimental system.

2. A statement indicating the health unit and local or regional government's right of entry to the property for purposes of routine inspection, sampling, monitoring or necessary enforcement action.

3. A statement that the applicant or owner will not remove or damage the experimental system.

4. A statement that the applicant or owner will, in the event of a non-repairable failure (as determined by the health officer), replace the experimental system with:

   a. a current system;

   b. a hook-up to a sewer; or

   c. will cease to discharge sewage.

   Time frames for these actions should be expressed in the agreement.

5. A statement indicating the applicant's or owner's agreement to monitor and maintain the system, including details of responsibilities for the cost of maintenance and monitoring including lab fees. Except where the system is operated, maintained and ultimately corrected by local or regional government under a bylaw.

6. A statement that the applicant or owner will report and provide records on inspections and monitoring as requested or as per a schedule agreed upon by the parties. If a schedule is used, it should be included as part of the recorded agreement and terms and conditions of the permit.

7. A statement that in the event records and reports are not provided as per this agreement, the same conditions as a system failure will be applied.

8. A statement that the applicant or owner will notify prospective purchasers or other parties of this agreement before sale or transfer of ownership.

9. The Term of the project shall not exceed 5 years.

The recorded agreement should be approved by the environmental health officer and filed for record with the auditor (Manager, Environmental Contaminants/Waste Disposal) before the issuance of a permit or the beginning of construction.

IV. Suggested Permit Conditions and Authorizations to use Conditions

- Without first obtaining a permit from the appropriate health unit, no person shall construct a "system". No person shall cover or use a "system" until first obtaining Authorization to Use in writing from the Environmental Health Officer.

A. The following terms and conditions for the permit to construct are suggested:

1. The details of construction plans, specifications, and operation and maintenance requirements should be complete.

2. The recorded agreement, including backup design is part of the permit.

3. The details for final or intermediate inspection if not included in the recorded agreement.

4. The details of testing, including the parameters to be tested, responsibilities for sample collection, recording and reporting, frequency of testing, methods of analysis, names of laboratories and/or responsible individuals.

B. The following terms and conditions for authorization to use are suggested:

1. Authorization to use "systems" are not transferable unless the purchaser of the property agrees in writing to accept terms and conditions of the permit and the authorization to use and this is approved by the local health unit.

2. The recorded agreement.

3. The operation and maintenance agreement.

4. The details of testing, including the parameters to be tested, responsibilities for sample collection, recording and reporting, frequency of testing, methods of analysis, names of laboratories and/or responsible individuals.

V. Performance Monitoring

A. Performance monitoring is required on all "systems" installed. The purpose of performance monitoring is to obtain current field data on the functioning of different "systems". This information should be included in the proposal with the provision that it will be the responsibility of the homeowner to undertake the monitoring.

An adequate number of "systems" must be installed for data to be statistically valid. From these systems, sufficient data should be generated from performance monitoring and testing to allow the system to be presented for future evaluation. The criteria that must be included in the proposal is as follows:

1. Life Expectancy
2. Reliability
3. Performance Testing
   a. Summary results
   b. Method and location of testing
   c. Party conducting the testing
4. Installation requirements
5. Operation and maintenance requirements
6. Possible applications, with supporting evidence
7. Energy requirements

B. The frequency and duration of performance monitoring will vary depending on the type of experimental system being considered. The frequency and duration of monitoring should be agreed upon and included in the recorded agreement and be part of the terms and conditions of the permit and the authorization to use.

It is recommended that a minimum initial monitoring period of two (2) years be considered. During the period, quarterly inspections are suggested. Following the initial two years, annual inspections are recommended.

The factors monitored will also vary, depending on the type of "system" being proposed. As a minimum, the following factors should be considered:

1. Age of system
2. Type of use
3. Name brand or manufacturer
4. Mechanical or electrical malfunctions
5. Pump or switch problems
6. Neglect or improper maintenance

When problems are identified, a brief narrative describing the problem and indicating the frequency and duration of the problem should be provided.

Completed forms/records shall be submitted to the Chief Environmental Health Officer and Manager, Environmental Contaminants/Waste Disposal.

C. The responsibility for operation and management should be determined and documented in the recorded agreement which will form the terms and conditions of the permit and authorization to use. An operation and management manual should be provided for all "systems". The content will depend on the complexity of the system. If required by the environmental health officer, the manual could be included as part of the recorded agreement which will form part of the terms and conditions of the permit and authorization to use.

VI. At the end of the evaluation period which shall not be longer than five years the Chief Environmental Health Officer, Senior Public Health Engineer and Manager, Environmental Contaminants/Waste Disposal, will review the "system" and make recommendations on the suitability of the "system" as proposed.

APPENDIX 2

NSF BASIC CRITERIA C-9

FOR
EVALUATION OF SPECIAL PROCESSES, COMPONENTS, OR DEVICES USED IN TREATING WASTEWATER

SECTION 1. GENERAL

1.0 SCOPE: These criteria cover the requirements for special processes, components, or devices used in handling, treatment, or disposal of wastewater. These criteria shall be used to evaluate special processes, components, or devices not covered by other NSF standards or criteria. It is considered impractical to specify the parameters for all pertinent tests which could apply to the various types of equipment. Provision is made for the manufacturer to suggest applicable evaluation parameters with supportive data (see Appendix A).

1.1 MINIMUM REQUIREMENTS: Variations from these minimum requirements may be permitted when they make the process, component, or device equally resistant to corrosion, wear, and physical damage, or if they provide equal operation and performance. Variations shall be accepted prior to use. Devices with components covered under existing NSF standards shall comply with those applicable requirements.

1.2 ALTERNATE MATERIALS: If the specific materials are mentioned, other materials equally satisfactory may be permitted.

1.3 CRITERIA REVIEW: A complete review of these criteria shall be conducted at least every five years to keep the requirements consistent with new technology. These reviews shall be conducted by representatives from the public health, industry, and user groups of NSF Joint Committee on Wastewater Technology.

SECTION 2. DEFINITIONS

PROCESSES, COMPONENTS, OR DEVICES

2.0 APPURTENANT DEVICE: A component of a total or unit process (diffuser, chemical feed pump, chlorinator, etc.).

2.1 TOTAL PROCESS: A process receiving raw wastewater and discharging a treated effluent. Types of total processes may be classified as:

2.1.1 Biological;

2.1.2 Chemical;

2.1.3 Mechanical;

2.1.4 Other or combinations of the above.

2.2 UNIT PROCESS: A single step in the total treatment process (comminution, screening, aeration, sedimentation, chemical precipitation, vacuum filtration, centrifugation, incineration, chlorination, etc.).

ANALYTICAL PARAMETERS

2.3 ACIDITY: The quantitative capacity of aqueous solutions to react with hydroxyl tons expressed as milligrams per liter (mg/L) of calcium carbonate.

2.4 ALKALINITY: The quantitative capacity of aqueous solutions to neutralize acids, a property imparted by carbonates, bicarbonates, hydroxides, and occasionally borates, silicates and phosphates expressed as mg/L of calcium carbonate.

2.5 AMMONIA NITROGEN (NH_3-N): All the nitrogen in wastewater which exists as ammonium ion or in the equilibrium $NH_4+ \quad NH_3+H^+$.

2.6 CHEMICAL OXYGEN DEMAND (COD): A measure of the oxygen-consuming capacity of organic and inorganic matter present in wastewater expressed as mg/L.

2.7 CHLORINE DEMAND: The difference between the amount of chlorine added to wastewater and the amount of residual chlorine remaining at the end of a specified contact period expressed as mg/L.

2.8 CHLORINE RESIDUAL: A measure of the amount of chlorine remaining in wastewater after a specific contact period.

2.9 DISSOLVED OXYGEN (DO): The oxygen dissolved in wastewater, expressed as mg/L.

2.10 DRAINABILITY: A measure of the dewatering characteristics of sludge.

2.11 FECAL COLIFORMS: Aerobic and facultative anaerobic, gram-negative, nonspore-forming, rod shaped bacteria, distinguished from nonfecal coliforms by incubation at 44.5°C.

2.12 FIVE-DAY BIOCHEMICAL OXYGEN DEMAND (BOD_5): The quantity of oxygen used in the biochemical oxidation of organic matter in five days at 20°C under specified conditions, expressed as mg/L.

2.13 HEAD LOSS: The difference between total heads at two points in the hydraulic system, expressed in feet (m) of water.

2.14 METHYLENE BLUE ACTIVE SUBSTANCE (MBAS): A blue salt formed when methylene blue complexes with anionic surfactants.

2.15 MOISTURE CONTENT: The quantity of water in sludge filter cake or screenings, expressed as percent of wet weight.

2.16 NITRATE NITROGEN (NO_3-N): The end product in the oxidation of ammonia or organic nitrogen.

2.17 NITRITE NITROGEN (NO_2-N): An intermediate product in the oxidation of ammonia or organic nitrogen, or reduction of nitrate.

2.18 pH: The logarithm of the reciprocal of the hydrogen-ion concentration.

2.19 PHOSPHATES (PO_4): Acid salts containing phosphorus, expressed as PO_4.

2.20 PRESSURE (P): The total load or force applied to a unit area of surface, expressed in pounds per square inch (psi) (kPa).

2.21 SENSITIVITY LEVEL: The lowest concentration that can be detected and quantified by a test method.

2.22 SETTLEABLE SOLIDS: Solids which settle during a preselected period of time, expressed as milliliters per liter of sample after 30 minutes of settling time (mL/L/30 min).

2.23 SLUDGE VOLUME INDEX (SVI): Ratio of the volume in mL of sludge settled in 30 minutes from a 1,000 mL sample of mixed liquor to the concentration of suspended solids in mg/L multiplied by 1,000.

2.24 SUSPENDED SOLIDS (SS): Solids in wastewater which can be removed readily by standard filtering procedures in a laboratory, expressed in mg/L.

2.25 TEMPERATURE (T): The measure of the thermal state of a substance with respect to its ability to communicate heat to its environment, expressed in degrees centigrade (°C).

2.26 TOTAL COLIFORMS: All aerobic and facultative anaerobic, gram-negative, nonspore-forming, rod shaped bacteria that ferment lactose with gas formation within 48 hours at 35°C; all bacteria that produce a dark purplish-green colony with metallic sheen within 24 hours following incubation by the membrane filter technique used for typical coliform identification.

2.27 TOTAL ORGANIC NITROGEN (TON): All of the nitrogen combined in organic molecules such as proteins, amines, and amino acids.

2.28 TOTAL SOLIDS (TS): The sum of dissolved and undissolved constituents in wastewater, expressed in mg/L.

2.29 VOLATILE SUSPENDED SOLIDS (VSS): The percent of total suspended solids in wastewater which are lost on ignition of the dry suspended solids at 550 ± 50°C.

SECTION 3. MATERIALS

3.0 GENERAL: Materials used in the construction of processes, components, or devices must be structurally sound under operating conditions. They shall withstand exposure to the use environment, including corrosive action of chemicals used.

3.1 DURABILITY: Materials shall be durable and withstand normal stresses during shipping, installation, and operation.

SECTION 4. DESIGN AND CONSTRUCTION

4.0 GENERAL: Processes, components, or devices shall be fabricated to perform their intended function when installed and operated according to the manufacturer's instructions. They shall not be adversely affected by the use environment. Processes and appurtenant devices shall be fabricated to present no hazardous or unsafe condition when operated according to the manufacturer's instructions.

4.1 SERVICEABILITY: Component parts subject to malfunction or wear shall be accessible for repair or replacement.

4.2 CHEMICAL REQUIREMENTS: The manufacturer shall supply, on a confidential basis, a detailed description of types and quantities of any chemicals required for the operation when presented for evaluation. In lieu of specific quantity requirements, the manufacturer may submit a test methodology for determining chemical requirements.

4.3 ELECTRICAL EQUIPMENT: Electrical equipment shall be protected with safety devices (overload interrupting devices, fuses, etc. and shall comply with appropriate National Electrical Manufacturers' Association (NEMA), American National Standards Institute (ANSI), and/or Underwriters Laboratories (UL) requirements. Equipment shall be capable of installation in compliance with the National Electrical Code. Electrical component parts shall be covered by the manufacturer's limited warranty (see Item 5.4).

4.4 MECHANICAL COMPONENTS AND SYSTEMS: Mechanical components and systems shall be provided with personnel safeguards, and be protected against damage or impairment of efficiency for all normally anticipated operating conditions. Mechanical component parts shall be covered by the manufacturer's limited warranty (see Item 5.4).

SECTION 5. INSTRUCTIONS AND INFORMATION

5.0 GENERAL: A complete installation and operation manual (including a basic description of process fundamentals, design data, complete drawings and specifications) shall be provided by the manufacturer with the application for evaluation.

5.1 INSPECTION AND MAINTENANCE: A manual (including instructions for any required inspections, accessibility, and maintenance operations) shall be provided by the manufacturer with the application for evaluation.

5.2 ENERGY REQUIREMENTS: The manufacturer's engineering data and literature shall specify the energy sources and requirements for proper operation of processes, components, or devices or any auxiliary system.

5.3 PARTS LIST: The manufacturer shall provide a parts list with each process, component, or device. Parts shall be listed by number, letter or symbol, and identified by the same designation on a photograph, print, or illustration with the same designation.

5.4 LIMITED WARRANTY: The manufacturer shall provide at least a two-year limited warranty, from date of installation, covering all parts and materials. See sample limited warranty in Appendix B (see also Items 4.3 and 4.4).

5.5 DATA PLATE: A permanent type plate shall be provided. The plate shall be inscribed and installed to be easily seen and understood, and be securely attached at a location normally visible following recommended installation. It shall include:

5.5.1 Name and address of manufacturer;

5.5.2 Model and serial number designation;

5.5.3 Design capacity or rated daily capacity, if applicable.

SECTION 6. PERFORMANCE EVALUATION METHOD

6.0 PREQUALIFICATION: Prior to performance evaluation, the manufacturer shall supply evidence of the feasibility of the process, component, or device for its intended use.

6.1 GENERAL TEST CONDITIONS: Performance evaluation shall be independent of design and construction. However, structural weaknesses, undesirable noise, and other environmental defects and failures during the test shall be reported in the test results.

6.1.1 The device shall be operated and maintained, or the process carried out, according to the manufacturer's instructions. If these instructions conflict with the provisions of Section 6, the provisions of the criteria shall apply. Records for frequency of maintenance shall be included.

6.1.2 All sample collection and analytical methods shall be those established in the 15th edition of *Standard Methods for the Examination of Water and Wastewater*, published by the American Public Health Association, except as otherwise specified.

6.1.3 The duration of the evaluation period shall be sufficient to insure that results are reliable and applicable to anticipated operating conditions. The length of the evaluation period shall be specified in the test report.

6.2 EVALUATION PARAMETERS: Evaluation parameters shall be determined by the Special Task Committee.

6.2.1 TOTAL PROCESS: Parameters for evaluating a total process may include:

- Alkalinity
- Dissolved Oxygen
- Nitrogen - Ammonia, Nitrite, Nitrate and/or Total Organic
- Oxygen Demand - Biochemical and/or Chemical
- pH
- Phosphates
- Suspended Solids
- Temperature
- Total and/or Fecal Coliform Densities

6.2.2 UNIT PROCESS: Parameters for evaluating a unit process may include:

- Chlorine - Demand and/or Residual
- Dissolved Oxygen
- Drainability
- pH
- Moisture
- Oxygen Demand - Biochemical and/or Chemical
- Solids - Total Suspended, Volatile and/or Settleable
- Temperature
- Total and/or Fecal Coliform Densities

6.2.3 APPURTENANT DEVICES: Parameters for evaluating appurtenant devices may include:

- Chlorine Demand - and/or Residual
- Dissolved Oxygen
- Drainability
- Head Loss
- Particle Size
- pH
- Response Time
- Sensitivity
- Total and/or Fecal Coliform Densities

6.2.4 APPLICATION INFORMATION: An application may be accompanied by suggested evaluation parameters, giving anticipated range of values, and citing as reference: published data, manufacturer's tests, and other valid source of information. Where possible, these suggested evaluation parameters shall follow the format of NSF standards or criteria. They shall include the basis for deviations from standards and criteria which relate to similar devices or processes.

6.2.5 REPORTS: The testing agency shall provide a report to the manufacturer that includes the test protocol and significant data showing the test results. Appropriate comments shall also be provided.

SCHEDULE 2

PERMITTED USES AND STANDARDS FOR RECLAIMED WATER (SECTION 13)

Reclaimed Water Category and Permitted Uses	Treatment Requirements[1]	Effluent Quality Requirements[2]	Monitoring Requirements[3]
UNRESTRICTED PUBLIC ACCESS			
URBAN - Parks - Playgrounds - Cemeteries - Golf Courses - Road Rights-of-Way - School Grounds - Residential Lawns - Greenbelts - Vehicle and Driveway Washing - Landscaping around Buildings - Toilet Flushing - Outside Landscape Fountains - Outside Fire Protection - Street Cleaning AGRICULTURAL - Aquaculture - Food Crops Eaten Raw - Pasture (no lag time for animal grazing) - Frost Protection, Crop Cooling and Chemical Spraying on Crops Eaten Raw RECREATIONAL[14] - Stream Augmentation - Impoundments for Boating and Fishing - Snow Making	Secondary[4] Chemical Addition[5] Filtration[6,2] Disinfection[7] Emergency Storage[1]	pH = 6 - 9 ≤ 10 mg/L BOD_5 ≤ 2 NTU[8] 2.2 fecal coli/100 mL[9,10] General[11,12]	pH - weekly BOD - weekly Turbidity - continuous Coliform[13] - daily (flow ≥ 5000 m^3/d) - weekly (flow < 5000 m^3/d)
RESTRICTED PUBLIC ACCESS			
AGRICULTURAL - Commercially processed food crops[15] - Fodder, Fibre, Seed Crops - Pasture[16] - Silviculture - Nurseries - Sod Farms - Spring Frost Protection - Chemical Spray - Trickle Drip Irrigation of Orchards and Vineyards - Aquaculture URBAN/RECREATIONAL[14] - Landscape Impoundments - Landscape Waterfalls - Snow Making (during production) CONSTRUCTION - Soil Compaction - Dust Control - Aggregate Washing - Making Concrete - Equipment Washdown INDUSTRIAL[20] - Cooling Towers - Process Water - Stack Scrubbing - Boiler Feed ENVIRONMENTAL[14,21] - Wetlands - Marshes - Stream Augmentation	Secondary[4] Disinfection[7]	pH = 6 - 9 ≤ 45 mg/L BOD_5 ≤ 45 mg/L TSS ≤ 200 fecal coli/100 mL[9,17,18] General[12,19]	pH - weekly BOD - weekly TSS - daily Coliform - weekly

≤ means less than or equal to ≥ means greater than or equal to > means greater than

APPENDIX 1 TO SCHEDULE 2: EXPLANATORY NOTES

1 Reliability must be provided for all treatment processes as set out in schedule 10. For the unrestricted public access category emergency storage must also be provided as set out in section 13.

2 Effluent quality limits must apply to the reclaimed water at the point of discharge from the treatment facility. Sixty day storage after secondary treatment is acceptable in lieu of filtration provided the final effluent quality requirements are met.

3 Schedule 2 monitoring requirements are additional to and/or take precedence over the monitoring requirements set out in section 30 and schedule 7.

4 Secondary treatment processes include activated sludge processes, trickling filters, rotating biological contactors and many stabilization pond systems. Secondary treatment must produce effluent in which both the BOD and TSS do not exceed 45 mg/L and average 20 to 30 mg/L.

5 Chemical addition includes coagulant and/or polymer prior to filtration. Use is restricted to those coagulants and polymers shown to be non-toxic.

6 Filtration means the passing of secondary effluent through filter media such as sand, membranes, anthracite and/or other comparable filter media.

7 Disinfection means the destruction, inactivation or removal of pathogenic microorganisms by chemical, physical or biological means. Disinfection may be accomplished by chlorination, ozonation, other chemical disinfectants, UV radiation, membrane processes or other processes.

Turbidity limit shall be met prior to disinfection. The average turbidity must be based on a 24-hour time period. The turbidity must not exceed 5 NTU at any time. If TSS is used in lieu of turbidity, the average TSS must not exceed 5 mg/L.

9 Coliform limits are median values determined from the bacteriological results of the last 7 days for which analyses have been completed. Either the membrane filter or fermentation tube technique must be used.

10 The number of fecal coliform organisms must not exceed 14/100 mL in any sample.

11 Microbiological quality of the reclaimed water must be fully characterized prior to implementation of a reuse program. Reclaimed water must not contain measurable levels of pathogens. Reclaimed water must be clean, odourless, non-irritating to skin and eyes and must contain no substances that are toxic upon ingestion.

12 Agricultural (crop) limits must govern criteria for metals. High nutrient levels may adversely affect some crops during certain growth stages. Crop limits and season must govern nutrient application.

13 Coliform monitoring must be daily for all flows $\geq 5000\ m^3/d$. For flows $< 5000\ m^3/d$, coliform monitoring must be weekly unless quality limit exceeded, in which case monitoring must be daily until quality limit is in compliance. Ten tests must be conducted to demonstrate that the discharge is back in compliance and frequency can be reduced.

14 Dechlorination must be undertaken to protect aquatic species of flora and fauna. Nutrient removal may be necessary to limit algae growth in impoundments.

15 Commercially processed food crops are those that, prior to sale to the public or others, have undergone chemical or physical processing sufficient to destroy pathogens.

16 Milking animals must be prohibited from grazing for 6 days after irrigation ceases. Other cattle must be prohibited from grazing for 3 days after irrigation ceases unless the meat is inspected under the Federal Meat Inspection Program.

17 The number of fecal coliform organisms must not exceed 800/100 mL in any sample.

18 Worker contact with reclaimed water must be minimized. A higher level of disinfection to achieve ≤ 14 fecal coli/100 mL must be provided where frequent worker contact with reclaimed water is likely.

19 Setback distance to potable water well must be ≥ 30 m. Windblown spray must not reach areas accessible to the public.

20 Consult recommended water quality limits for make-up water. Additional treatment by user is usually provided to prevent scaling, corrosion, biological growths, fouling and foaming.

21 If chlorine is used as a disinfectant then dechlorination is necessary to protect aquatic species of flora and fauna. The use of alternative disinfection methods is recommended. Possible effects on groundwater must be evaluated. Receiving water quality requirements may necessitate additional treatment. The temperature of the reclaimed water must not adversely affect the ecosystem.

PROPOSED REVISION SHEET

Change No. 7.1.-03	Date: August 1996	Page 1 of 1
Reference: 7.1.6.3.		
Ontario Building Code O Reg. 413/90 as amended		

EXISTING REQUIREMENT

7.1.6.3. Water Distribution Systems. Every *water distribution system* shall be connected to a public watermain or if no public watermain a *potable private water supply system.*

PROPOSED CHANGE

Delete Article 7.1.6.3. and substitute:

7.1.6.3. Water Distribution Systems

(1) Every *water distribution system* shall be connected to a public watermain or if no public watermain is available a *potable private water supply system.*

(2) Notwithstanding Sentence (1), where a supply of *potable* water is unavailable or insufficient to supply water to a *plumbing system*, non-*potable* water may be used for the flushing of *sanitary units* or the priming of *traps*, and the piping conveying the non-*potable* water shall be installed in conformance with Section 7.7.

REASON

To allow non-potable water to be used to flush sanitary units or prime traps. This had previously been allowed and had caused no problems.