PART II – SAFE DRINKING WATER LEGISLATION IN OTHER JURISDICTIONS: DESCRIPTION AND IMPLEMENTATION

2.1 Introduction

This section provides overview information on jurisdictions other than Ontario and discusses how they handle the quest for safe drinking water. There is evidence that the U.S. *Safe Drinking Water Act* has been effective in reducing the outbreaks of waterborne disease. It is our observation, however, that most legislation and regulation is reactive, rather than innovative. Usually legislation or regulations are introduced or strengthened after there have been disease outbreaks caused by drinking water. Within the last year, since the tragedy at Walkerton almost every province in Canada has tightened its drinking water regime. Similarly, in New Jersey where some of the strongest provisions have been enacted, communities suffered diseases such as cancer and even mercury poisoning from contaminated drinking water. These misfortunes triggered more protective legislation at the state level and at the federal level.

The comparative analysis in this section is not always consistent for every jurisdiction as the emphasis is on innovative initiatives worthy of consideration in a new and improved Ontario regime. This has involved a "pick and choose" approach along with a contextual analysis of the particular jurisdictions. Generally, information on the following list of topics was sought. The topics reflect issues identified by CELA during its long history of dealing with water issues, as well as specific observations related to Walkerton. However, given the wide range of jurisdictions and sources of information, as well as prevailing conditions, information on all of these topics was not always obtained.

The topics include:

a. Accountability: Is there one ministry responsible? What is the accountability structure, and is it easily ascertainable? Is responsibility fragmented or is the Health or Environment minister in overall control?

b. Statement of purpose / statement of rights: Is there a statement of purpose in the applicable legislation so that consistent direction is provided when interpreting individual provisions?

c. Applicability of the Legislation: How comprehensive is the legislation? Does it apply to private wells, bottled water, the whole country or province?

d. Does the legislation apply to the Crown?

e. Setting contaminant standards and regulations: What is the standard-setting process? Is there periodic review of standards? How are new pathogens identified? Are standards set through regulations or guidelines? Are vulnerable populations specifically considered?

f. Approvals, licensing, and accreditation: Licensing of water works, operators and testing facilities. Are public or private labs used? If a combination, which functions do each perform?

g. Operational duties: testing, treatment, notification, and corrective action. Are all water sources required to be treated and tested? Who is required to monitor and what are the testing requirements? Are there notification requirements when test results show contamination or results above standards? Is there a duty to act, and when is it activated?

h. Source water assessment and protection: Are there provisions for watershed protection, including watershed assessments? What level of government is responsible (provincial, municipal)? Are there requirements for wellhead protection?

i. Community right to know: Is there a specified course of action for things like boil water orders, results of sampling, and irregular operational events? When must the community be notified, and how? Are vulnerable populations identified and specially considered for notification purposes?

j. Provincial monitoring and reporting: Is there an annual report or audit requirement? What is the frequency of reporting?

k. Investigation and enforcement: Is there provision for citizen suits? Are government decisions subject to judicial review? Are there mandatory funding requirements?

l. Prohibitions and penalties: What types of prohibitions and penalties are included in the legislation and regulations?

m. Funding, research and technical assistance: Are there ongoing requirements for research, and are there special mechanisms for funding such research? Are small water systems given special assistance? Are there funding obligations for treatment systems? Are any types of funding requirements entrenched in law? Are small systems / communities given priority?

n. Advisory mechanisms: Does government utilise private sector and academic expertise through advisory committees or other advisory mechanisms, and are they required by law or merely allowed if government wishes to utilise such arrangements?

2.2 Other Canadian Provinces (British Columbia, Alberta, Québec, New Brunswick)

(a) British Columbia

British Columbia has an extremely complex framework for water with numerous statutes, regulations and guidelines coming into play. Several ministries share responsibility for monitoring and enforcement. The threats to the province's drinking water sources come from the resource-based industries and their polluting activities – toxic effluents from pulp and paper

mills, acid mine drainage, extensive livestock operations and erosion, landslide and road building from the forest industry.[127]

B.C. has the highest per capita incidence of waterborne and food-borne disease of any province in Canada, according to the B.C. Auditor-General's 1999 report "Protecting Drinking Water Sources".[128] Toxoplasmosis, *Cryptosporidium*, and *Giardia* have been the well-documented culprits in several outbreaks. Since 1985 there have been 18 confirmed outbreaks of waterborne disease in B.C., and in February 2000 there were 240 boil water advisories in effect in the province.[129] In 1996 there were more than 12,000 cases of waterborne illness caused by *Cryptosporidium* associated with human activities and livestock. In April, 2001, there were over 200 boil water advisories in British Columbia.[130]

After a number of outbreaks in the 1980s, concern over drinking water quality in British Columbia was high, and legislation was passed to address the problems -- the *Health Act*[131] and the Safe Drinking Water Regulations under this Act. This Act is administered by the Ministry of Health, which has the primary responsibility for safeguarding drinking water in British Columbia.

The most vulnerable communities are those that depend on small water systems where there is a lack of resources for protecting the sources, and for influencing development approvals. In the wake of Walkerton British Columbia is stepping up its enforcement of its 1992 Agricultural Waste Control Regulations under the *Waste Management Act*. This is the only law that addresses agriculture in the province. There are no regulations in British Columbia that protect groundwater.

These agricultural waste control regulations are intended to control farming practices that contaminate ground and surface water. The concern is for nitrates, particularly in the lower Fraser Valley where the aquifer is unconfined. That is, there is no protective layer over the seven major aquifers that provide drinking water, and water soluble nitrates from animal manure are easily carried into the groundwater. The government is inspecting farms throughout the Fraser Valley to ensure that during the winter, farmers are covering manure piles and are not spreading manure on land. Nitrates are of concern because they are linked to SIDS (sudden infant death syndrome) and are suspected carcinogens.

The 1999 B.C. Auditor-General's Report made 26 recommendations. In March 2000 a report was presented to the Standing Committee on Public Accounts outlining actions being taken in

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[127] West Coast Environmental Law Association, *Safe to Drink.* Vancouver, BC: June 2000
[128] Office of the Auditor General of B.C. 1998/1999: Report 5, April 1999 at p.2 of 12: http://www.oag.bc.ca/pubs/1998-99/report-5/sec-1.html.
[129] British Columbia Ministry of Health, Health File #49a, February 2000: <http://www.hlth.gov.bc.ca/hlthfile/hfile49a.html >.
[130] Dirk Meissner, "*B.C.'s new act designed to avoid Walkerton Tragedy*", Canadian Press, April 6, 2001, <http://allpop.com/Health0104/06_water-cp.html>, accessed April 10, 2001
[131] *Health Act*, R.S.B.C. 1996, c. 179.

response to the recommendations.[132] The report categorized its initiatives into four main topics, and the ministries or agencies responsible for each. These were:

- source water protection (11 responsible agencies)

- water treatment (4 responsible agencies)

- distribution system (4 responsible agencies)

- monitoring/evaluation (2 responsible agencies).[133]

The report recognized that source water protection is complex because differing land tenure and land uses involve several agencies and interests, and that although delivery of safe water is the responsibility of the water purveyor, a degraded source water supply often increases the outlay of treatment expenditures. The province is trying to build an information base for better management of groundwater through the mapping of aquifers and monitoring of groundwater quality and quantity. Consideration is also being given to developing groundwater protection legislation.[134]

The Auditor-General noted that responsibility for drinking water was shared by many different ministries in British Columbia, and recommended that there be "one voice" speaking for drinking water in the province.

Another major issue recognized by the Auditor-General is the vulnerability of small water systems. Approximately 500,000 people, or one-seventh of B.C.'s population, get their drinking water from small systems. Sixty percent of them use surface water and the rest use groundwater.[135]

This report has led the government to introduce a proposed Drinking Water Protection Plan that was discussed throughout the province at public meetings. The main points of discussion in the plan are proposals to: assess water sources to identify threats to drinking water; make assessments and monitoring reports public; set province-wide standards for drinking water and for frequency of monitoring; and to require training and certification for operators.

Environmentalists are critical of the Plan for not recommending a single drinking water agency, one of the primary recommendations of the Auditor-General's report.

As a result of these consultations, the B.C. government recently enacted the *Drinking Water Protection Act* in April, 2001[136], making B.C. the first province to enact a statute dedicated to drinking water. The *Drinking Water Protection Act* is organized into six main parts:

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[132] British Columbia Ministry of Environment, Lands & Parks, "Provincial Government Actions to protect Drinking-water Sources" (March 8, 2000): http://www.elp.gov.bc.ca/wat/wq/dw/march2000pac.html.
[133] Ibid, p.2.
[134] Ibid, p3-7.
[135] See footnote 2 (Auditor General's Report), Ch. 5, p.1, of 7.
[136] Bill 20, *Drinking Water Protection Act*, 5th Session, 36th Parliament (assented to April 11, 2001, S.B.C. 2001, c. 9) < http://www.legis.gov.bc.ca/2001/3rd_read/gov20-3.htm >

- Part 1: creation of drinking water officers, provincial drinking water coordinators, and drinking water advisory committees;

- Part 2: protection of drinking water supply through treatment, monitoring, training, notification, and emergency response requirements;

- Part 3: development of water source and system assessments and response plans;

- Part 4: creation of various prohibitions, penalties and administrative orders to protect drinking water;

- Part 5: development of drinking water protection plans for prescribed areas; and

- Part 6: creation of investigation and enforcement powers, and consequential amendments to other provincial water laws."

The Act is noteworthy for its focus on the relationship between source water quality and drinking water quality. It is hoped that the Act will address the many source water protection problems highlighted in the B.C. Auditor General's report that were responsible for B.C. having an unacceptably high pathogen incidence. According to one commentator, the Act has made B.C. "world leaders in preventative action" through its focus on source protection. However, the legislation is brand new, and is only a framework, so it will require time to see how it will be implemented.

Commentary:

With the new *Drinking Water Protection Act*, British Columbia has moved to the forefront among provinces in terms of establishing a strong commitment to safe drinking water, particularly regarding source water protection and accountability. The *Water Act* of 1909, administered by the Ministry of Environment, Lands and Parks, licenses water-related activities. And in 1995, British Columbia has passed the *Water Protection Act*, which confirms that British Columbia owns its water. This legislation prohibits large-scale diversions. But until the *Drinking Water Protection Act*, there has been no single Act or Agency that governs and protects drinking water in B.C.

In the past, one of the strengths of the B.C. system has the strong role played by the Ministry of Health. B.C. commentators believe action is quicker because health officials, as opposed to environment officials, have appropriate expertise to deal with drinking water problems. Even in the new Act, both health and environment ministers are to appoint “provincial drinking water coordinators”, who are required to jointly establish guidelines and directives to be considered by officials acting under the legislation, so a strong health role will be maintained.

The new Act also goes a long way towards addressing former serious gaps in British Columbia’s legislative framework: there are now qualification standards for operators, there is a

strengthened system of permits for the construction and operation of water supply systems, and significant new source water assessment and drinking water protection plan provisions.
Vulnerable populations are given consideration in that the Ministry of Health advises anyone who is immuno-compromised to boil drinking water[137] – as does the American Water Works Association. Disinfection is mandatory in British Columbia, although even this measure is controversial. One community, Erickson, was recently taken over by the Ministry of Municipal Affairs because it refused to chlorinate its drinking water.

The history of the struggle in British Columbia to protect drinking water has been carried out largely on a community by community basis. The Ministry of Environment, Lands and Parks plays a role in the protection of watersheds, a necessity to protect drinking water; but it must also balance the interests of the Ministry of Forests that administers the *Forest Practices Code Act*.
The problems in British Columbia mostly arise from the tension between communities and the logging ambitions of the forest industry. Much of the accessible old growth forest is gone, and now forest companies are looking at the watershed areas that have traditionally been off-bounds for them. Because the watershed areas are near communities, they are also near the mills and, therefore, attractive targets for the forest industry. The lower Fraser Valley is more agricultural and more prone to the problems afflicting communities like Walkerton.[138]

Together, Victoria and Vancouver account for 61 per cent of the population of British Columbia, and both these cities now have watershed protection in place. Victoria is a good example of successful community control. The Capital Regional District government encompassing Victoria owns the land within the catchment basin and watershed area from which it obtains its drinking water. The area is 87 square kilometres and is 90 per cent owned and controlled by the Water Department. Activities in this watershed area are very restricted. People are not allowed into the watershed area and fencing keeps cattle out. An Advisory Committee has been set up to provide advice on water supply, water quality and the stewardship of the watershed lands.[139]

Under the provincial *Land Act*[140], four other communities including Vancouver, Enderby, Fernie, and Vernon have obtained long term leases from the province for their water supply lands.[141]
The Greater Vancouver Water District was formed in 1926 when a 999-year lease was granted by the province for the watershed lands under the *Land Act*. By 1936, mining and logging operations were halted and the Water District adopted a closed watershed policy.
In the 1960s, Vancouver jeopardized the integrity of its drinking water by allowing logging within the watershed area. This was done through an amendment in 1965 that turned the watershed area into a tree farm by allowing wood to be extracted. Logging leads to road building and sedimentation in the drinking water and the need for more chlorination to clean the

[137] British Columbia Ministry of Health, Health File #56, February 2000:
< http://www.hlth.gov.bc.ca/hlthfile/hfile56.pdf >
[138] For British Columbia, comments on the existing situation were obtained from Les Swain, Acting Manager of Water Quality, Ministry of Environment (250 387-9500), Bev Anderson, Ministry of Environment (604 582-5340), Ivan Bulic of SPEC (604 736-7732), Karen Rothe, Watershed Planner, Habitat Branch, Ministry of Environment, Lands and Parks (250-387-9556), and Will Koop, SPEC, Vancouver (604-224-4717) and wkoop@alternatives.com.
[139] B.C. Capital Regional District Water Department < http://www.crd.bc.ca/water >, accessed March 15, 2001.
[140] *Land Act*, R.S.B.C. 1996, c. 245.
[141] West Coast Environmental Law Association and B.C. Environmental Network, Steven Shrybman. *Safe to Drink* (June 2000), < http://www.wcel.org/wcelpub/2000/13148.pdf >, accessed November, 2000."'

drinking water. After a long campaign by the Society Promoting Environmental Conservation (SPEC), a Vancouver-based environment group, the tree farm licence has been revoked and the watershed area is once again being protected as a drinking water source.[142] SPEC and other B.C. environmental groups would like to see every community watershed area set aside as an exclusive reserve used only for drinking water. In 1980, a provincial Task Force created Community Watersheds, designating any community where a water licence was held for drinking water and whose watershed area was more than 50 per cent Crown land. The government planned to develop guidelines to protect community watersheds from logging, agriculture and other threats to the drinking water supplies. When the Forest Practices Code came into effect in 1995, however, these designated areas were incorporated into that legislation.

At that time about 400 communities were designated as community watersheds. Other communities have since applied for this designation. However, the degree of protection available to these communities under the *Act* is very limited. It means the forest companies, before they receive their licences to cut trees, must enter into an agreement with the communities to protect the watershed. Logging companies are generally required to respect water supplies by leaving buffer zones, restricting clearcutting, and maintaining water quality by meeting the Ministry of Environment, Lands and Parks' water quality objectives. However, these are not across-the-board objectives, but vary according to the community.

(b) Alberta

In 1993 Alberta consolidated and updated its environmental legislation into one broad statute – the *Environmental Protection and Enhancement Act*, administered by Alberta Environment[143]. These legislative changes were not sparked by any major incident but by the desire to deal more holistically with environmental legislation and put into place common legal tools for the various types of approvals and contraventions.

The Act's purpose is "to support and promote the protection, enhancement and wise use of the environment", while recognizing ten principles including "the need for Government leadership in areas of environmental research, technology and protection standards", and " opportunities made available through this Act for citizens to provide advice on decisions affecting the environment (s.2 (e),(g)). The Crown is bound by the Act except where the Act specifically provides to the contrary (s.3).

Although the Act is not a *Safe Drinking Water Act*, it does address responsibility issues through the establishment of a Sustainable Development Co-ordinating Council. This Council, to consist of Deputy Ministers from a large number of other departments, including health and municipal affairs, the chairs of Energy Resources and Natural Resources Conservation Boards and the Chief Executive Officer of the Alberta Science, Research and Technology Authority, reports to the Minister designated by the Act (s.5-11). The Act also specifically recognizes the "integral relationship between human health and the environment" and requires the Minister to "co-

[142]For more information on the Greater Vancouver Regional District watershed lands, see <http://www.gvrd.bc.ca/services/water/sheds/default.html > accessed March 15, 2001. For the SPEC campaign, see http://www.spec.bc.ca/campaigns/water/BriefFeb20-2001.htm accessed February 27, 2001.
[143] *Environmental Protection and Enhancement Act*, S.A. 1992, c. E-13.3.

operate with and assist the Minister of Health in promoting human health through environmental protection" (s.11).

The Minister may enter into agreements with landowners to restrict uses of a particular piece of land, and may also enter into conservation easements (s.22). An environmental protection and enhancement fund is established under the Act, and a separate accounting record of the fund is to be kept by the Provincial Treasurer (s.28).

Potable water is dealt with as a separate subject in Part 7 of the Act. It defines "disinfection" and "person responsible for a waterworks system" (s.40). It allows for an environmental protection order to be issued even if an approval holder is complying with the terms and conditions of its approval where the Director believes that the waterworks may cause potable water to be unfit for any of its intended uses or cause the concentration of a substance to vary from the specified concentration for that substance as set out in any applicable approval or regulation (s.143(1)). Emergency measures are provided for, and the Minister may (but is not required to) make regulations (s.145, 146).

The Minister is to report annually on the state of the Alberta environment (s.15). An innovative public involvement provision allows any 2 residents of Alberta over 18 years of age to apply to the Director to investigate an alleged offence. The applicants must make a solemn declaration related to the alleged offence, but once that is done the Director is required to investigate and report to the applicants. The Director may discontinue the investigation but if so, he or she must prepare a statement stating the reasons for the decision and supply it to both the applicants and the person whose conduct was investigated (s.186-187).

In terms of enforcement, enforcement orders are specifically allowed to impose requirements that are more stringent than applicable requirements in the regulations "in order to effect compliance with this Act" (s.200 (2)).

Under the civil remedies provisions, costs incurred by the Director, where there has been failure to comply with an enforcement order or an environmental protection order, or where the Director was required to take emergency measures, constitute a charge in favour of the government enforceable in the same way as a mortgage or other security and ranks above any other charge against land (s.205). The Act also provides that a judge can, in certain circumstances, extend the limitation period for actions involving the release of a substance into the environment (s.206). A person harmed as a result of an offence for which a conviction was obtained under the Act may sue for an amount equal to the loss or damage that can be proved and a person can apply for an injunction to stop conduct that is contrary to the Act and is causing or will cause damage (s. 207 and 213).

The main regulation dealing with drinking water, the Potable Water Regulation[144], came into effect at the same time as the Act. It requires, generally, that waterworks systems "be designed, operated and maintained to achieve under all normal and foreseeable operating conditions all water quality requirements as specified in this Regulation or an approval" (s.3). Under the regulation, all water suppliers must meet the latest requirements of the Canadian Drinking Water

[144] Alta. Reg. 122/93 (Consolidated up to 214/96).

Quality Guidelines (s.6 (1) (a)). This means that they cannot exceed the maximum concentration levels of the parameters listed in the guidelines. Suppliers must test regularly for bacteria as the guidelines require.

The main document that describes how water must be protected for individual systems is the approval document which is drawn up for every water supplier in the province. This is a legally binding approval which lasts for up to 10 years – a kind of mini-regulation. For example, Edmonton and Calgary would have their own municipal approvals tailored to their site-specific circumstances. [145] The approvals are used by Alberta Environment to regulate performance standards and contaminant levels. All standards and all monitoring requirements are spelled out in the specific approvals. The frequency of sampling for chemicals varies depending on the drinking water system.

If the Canadian Drinking Water Guidelines change, then the levels prescribed in the approvals will be changed either by changing all the approvals in the province if it is a health-related parameter, or by updating the approval when it is renewed. The Director of Alberta Environment may include in the approval more stringent requirements than those set out in the Potable Water Regulation.

Alberta also has Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems that are referenced in the Potable Water Regulation. These came into effect in 1997. The Potable Water Regulation requires operators to meet the requirements for standards and design set out in this document [146].

The water suppliers must take samples and report on the results to Alberta Environment. All bacteriological monitoring is done at government labs. If there is a non-compliant result, it is reported to the owner of the water works and to the ministries of Environment and Health. Chemical monitoring, however, is done at private labs, and Alberta is in the midst of setting up more stringent requirements for the approval of these labs. Alberta Environment itself does surveys and testing to determine generally if water quality is deteriorating or improving. Certification of the day-to-day operators of municipal water systems is mandatory.[147] The operating approval for each facility specifies the certified operator requirements.

Edmonton's water supply is managed by an arm's length corporation called Epcor, wholly owned by the City of Edmonton. There are about 260 groundwater and 240 surface water supplies, mostly publicly owned. The most vulnerable systems are individually-owned wells that are not covered by approvals.

Commentary

From both a public interest perspective and the government's point of view, the system for protecting and monitoring drinking water in Alberta appears to be working well. Nevertheless,

[145] Main sources of information for Alberta were Cindy Chiasson, a lawyer with the Environmental Law Centre in Edmonton (780-424-5099), and Pat Lang, head of Municipal Program Development at Alberta Environment (780-427-8120).
[146] Ibid, s. 7.
[147] Alta. Reg. 122/93, s. 16-17.

the February 2001 Throne Speech committed $260 million over three years to improve water systems and municipal infrastructure.[148]

Most of the concern for drinking water quality is focussed on southern Alberta where farmers raise more than 1 million head of livestock. Cattle, hogs and chickens from these factory farms produce manure that is the equivalent of the sewage from a city like New York. Although there has not been a specific disease outbreak related to drinking water, health officials have found high levels of nitrate and disease-causing bacteria in surface water used for drinking.

The area 200 miles south of Calgary, has the highest rate of intestinal illness in Alberta, and a number of boil water orders have been issued for several towns whose water treatment plants were not removing *Giardia* and *Cryptosporidium*.[149] In 1997, a surface water study was done as a result of a Canada-Alberta Environmentally Sustainable Agricultural Agreement. *Giardia*, *Cryptosporidium*, and some fecal coliform emerged as problems in surface waters and shallow groundwater systems. There are no regulations, only guidelines requiring animal waste to be managed to prevent bacteria from seeping into water systems. One group, Trout Unlimited, have a program called "Cows and Fish" to persuade farmers to keep cattle away from creeks.[150]

The Alberta Auditor General's 1998-99 report made recommendations about enhancing the systems that support the approval process, specifically issues of management information and data completeness. Although some of the emphasis was on efficiencies, it also pointed out that data entry of monitoring reports received from industry is backlogged. Routine monitoring reports are used for compliance purposes, and then are entered into the database. The Auditor's view was that the reports "provide an early warning system for potential problems and are critical to ensure that the Department is aware of any issues of concern." [151]

If Alberta has a major weakness, it is in the protection of watershed areas. There is little to no protection of these areas, although it is arguable that agreements with landowners, contemplated under the *Environmental Protection and Enhancement Act*, could be used for this purpose. Currently, protection is essentially limited to taking watershed considerations into account when drafting an approval for an industry discharging into a river used for drinking water.

There is no public reporting of drinking water monitoring, although it is possible to get this information. Alberta Environment, under the *Environmental Protection and Enhancement Act*, allows anyone to see a certificate of approval and any monitoring done for that approval. There are no requirements, however, for water suppliers to report this information directly to the public.

[148] http://www2.gov.ab.ca/thronespeech2001/, p.10.
[149] London Free Press, March 7, 1998
[150] "Assessing Alberta's water quality", < http://www.agric.gov.ab.ca/sustain/water/wq10.html >, accessed October 19, 2000
[151] Annual Report of the Auditor General of Alberta, 1997-98, < http://www.oag.ab.ca/html/ar1997-98 >, p. 160.

(c) Québec

Unlike British Columbia where responsibility for drinking water is primarily entrusted to the Ministry of Health, Division 5 of the *Environmental Quality Act*[152] clearly gives the Québec Minister of the Environment power over water and sewer systems, waste water treatment and water supply intakes.

Under the *Environmental Quality Act*, Québec has enacted the Drinking Water Regulation which requires drinking water service managers to analyze the water they distribute, to inform the government of their analyses on a regular basis, to report all cases of contamination, and to take the steps required to comply with regulatory standards.

This regulation was passed in 1984. It adopted the Canadian Drinking Water Guidelines current at that time. This meant that only 46 drinking water parameters were regulated, and they have not been revised since 1984. Sampling was compulsory.

Groups like Eau Secours have been lobbying the Minister of the Environment to update the legislation and make it more protective. On July 12, 2000, the Minister of the Environment, anxious to tighten up Québec's drinking water regime to avoid the tragic consequences of Walkerton, put out a draft regulation for public discussion.[153] The announcement of a final regulation is expected soon.

The proposed regulation would incorporate standards for parameters based on Health Canada's most recent Canadian Drinking Water Guidelines. There would be statutory limits on turbidity and trihalomethanes. In addition, the new regulation would require much more comprehensive and frequent sampling by every municipality and private system, including water delivered by tank truck. It also covers tourist areas like parks and trailer camps. (s. 8-12, s. 15-19, s. 25-28)

Under the new proposal compulsory testing for total coliforms must be done at least 8 times per month (up from twice a month) for small systems serving 8,000 people or less. Water suppliers must do one additional test per month for every 1,000 people above 8,000. Forty-two organics and 17 inorganics will be regulated and they must be sampled twice a year. (s. 8-10)

Québec has chosen to use the stricter American standards for turbidity (less than 5 NTUs) and for trihalomethanes (80 micrograms per litre), rather than the Canadian guidelines. All sampling must be done at laboratories accredited by the Minister of the Environment. (Schedule s. 3, 6)

The most far-reaching provision of the proposed regulation is the requirement for well water testing. Most drinking water legislation, even comprehensive drinking water legislation like the U.S. *Safe Drinking Water Act*, does not cover individual wells. In Québec, people drawing water from their own wells would be required to sample for coliforms twice a year and for nitrates once a year.

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[152] *Environmental Quality Act*, R.S.Q. c. Q-2.

[153] The contact person regarding the draft regulation was Mr. Jean-Maurice Latulippe, Ministère de l'Environnement, Direction des politiques du secteur municipal (418-521-3885 or Jean-Maurice.Latulippe@mef.gouv.qc.ca).

Currently in Québec there is no compulsory treatment for drinking water. Thousands of small systems do not have any water treatment at all. If the proposed regulation is adopted, disinfection of all surface water and all ground water affected by surface water that goes through a distribution system would become compulsory. Groundwater would also have to be disinfected if testing showed signs of microbiological contamination. Québec does not dictate what type of disinfection is required because there are a number of different treatments used in Québec. Ozonation is used to treat the drinking water of about 2 million people, and Québec is the first jurisdiction in North America to treat water with biological carbon. (s. 4-6)

Filtration of surface water and groundwater systems influenced by surface water would also be required if there is evidence of drinking water contamination. Québec is following the U.S. Surface Water Filtration Rule and allowing for possible waivers of the filtration requirement where the raw water is of good quality. Strict criteria would be applied, however.

Certification of water system operators would be compulsory. Right now in Québec there is no requirement for certification.

The proposed regulation sets out notification requirements: the testing laboratories must immediately inform the water supplier, the Ministry of the Environment, and the regional public health director if they find a sample that violates the standards. The water supplier, as soon as he or she is informed, must notify the Ministry of the Environment and the regional public health director of the action that has been taken to correct the problem and to protect people drinking the water. If E.coli is detected, the water supplier must notify users through the media and send individual notices indicating that they should boil their water for at least one minute. If E. coli is found in the water used by a school, hospital or similar institution, the water supplier must alert the head of the institution who must post notices. The fines for supplying water that does not meet the standards or for submitting false or inaccurate data may be as high as $40,000. (s. 20-21)

There is no provision for public reporting on drinking water supplies in the old or new Québec regime.

As far as watershed protection goes, the United States has gone farther than any other jurisdiction in mandating assessments of the sources of drinking water. For Québec this is not as relevant. Most of the province's water treatment plants draw water from the St. Lawrence River and their ability to control upstream pollution sources is limited. The Ministry of the Environment is starting to regulate the major industries, starting with pulp and paper mills, then the petroleum and aluminum industries. The goal is to improve source water quality by limiting discharges from these plants.

In Québec, sources of drinking water can be protected through municipal initiatives. For example, municipalities that draw their drinking water from lakes have the authority to regulate activities around their drinking water sources.

Québec, like Ontario, has been cutting back on inspections and enforcement of environmental regulations in the last few years, but the Minister's statements seem to promise that the province

would assist municipalities by paying for half the cost of new infrastructure necessary to meet the regulation.

Commentary

Québec is generally well-regarded with respect to drinking water management, but its legislation is not as comprehensive as Alberta's and is currently lagging behind Ontario since Ontario passed its new regulation. It does not have many of the important provisions of the U.S. *Safe Drinking Water Act*, such as public right to know and source water assessment requirements.

Québec has not had many outbreaks of waterborne disease so it has been slow to improve drinking water legislation. However, there was a great deal of concern in Québec after Walkerton and fear that the same sort of tragedy could happen there. A new regulation to update the drinking water legislation has been pursued since July 2000, and if this regulation is adopted as proposed, it would put Québec alongside Ontario and Alberta in having a more comprehensive drinking water regime than most other provinces. [154]

Large municipalities like Montréal have enjoyed generally good quality drinking water, but nitrate pollution from agriculture is a problem in the countryside. Like Alberta, Québec is the new home of large factory farms. In January 2001, the citizens of Kamouraska revealed the results of well testing in their area. They found levels of nitrates between 3 and 7 milligrams per litre in 20 residential wells. Even though the Canadian standard is 10 mg/l, they are angry at the Minister of the Environment for giving approval in 1999 to the establishment of a "méga-porcherie", or industrial pork farm, which they fear will raise the levels of nitrate even higher.[155]

(d) New Brunswick

Although New Brunswick's drinking water regime is not as rigorous and comprehensive as some of the larger provinces, New Brunswick has taken more initiative in passing legislation with the goal of protecting its drinking water sources. It has targetted regulations specifically at the protection of watershed and wellfield areas. Even the United States has only recently mandated drinking water source assessments and is still limited to voluntary programs for wellhead protection.

New Brunswick has a unique regime for protecting its water supply, including three major components. The primary instruments for this protection are the 1993/94 Potable Water Regulation[156] under their *Clean Water Act*, the 1990 Watercourse Setback Designation Order[157], and the more recent 1999 Wellfield Protected Area Designation Regulation.[158]

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[154] For Québec, the main contacts were Simon Théberge, Drinking Water Co-Ordinator, Québec Ministry of the Environment (418-521-3885) and Andre Bouthillier, Eau Secours. For Eau Secours, see also <http://www.eausecours.org/entrée_generale_eal_tres_bonne_qualite_presse28janv.htm> and <http://www.eausecours.org/entrée_generale/dossiers/revue_de_presse/eau_potable/rumeur_au >

[155] Louis-Gilles Francoeur, "Kamouraska: des nitrates dans l'eau potable", Le Devoir, January 31, 2001.

[156] Regulation 93-203 (O.C. 93-979).

[157] New Brunswick Regulation 90-136 under the Clean Water Act (O.C. 90-887).

[158] New Brunswick Regulation 2000-47 under the Clean Water Act (O.C. 2000-451).

The Potable Water Regulation applies to surface water, ground water and domestic wells. The responsibility for it is shared by the Department of Health and Wellness and the Department of Environment and Local Government. The Auditor General in his report for the year 2000 criticized the lack of clarity in this shared responsibility and its implications for drinking water problems.[159]

Concerned that there might be risks similar to Walkerton in New Brunswick, he decided to investigate domestic wells which provide water for 40 per cent of the people, those who live in small towns and rural areas. He looked at two regulations, the Potable Water Regulation and the Water Well Regulation[160]. The Water Well Regulation, administered solely by the Department of Environment and Local Government, licenses well contracters, drillers and diggers and sets out safety standards which must be met in creating new wells. It ensures that well contractors will not drill or dig wells near septic systems or landfill sites.

The Potable Water Regulation is the more important regulation for overall drinking water safety. It addresses the monitoring aspect of water. Every new well or community water supply must be tested thoroughly before it can be offered for drinking water. The Department of Environment and Local Government has standard protocols for what must be tested the first time.

Well contractors, diggers, and drillers must sell homeowners water testing "vouchers", entitling them to an analysis for inorganic substances and micro-organisms. It is mandatory to have wells tested within 12 months of their construction. These tests are done by the Department of Environment's lab.

All monitoring results are then sent by the lab to the Department of Health and Wellness for interpretation. Results are compared to the Canadian Drinking Water Guidelines and the New Brunswick Health Advisory Limits. If there is no problem, the well owner will receive a letter with the results of the tests from the Department of Health. If the water does not meet these guidelines, health officials must get in touch with the owner of the well by registered mail within 3 days.

The Auditor found that homeowners were not always informed that they had paid for drinking water testing and were required to have it done. When it was done, they were often not notified within the 3 day limit when problems were found. He also found that if coliforms were present, only two of five regions directed homeowners to boil their water before using it. [161]

For community water supplies, the Department of Health and Wellness approves a sampling plan. The sampling plan includes the frequency of testing, the list of substances to be tested for, the locations and dates and the name of the testing laboratory.

After the initial monitoring, the ongoing sampling that must be done for public water supplies is decided based on the likelihood of the contaminant being present. For example, bacteria must always be tested for on a regular basis by all communities. Arsenic, on the other hand must be

[159] Office of the Auditor General, 2000 Auditor General's Report, ch. 4, p. 54-56: http://www.gov.nb.ca/oag_bvg/2000.
[160] New Brunswick Regulation 90-79 under the Clean Water Act (O.C. 90-531).
[161] Auditor General's Report, 2000, p. 43.

monitored if it is a threat to a particular community's water supply. If sampling in another community shows no sign of arsenic, it is not regularly required. Every municipality and public water supply has its own individual sampling plan.

The Potable Water Regulation also requires that all sampling of public water supplies must be done by an accredited lab or a lab approved by the Ministry of Health and Wellness.

The Department of Health and Wellness has the legal authority under The *Clean Water Act* to shut down a water supply or to order a water supplier to give notice of a health risk and provide an alternative supply of drinking water. There are, however, no clear provisions for what action will be taken when there are exceedences or when it is necessary to notify the public. This is left to the judgement of the Ministry of Health and Wellness.

The gaps in New Brunswick's laws are the requirements for treatment and training. Right now New Brunswick is looking at possible requirements for certification of water treatment plant perators. The Ministry has training for people in water treatment plants but they are considering t upgrading their requirements as a result of the problems at Walkerton.

There are also no requirements for the treatment of drinking water in any of New Brunswick's legislation, although most plants in New Brunswick treat their water in some way.

Surface Water Protection

The other significant part of its drinking water regime is the protection of surface and groundwater sources. Here New Brunswick has introduced innovative legislation. It has recognized that the best and most inexpensive way to provide safe drinking water is to prevent contamination.

As a first step in surface water protection New Brunswick identified all the watershed areas that supply municipal drinking water in the province.

After identifying the watershed areas, they passed the Watershed Protected Area Designation Order under Section 14 of the *Clean Water Act*. This Section allows the Minister to designate any part of a watershed that provides drinking water as a protected area. The Order now applies to all 30 communities in New Brunswick that take their drinking water from surface waters. This represents about 300,000 people or 40 per cent of the population. The Order has two phases. The first phase began in 1990.

Phase 1 of this order requires every watershed that supplies drinking water to have a 75-metre setback zone. This area is the entire zone within 75 metres back from the banks of most watercourses within the watershed. It creates a buffer between watercourses and potentially harmful activities.

The Watercourse Setback Designation Order defines the setback zones and what can occur within them. By permitting only very restricted activities, it reduces the risk of contaminating the drinking water source. Permitted activities include recreational activities like hunting, fishing, canoe portaging and cross-country skiing, rebuilding or renovating existing buildings,

tree-planting, and using existing beaches and boat launching areas. Existing agricultural activities are strictly controlled.

Activities that are not specifically allowed within the watershed area are considered to be prohibited. For example, someone wishing to build a new cottage on a lake that is used for drinking water cannot build within 75-metre setback zone.[162] There are exemptions for developments and activities that already exist within the setback zone that do not conform to the regulations.

Phase 2, which is expected to be proclaimed in 2001, will extend the protected areas around the designated watersheds. It lays out guidelines for the land area that extends from 75 metres back to the outer limit of the watershed, and restricts activities on the watercourses themselves.

The categories of activities that are considered to pose the greatest risk are forestry, agriculture, road construction, commercial and industrial development, mining, recreation, aquaculture and residential development. Phase 2 regulations restrict these activities. For example, there are restrictions on manure storage and application, clearcuts are limited to 25 hectares, and there can be no discharge of mining effluents. Even boating is restricted in drinking water supply areas. [163]

It is noted in the Sierra Legal Defence Fund's report[164] that Saint John is buying up land in their watershed area. Although this probably minimizes some of the land use conflicts that might arise, all New Brunswick communities using surface water have designation orders and whether the land is publicly owned or private, it has some degree of protection.

Groundwater Protection

The Wellfield Protected Area Designation order has just come into force and will apply to the 54 communities in New Brunswick, or about 300,000 people that use wellfields fed by groundwater for drinking water. Its intention is to protect the recharge area that supplies water to the wellfields.

So far only one community has been designated.[165] The work is going on co-operatively with the other municipalities to get their endorsement. If there is a criticism of this program, it is that it is going too slowly because every municipality has to have its own groundwater assessment and a tailor-made regulation.[166]

The Order creates 3 separate zones around a wellfield or underground drinking water source – zone A, zone B and zone C. It imposes quite severe restrictions on what can be stored or used within the three different zones.

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[162] Watercourse Setback Designation Order, N.B. Reg. 90-136.
[163] New Brunswick Department of the Environment, *Watershed Protection Program Discussion Paper*, November 1998.
[164] Sierra Legal Defence Fund, Waterproof: Canada's Drinking Water Report Card, January 2001.
[165] New Brunswick Department of Environment and Local Government, *Wellfield Protection Program*, July 2000.
[166] The main commentators in New Brunswick were Parker Gray, Senior Policy Advisor, Dept. of Environment and Local Government, New Brunswick (506 453-6708) and David Coon, Conservation Council of New Brunswick.

The potential risk associated with a given chemical can be determined by "groundwater travel time". This is the length of time it takes for substances to travel in groundwater before they are broken down by natural processes. Bacteria, for example, are assumed to have a travel time of 30 days[167] while dry cleaning solvents may take decades to break down. Chemicals that are harmful at low concentrations and highly soluble pose the greatest risk and are, therefore, the most restricted.

Zone A lies closest to the wellhead. It is the most sensitive and has the most restrictions. Septic tanks, manure storage and spreading, sewer lines, petroleum products, chlorinated solvents, pesticides and preservatives are restricted. In Zone A, for example, only 25 litres of heating oil may be stored, so in Fredericton, where 500 of the homes in Zone A use furnace oil, these families will be given a phase-out period, probably around 5 years, to find a different method of heating their homes.

Zone B is farther from the wellhead and surrounds Zone A. Petroleum products, chlorinated solvents and other persistent chemicals are restricted in this zone. Zone C, which surrounds A and B, is farthest from the wellheads, but it is still protected from chlorinated solvents, petroleum products, and fertilizer applications.

Dry cleaning operations cannot go on in any of the three zones because of the threat of perchloroethylene to wells. This means that municipalities will have to move dry cleaners to new, less sensitive locations.

Commentary

The distinctive feature of New Brunswick initiatives is the attempt to protect sources of drinking water, whether ground or surface. The Potable Water Regulation's innovative measures include provision of "vouchers" for water testing to well owners as part of the price of digging or drilling their new wells, and notification if there are problems with water quality.

The basic theory behind New Brunswick's system is that contamination of water sources should be prevented. For surface water, it has identified all watershed areas that supply municipal drinking water in the province and passed the Watershed Protected Area Designation Order under the Clean Water Act. It specifies a 75-metre setback zone from the banks of the watercourse that supplies water and enumerates permitted activities. Phase 2, expected to be proclaimed in 2001, provides guidelines for the area between the 75-metre setback and the outer limit of the watershed.

For groundwater, a Wellfield Protected Area Designation Order applies to wellfields fed by groundwater for drinking water. The intention is to protect recharge areas, but it is a slow process since each municipality must be designated separately with a tailor-made regulation.

New Brunswick appears to be taking a long-term protection of source water approach that accounts for local conditions and individual well owners. Perhaps for this reason it is weak in

[167] Although note that while this 30-day period is a commonplace assumption, according to testimony at the Walkerton Inquiry, bacterial strains such as E.coli 157:H7 can survive for over a year (see Part 1A testimony of Gary Palmateer, October 23, 2000)

terms of treatment requirements and training of treatment plant operators, although it is looking at implementation of certification requirements for treatment plant operators.

2.3 United States Jurisdictions:

(a) The U.S. Safe Drinking Water Act[168]

The US *Safe Drinking Water Act* is the most well established and most comprehensive drinking water legislation today. Everyone working with the Act -- government administrators, environmentalists and water suppliers – support the Act and believe it is a powerful force for the protection of drinking water.

The data collected from the Centers for Disease Control seem to confirm this. They show the number of disease outbreaks related to drinking water has been going down since the introduction of the Act.[169] With the exception of the outbreak in Milwaukee of *Cryptosporidium*, disease outbreaks have been primarily in groundwater systems. Even with the Act, however, the CDC estimates that from 200,000 to 1,300,000 Americans become sick every year from microbes in the drinking water, with 50 to 1200 people dying as a result.[170]

The Environmental Protection Agency's own surveys show that in 1994, 83 per cent of the population was served by community water systems that did not violate health-based standards. By 1998 that figure had increased to 89 per cent of the population. EPA data also shows that violations of standards for inorganic contaminants, trihalomethanes and synthetic chemicals peaked in the 1980s and then declined in the late 1990s.

From its beginnings in 1974 the Act has been amended twice drawing on on-the-ground experience to evolve into a better piece of legislation. The 1996 amendments have taken the Act into new areas and responded to many of the concerns raised by the industry and environmentalists. The success of this additional legislation has not been fully assessed yet but initial reports are cautiously optimistic.

It is also important to understand that the *Safe Drinking Water Act* imposes duties on the Environmental Protection Agency that in turn draws up rules for the states to follow in carrying out the intentions of the Act. In many cases, even though the amendments have been passed, there is a timetable for implementation that continues for several years.

This is a brief history and highlights.

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[168] Commentators for this section included Erik Olson, Senior Attorney, Natural Resources Defense Council, enegin@nrdc.org, 202-289-2405.

[169] Rachel S. Barwick et al, "Surveillance for Waterborne-Disease Outbreaks- United States, 1997-1998*"*, *Morbidity and Mortality Weekly Report*, Vol. 49, No. SS-4, May 26, 2000.

[170] See statement of Erik D. Olson, Sr. Attorney, Natural Resources Defense Council before the Environment and Public Works Committee Subcommittee on Fisheries, Wildlife, and Drinking Water, United States Senate Hearings On Implementation of the Safe Drinking Water Act Amendments of 1996, March 3, 1998.

Safe Drinking Water Act

In 1974 Congress passed the *Safe Drinking Water Act* (SDWA) to protect the public from the risks of contaminated drinking water. This act was to be administered and enforced by the U.S. Environmental Protection Agency (EPA). The EPA's Office of Ground Water and Drinking Water oversees the implementation of the Act today.

The first Act took the significant step of making enforceable previously voluntary drinking water parameters for contaminants. Initially 18 standards were set – 6 organics, 10 inorganics, turbidity, and total coliform bacteria (called the National Interim Primary Drinking Water Regulations). Although turbidity and coliform bacteria are not necessarily a health concern, they may indicate the presence of serious contamination.

Two years later in 1976, radionuclides were regulated, and in 1979 total trihalomethanes, a group of four volatile organic chemicals formed when chlorine is used to disinfect drinking water, were regulated. In 1979 the EPA set non-enforceable guidelines for contaminants that cause aesthetic problems in water, like colour and odour (National Secondary Drinking Water Regulations).

The EPA was also mandated to establish requirements for monitoring the quality of drinking water supplies and ensuring that water systems were properly operated and maintained. Water system operators were required to notify customers whenever they failed to meet one of the standards or when they failed to monitor the drinking water.

In the 1974 Act the EPA was authorized to give states the authority for enforcing the Act if the states met requirements such as adopting drinking water regulations no less stringent than EPA's and if states adopted and implemented procedures to carry out the program. This was called giving the States "primacy".

The United States has embraced the idea of public involvement in drinking water issues since the beginning of the Act in 1974. The original Act created the National Drinking Water Advisory Council. This Council is considered by the EPA to be one of its most valuable vehicles for public involvement. The 15 member Council supports the drinking water program by providing advice and recommendations on drinking water issues. They advise the EPA on proposed regulations, on research and special studies, on drinking water standards and on emerging hazards.

The Council sets up its own working groups that gather information, conduct meetings and provide advice to the Council. These working groups have addressed many of the critical issues including, from the 1996 amendments, consumer confidence reports, small drinking water systems, source water assessments and the contaminant candidate lists. All meetings are open to the public and include time for public comment.

Under the *Safe Drinking Water Act*, the EPA is authorized to file civil suits or issue administrative orders against public water systems that violate the Act when the individual states are slow to take appropriate enforcement action or when states ask them to act. Maximum civil penalties are $25,000 per day of violation. In addition, the SDWA gives any individual or organization the right to bring suit against anyone violating the law – the water supply system, the state or EPA.

The *Safe Drinking Water Act* does not cover wells serving fewer than 25 people.[171]

These amendments strengthened the standard setting procedures, groundwater protection provisions and enforcement. They also mandated filtration and disinfection of drinking water.

In 1986, unhappy with the slow pace of standard development, Congress amended the Act to require the EPA to issue or revise standards for 83 contaminants by 1989. In addition, a timeframe for regulating 25 new contaminants every 3 years was set although this provision was never implemented.

There was also concern that microbial contaminants were not being adequately controlled under the Act. The health goal for total coliforms was set at zero, and requirements for mandatory disinfection and filtration were established. The amendments required disinfection of all public water supplies, and they required all water systems using surface water to filter their water or to meet stringent criteria if they wanted to be granted a waiver from filtration.[172]

These amendments banned lead-based solder, pipes or flux materials from distribution systems.

These amendments also attempted to address groundwater issues by developing voluntary programs for Wellhead Protection and Sole Source Aquifers.

The EPA was asked to specify the "best available technology" for treating every regulated contaminant, and the "best" technology for four contaminant groups: pathogens, organic and inorganic chemicals and disinfectant by-products.

By 1992 EPA had issued regulations for 76 of the 83 contaminants. These contaminants are grouped into four basic rule categories: the Total Coliform Rule which sets the standards for total coliforms, the Surface Water Treatment Rule which mandates filtration and disinfection, the Chemical Rule which regulates chemicals that generally pose long-term health risks, and the Lead and Copper Rule which sets limits on lead and copper and requires water systems to evaluate the pipes in their distribution systems.

1996 Amendments

The driving force behind the 1996 amendments was the environmentalists' concern that there was an unacceptably high level of non-compliance with the *Safe Drinking Water Act* and a lack of enforcement. In many places across the United States water was not tested properly, water was not treated properly, and when illegal contaminants were found no action was taken. Many of the water quality violations were in small systems and the problem of ensuring safe drinking water for smaller communities was a controversial issue.

At the same time industry and governments criticized the Act for being inflexible, enacting rules and regulating chemicals without taking into account health benefits in relation to costs. As well, EPA had fallen behind on the statutory timetable for implementing new contaminant regulations.

[171] 1986 Amendments.
[172] U.S. Environmental Protection Agency, *25 Years of the Safe Drinking Water Act: History and Trends.*

The cornerstone of the *Safe Drinking Water Act* has always been its regulated standards. The 1996 amendments took a new tack. They emphasized the need to set standards based on adverse health effects of contaminants, their occurrence in water systems, and the costs of eliminating them.

Environmentalists fought for improved right to know provisions. They believed that if members of the public were better informed about the sources of drinking water and the contaminants in drinking water, that they would support protection of the sources and infrastructure improvements. The new law expanded the public's right to know about the quality of their drinking water by making annual Consumer Confidence Reports mandatory.

The amendments for the first time emphasized the prevention of pollution and the protection of sources of drinking water by requiring source assessments. These amendments also require national minimum guidelines for the states to certify operators of water treatment systems. In addition, to fund infrastructure costs and the costs of complying with the new amendments, especially for small water systems, the United States established a multi-year multi-billion dollar fund through the State Revolving Fund programme.

Standards development

The 1996 amendments eliminated the requirement that EPA set standards for 25 new contaminants every 3 years and replaced it with a 5-year regulatory cycle. The amendments required that new contaminant limitations be based on risk to human health and on sound science and allow the EPA to take the cost of compliance into account.

Instead of setting new standards every three years, the EPA is now required to publish a list of high-priority contaminants not previously regulated and determine whether to regulate at least five of these contaminants. The EPA requires states to monitor these candidate chemicals so that they can determine how frequently they appear in drinking water. This is known as the Unregulated Contaminants Monitoring Rule. The decision to regulate a chemical is to be based on the best available health information and how widely it appears in the environment.

The EPA was also mandated to finalize the new regulations that were already proposed at the time of the amendments concerning disinfection by-products and *Cryptosporidium*. The EPA is required to review and revise the existng primary drinking water regulations every 6 years.

Source Assessment

Since 1974 the *Safe Drinking Water Act* has had provisions for the protection of groundwater. The original Act contained the Underground Injection Control program, designed to ensure that fluids injected into underground wells are contained within the wells and do not threaten drinking water. Thre was also a provision for designating Sole Source Aquifers, which were important sources of drinking water. If an aquifer is designated, the EPA must ensure that any new federal projects near the aquifer do not pollute it. There is also a voluntary Wellhead Protection Program established in 1986, encouraging states to develop programs to protect land areas around water supply wells.

The 1996 amendments, however, make pollution prevention a major focus. The amendments require that all waters serving as drinking water sources for public water systems be identified and assessed for their susceptibility to contamination. Public participation is an important component of these assessments. The individual states are doing the assessments. They should be completed by 2003 and shared with the public. Once they are done, the assessments can be used as a guide to protecting drinking water sources from harm.

Special attention is being paid to groundwater. The EPA has proposed that all groundwater that is used for drinking water be assessed for contamination problems. Currently, only water systems using surface water or groundwater under the influence of surface water are required to use disinfection. The Centers for Disease Control showed that most waterborne disease outbreaks were associated with groundwater. Under the new Ground Water Rule, periodic surveys off groundwater must be done and wells that are sensitive to fecal contamination must be identified. If groundwater is found to be contaminated or at risk of contamination, it must be disinfected.

Consumer Awareness

Many water suppliers were not complying with their responsibilities for alerting the public to water quality violations. Although this requirement is still in place, environmentalists lobbied effectively for an expanded right to know provision. The new amendments require community water systems to issue annual consumer confidence reports

Beginning in 1999, large municipal water systems had to report annually to the public (usually with their water bills) including information on the water source, violations of any standards for contaminants found in their tap water, and the effect this could have on their health.

The consumer confidence reports must provide consumers with this information:

- the lake, river, aquifer or other source of drinking water;

- a brief summary of the susceptibility to contamination of the local drinking water source, based on source water assessments;

- how to get a copy of the source water assessment;

- the level or range of levels of any contaminant found in local drinking water, as well as the health-based standard for comparison;

- the likely source of that contaminant;

- the potential health effects of any contaminant in violation of an EPA health standard, and an account of actions taken to restore safe drinking water;

- the water system's compliance with other drinking water rules;

- an educational statement for vulnerable populations about avoiding *Cryptosporidium*;

- educational information on nitrate, arsenic or lead in areas where they are above 50 per cent of the EPA standard;

- phone numbers for additional information including the water system and EPA's Safe Drinking Water Hotline.[173]These reports must be written in plain language and provided to all customers of a water system. Some states even require that customers be notified when contaminants are detected even if there is no violation of federal standards.

Systems serving less than 500 people do not have to do these reports but they have to make the information available on request, and systems serving 500 to 10,000 people can use newspapers rather than water bills to inform customers about contaminants.

Environmentalists are still concerned about the inconsistency of these reports and who receives them.[174]

Groundwater Protection

Currently, only water systems using surface water and those using ground water under the influence of surface water are required to use disinfection. This was seen as adequate protection, but the Centre for Disease Control data showed that 318 waterborne disease outbreaks between 1971 and 1996 were associated with ground water systems.[175] The 1996 *Safe Drinking Water Act* amendments required that regulations be developed to ensure disinfection of ground water in public systems, where at least 15 service connections or 25 individuals are served daily for at least 60 days per year, when necessary to protect public health.[176]The proposed Ground Water Rule[177] is based on a multiple-barrier approach that would rely on five major components:

- a periodic sanitary survey of ground water systems using specific criteria;

- hydrogeological assessments to identify wells sensitive to fecal contamination;

- source water monitoring for systems drawing from sensitive wells without treatment or with other indications of risk;

- a requirement for correction of significant deficiencies and fecal contamination; and

- compliance monitoring to ensure that disinfection treatment is reliably operated if and when it is used.[178]

The Ground Water Rule is scheduled to be issued as a final regulation in the summer of 2001.[179]

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[173] *Consumer Confidence Reports: Final Rule*, EPA 816-F-98-007).
[174] *Measuring Up: Grading the First Round of Drinking Water Right to Know Reports, Campaign for Safe and Affordable Drinking Water*, March 2000.
[175] EPA Office of Water, *Proposed Ground Water Rule: Questions and Answers*, April 2000, wysiwyg://25/http://www.epa.gov/safewater/gwr.html.
[176] Ibid.
[177] National Primary Drinking Water Regulations: Groundwater Rule, Environmental Protection Agency 40 CFR Parts 141 and 142.
[178] Federal Register/Vol.65, No. 91/Wednesday, May 10, 2000/Proposed Rules.

Small Water Systems

These 1996 amendments have also attempted to address the problems associated with small water systems that have had difficulty ensuring the safety of their water. States are required to identify the systems with a history of problems, find ways to ensure they have the capability to meet the regulations and develop a strategy to assist them. In addition to these legislative initiatives, the U.S. Environmental Protection Agency in 1994 asked the National Research Council (NRC) to study small water system problems. The NRC created a Committee on Small Water Supply Systems under the sponsorship of the EPA. It reported in 1997[180], finding that the solution to the problem of providing safe drinking water to small communities has three elements. These are:

- providing affordable water treatment technologies;

- creating the institutional structure necessary to ensure the financial stability of water systems; and

- improving programs to train small system operators in all aspects of water system maintenance and management.[181]

Training issues include the fact that training programs are not geared for small system operators and they fail to provide small system operators with the combination of broad general knowledge and hands-on practical training that they need. "Most courses provide general training of a depth that goes beyond what a small system operator will ever require, yet skip many operational basics."[182] In its recommendations, the NRC noted that it has been the belief that a small system operator must exhibit competence in only two broad technical areas, treatment and distribution, but a small system operator also needs to be competent in administrative, financial customer service and other skill areas. The recommendations on training were:

- The EPA should guide the effort to improve training for small system operators (and should reallocate resources that implicitly overemphasize enforcement over technical training, develop multimedia training tools for nation-wide delivery, coordinate efforts to deliver training programs in the field to dispersed operators).

- Safe drinking water agencies should be responsible for delivering training programs developed by the EPA and these should be delivered locally.

- Lead training agencies should prioritize each of the general key training areas and offer training accordingly.

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[179] Although with the change in administration, there is now some uncertainty about this.
[180] National Research Council, *Safe Water from Every Tap: Improving Water Service to Small Communities*, 1997 National Academy Press, Washington D.C.
[181] Ibid., p. viii
[182] Ibid, p. 188.

- States should rewrite their certification laws for small system operators to emphasize the processes employed by the certified operator's particular system.[183]

New Funds

An important part of the 1996 amendments was the authorization of new funds to pay for drinking water programs. A Drinking Water State Revolving Fund program was set up to help finance needed water projects and to pay for programs such as the Source Water Assessment Plans. More than $9 billion has been made available to states under the re-authorized *Safe Drinking Water Act* for infrastructure improvements, to build new systems and protect sources of drinking water. The states may even set aside federal grant money for acquiring land to buffer water sources from contamination or to fund other local protection activities.

Commentary

The U.S. system has been a model in many respects because it has had specific legislation and enforceable standards since 1974. It requires continuous research and establishment of updated standards for a growing list of contaminants. It had the first legal requirement for public reporting by water suppliers of contaminant exceedances (Consumer Confidence Reports) and of the efforts being undertaken to restore water quality.

Individuals and organizations have the right to sue for violations under the Act, and the U.S. government is acting to assess and protect ground water as well as surface water sources of drinking water.

The U.S. has also made use of scientific and public expertise by establishing and supporting the National Drinking Water Advisory Council.

(b) State laws – selective elements from New York and New Jersey

New York State

New York State is one of the most conscientious states in meeting the requirements of the *Safe Drinking Water Act*. Drinking water is primarily the responsibility of New York's Department of Health. It has incorporated the regulations of the Act into its Sanitary Code, and the regulations have to be as stringent or more stringent than the Act. For example, the federal government has recently issued regulations for operator certification, public notification, and filtration standards for trihalomethanes. These regulations all become part of the Sanitary Code.

In a community similar to Walkerton in the United States, the water supplier would have to test regularly for total coliforms. This would be a presence/absence test and if coliforms were present, the sample would be analyzed for E. coli. If the sample is positive for E. coli, four more samples have to be taken and nearby areas sampled. Sampling frequency is based on population. The more people there are, the more often they sample. If they find violations, they take corrective action. They may, for example, draw up a compliance schedule. They do not often seek fines unless they feel the water supplier is not making genuine efforts to comply.

[183] Ibid, pp.193-204.

The results have to be reported within 24 hours to the county health departments. The health departments would issue a boil water advisory. Most of their boil water advisories are the result of broken water mains. If there is a broken water pipe, the health department issues an immediate boil water order and it stays in place for 2 days until sampling shows there is no sign of coliforms.

New York State goes farther than the federal legislation in the area of chemical sampling. In addition to the primary drinking water regulations, New York requires testing for principle organic chemicals which cannot exceed 5 parts per billion, and for unspecified organic chemicals which cannot exceed 50 parts per billion. Propylene glycol is an example of an unspecified organic chemical.

They have both private and public labs. There are New York State labs, county health department labs, municipal and private labs that all do analyses.

They are starting to do source water assessments. First, they have to pinpoint the precise location, latitude and longitude, of each drinking water source. Then they identify the threats to the source including bacteria, organics, and inorganics. The Department of Environmental Conservation will contribute to this by identifying waste discharges and overlaying their information on the Department of Health's. When this information is completed, it will be turned over to the public water systems to address the problems of vulnerability. New York has the ability to adopt watershed rules and regulations but they don't mandate it.

If there is a problem in New York State, it is with individual wells. These are not covered by the federal drinking water act. There are some protective rules for wells. The 100 foot radius around a wellhead should be owned by the water supplier, and the 200 foot radius around it should be a circle of control where the water supplier ensures that no adverse activity take place.

If a homeowner discovers contaminants in his well, the state will provide water on an emergency basis or put special filters on the tap. Leaking underground storage tanks are a particular problem. The government encourages people to be on public systems because there is regular monitoring of public drinking water supplies.

New York City: A Special Case

New York City is an example of intensive watershed protection efforts. Over half the people in New York State – about 9 million – drink New York City water.

U.S. water systems are required by legislation to use filtration to remove pollutants. However, some major cities such as New York, Boston and Seattle have waivers that allow them to avoid filtration if they can control the quality of the water coming into their basins.

Under the Surface Water Treatment Rule (SWTR) from 1996, water suppliers who use reservoirs, lakes or rivers are required to plan for filtration or design adequate watershed protection plans. The intention of the Surface Water Treatment Rule is to reduce the amount of

microbial pathogens in drinking water such as *Giardia* and viruses. The requirements for avoiding filtration are very strict. Annual on-site inspections must be done, no level of turbidity above 5 NTUs[184] can be found in drinking water, and the system cannot have any waterborne disease outbreaks.

Right now, New York still has relatively clean water. It takes its drinking water from surface water sources in upstate New York.. There are 2 watersheds that supply drinking water, the Croton and the Catskill-Delaware. They include 8 counties, 60 towns, one city, eleven villages and over 500 agricultural and horticultural units. There are also more than 100 sewage treatment plants that discharge into the watershed area.

The water is only disinfected with chlorine before it is distributed so that there is a chlorine residual in the pipes. This is done at the reservoirs.

The problem for New York City, however, is the increased population growth and development in the watershed area. To install filtration now for New York City would be extremely expensive -- an estimated $6 to $8 billion. To avoid filtration, a city like New York must be very vigilant in protecting the water supply and guaranteeing its safety. Once filtration is in place, however, the regulatory requirements for protective measures, such as frequent and extensive monitoring and regulations on activities around the watershed, decrease considerably.

The major environmental problems in the watershed area are the runoff from dairy farming operations, discharges from the sewage treatment plants and non-point source contamination from residential and commercial development.

For years, there has been controversy and conflict between New York City and the watershed areas. Residents of these watershed communities complain that they are restricted in their activities so that New York can be spared the expense of building filtration systems. Land use regulations in the watershed mean restrictions on development. Another contentious issue is New York City purchasing land for buffer zones in the watershed areas.

In 1993, the EPA granted New York City an Avoidance Determination if they could prove in one year that it had an effective watershed protection plan. Representatives from New York City, New York State, the watershed communities, and environmental groups got together to negotiate a watershed program. After much delay and dispute, in 1996 the negotiations produced a landmark agreement.

The Watershed Agreement between New York City and the surrounding communities protects the sources of drinking water while considering the rights of those who live in the watershed. Under the agreement, New York acquires land only by buying it from willing sellers and using other voluntary approaches like conservation easements. The City must also develop regulations for watershed land uses, conduct water quality testing, support major investments in sewage treatment plant upgrades and set up a fund for compatible economic development.

[184] Nephelometric turbidity unit

The agreement also sets up the Watershed Agricultural Whole Farm Planning program. The Whole Farm program is a voluntary program with farmers to limit agricultural pollution of the watershed. Demonstration farms were selected to work out how this could be done in a practical way.[185]

New York City has successfully repaired septic systems, reduced runoff through the Whole Farm program, acquired land around key reservoirs and in the watershed area, upgraded sewage treatment plants and brought other sewage treatment plants into compliance. The EPA, however is not satisfied with the amount of land the City has purchased in one of the key watershed areas and the lack of progress in upgrading non-city owned sewage treatment plants.

Fortunately, the 1996 amendments setting up the State Revolving Loan fund allow for assistance for pollution prevention efforts and for activities such as voluntary land acquisitions. In fact, New York State is specifically allocated 15 million dollars to implement its watershed protection strategies, if the state matches these funds.

Commentary

New York State has adopted the U.S. *Safe Drinking Water Act* requirements and gone them beyond them by requiring more extensive chemical sampling.

New York City, dependent on untreated surface water (except for chlorination at the reservoirs), has successfully avoided expensive treatment by undertaking watershed protection measures including voluntary land purchases, a Whole Farm Program to prevent agricultural pollution in the watershed, and reduction of discharges from sewage treatment plants.

New Jersey

New Jersey is another state that has effectively implemented the *Safe Drinking Water Act*.[186] New Jersey passed its own New Jersey *Safe Drinking Water Act* in 1977, a separate and distinct Act that mirrors the federal legislation. Since its inception, environmentalists in the State have been successful in strengthening the New Jersey Act, so that New Jersey has a very solid drinking water regime. New Jersey also has its own Bureau of Safe Drinking Water within the Department of Environmental Protection that is responsible for the programs and activities under the federal *Safe Drinking Water Act*.

In the case of source water assessments, for example, the federal law requires an assessment of current and future threats to drinking water sources based on an evaluation of regulated

[185] See EPA Office of Water, *Watershed Progress: New York City Watershed Agreement*, December 1996, http://www.epa.gov/OWOW/Watershed/ny/nycityfi.htm; Watershed Protection Update,*Watershed Memorandum of Agreement*,March 26, 2001, http://www.ci.nye.ny.us/html/dep/htm/news/wsprot.html; and Annual Water Supply Statement, *1996 New York City Drinking Water Supply and Quality Statement*, January 1998, http://www.ci.nye.ny.us/html/dep/html/wsstate96.html.

[186] The main informal contacts for New Jersey were Sandy Kreitzman, Environmental Scientist, New Jersey Department of Environmental Protection (609-292-5550); Amy Goldsmith, New Jersey Environmental Federation (732-280-8988), and Vince Monaco, Bureau of Safe Drinking Water, Permits and Compliance, Department of Environmental Protection (609-292-5550)

contaminants. New Jersey requires water suppliers to investigate and assess unregulated contaminants in addition to regulated contaminants. This provision was prompted by wells in Toms River, New Jersey, that were infiltrated by a plasticizer. Fifty childhood cancers were linked to this poison.[187]

New Jersey environmentalists have also lobbied for stronger warnings in the consumer confidence reports. Federal law requires that consumer confidence reports contain a warning to vulnerable people about contaminants in drinking water. In New Jersey consumer confidence reports, warnings to the vulnerable must be prominently displayed at the top of the report where violations are recorded. Not only are these reports sent to water customers as required under federal law, in New Jersey they must also be posted in daycare and health facilities, schools and apartment buildings (multi-unit dwellings).[188]

To address the problems of individual wells, New Jersey has introduced new drinking water legislation that addresses this gap in the federal legislation. They will require mandatory testing by owners/sellers and disclosure to buyers/renters for individual wells when there is a realty transfer. Wells on the property that is being sold must be tested for all the parameters regulated by the EPA plus chemicals commonly found in New Jersey's drinking water including radionuclides and pesticides. These parameters would depend on the location. For example, if someone has a well in coastal New Jersey south of Trenton, testing for radionuclides must be done. In these areas naturally occurring radionuclides are a drinking water threat. There is also a provision for zero interest loans for testing and cleanup of private wells.

Another important provision of the New Jersey Act is that the standards must be based on health criteria and not cost criteria. No contaminant can be in drinking water at a level that has a risk factor of more than 1 cancer in a million. Based on this risk factor, the U.S. standard for arsenic has been unacceptably high. The EPA has proposed a new standard for arsenic but the revised standard has recently been revoked. One environmental group, the New Jersey Environmental Federation, is suing the New Jersey State government to it to lower the standard in accordance with the New Jersey law.

In 1983 New Jersey undertook a major review of its own *Safe Drinking Water Act*, and in 1984 new provisions were signed into state law. The most important new requirement was that public community water suppliers test for volatile organic compounds. Although this is one test, it identifies many different volatile organic compounds (VOCs). In 1989, maximum contaminant levels (MCLs) were set for these compounds. Although 22 compounds were identified in the Act, maximum contaminant levels were only set for 16 based on the health data available.

New Jersey's Act also established the Drinking Water Institute, a research group, which provides recommendations to the department. This Institute is unique in that it looks specifically at New Jersey's needs. It has been funded since 1984 by a drinking water tax which collects 3 cents for every 1000 gallons of water sold. The money is used to supplement the money provided by the federal government. It takes care of provisions for New Jersey not covered under the federal

[187] Amy Goldsmith, New Jersey Environmental Federation, personal communication
[188] See New Jersey Environmental Federation, *Accomplishments in 2000*, http://www.cleanwateraction.org/njef/nj_accomp00.htm

Act. For example, it funds a section in the Department of Health that does epidemiological studies. Initially the fund was just over $2 million per year, but because of growth in the state it is now about $3 million.

The Act applies to public community water supplies, which are defined as over 25 people or 15 service connections to year round residents. There are also definitions for non-transient, non-community water suppliers. An example of this would be a public building like a school in a rural area that accommodates at least 25 people for 6 months, 4 hours a day, 4 days a week. All contaminant levels apply to these water supplies, and the monitoring is set out in the federal rules. There are also transient non-community water supplies like a fast food outlet that may have less than 25 employees but serves more than 25 people, open at least 60 days. They have less stringent monitoring requirements – only coliform bacteria and nitrates, acute contaminants. This would also apply to a campground open seasonally where there are less than 25 employees. The small non-community systems under federal legislation only have to test for nitrates once a year but New Jersey requires quarterly reporting.

If there is a positive coliform test found in routine lab testing, the water supplier must do E. coli or fecal coliform tests. Whatever the results, they must do a repeat or check sample. If the system is large at least 3 repeat samples must be done. If it is a small system at least 5 samples must be done in one month. One repeat sample must be done where the original positive sample was taken, another sample must be taken upstream, and one downstream at least 3 service connections away (up and down the street). They must all be tested for coliform and for every sample that is positive, an E. coli or fecal test must be done.

For any combination of the original sample or any repeats that are positive for fecal coliforms or if there is a sample that is total coliform positive above the acute maximum contaminant level, there is a violation of the maximum contaminant level for coliform. The public must be notified immediately within 24 hours. The water supplier must notify the radio station and the newspaper within 7 days. Each customer must be notified within 90 days. If the problem is corrected, no direct notification is required.

As part of the lab certification requirements, whenever the lab does a sample which is positive for E. coli or nitrate, they must notify the water supplier, the local health department and the state Bureau of Safe Drinking Water. There is a hotline number. The state had to argue with the testing laboratories in the late 1980s because the labs wanted to notify only the water supplier.

There is a well-defined process for boil water orders.[189] However, New Jersey is very careful with these orders because of the disruption it causes to hospitals, restaurants and other businesses. If there is a coliform violation and they can't find the problem, they will put the whole system on a boil water order. If there is a disruption of the system, a loss of pressure from a major water main break where there is the possibility of backflow, there will be a boil water advisory. And if there is any problem within the plant like a disinfection problem, there is a boil water order. They had serious problems in September 1999 when Hurricane Floyd flooded a major water plant at Elizabethtown. The turbidity coming in was so high it couldn't be handled

[189] New Jersey Department of Environmental Protection Bureau of Safe Drinking Water, *Guidance for Issuance of Boil Water Advisory*, September 30, 1999.

and the whole system was put in jeopardy. This led to boil water advisories that lasted for a week and affected approximately one million people.

New Jersey is very rigorous in enforcing all environmental legislation. It has zero tolerance for failure to monitor for significant non-compliance from water suppliers who do not regularly report their monitoring results. There is mandatory enforcement of the monitoring law. Unless the problem is severe, an administrative penalty is imposed, with a minimum $1,000 fine. If they fail to report, they are immediately fined. If they pay fines and do the work, the state will settle for 50 to 75 per cent of the assessment. This is done to avoid court appeals by the water suppliers which are costly for the state.

On the other hand, there are no mandatory penalties for maximum contaminant levels. Some water suppliers violate the same maximum contaminant level over and over again according to their monitoring reports, but the state is reluctant to take legal action against them because it would create more problems if they failed to report. New Jersey has not yet worked out a means of ensuring both reporting from suppliers and ensuring compliance with the standards through establishing equally firm enforcement measures in both instances.

Commentary

New Jersey has adopted its own legislation that includes all of the federal legislative requirements and improves upon them for local conditions. It requires testing of individual wells when an owner sells or leases land, and disclosure of the results to the buyer or renter.

For new sources of water, New Jersey requires unregulated substances of concern in the area to be assessed. It has expanded on consumer confidence reporting to require warning to vulnerable people to be prominently displayed on the reports themselves and to be posted at daycares, health facilities, schools and apartments.

Standards are based on health criteria, and the cost of meeting the standards is not considered. Citizen suits are allowed for standards that allow for a risk greater than one cancer per one million people. The state is rigorous in its enforcement efforts, especially with respect to monitoring reporting.

New Jersey has its own research group, funded in part by a water tax, to look at the state's own needs. The tax also funds epidemiological studies.

2.4 Europe:

(a) European Union

The European Union began with the creation of the European Economic Community in 1957. During the early days of European government, any environmental legislation was based only on efforts to reduce barriers to trade between different member states, which was an awkward combination, as the two aims were frequently contradictory. It was not until the increased environmental awareness of the 1970s that there began to be a separate focus on environmental

protection for its own sake. Water quality was one of the first environmental issues to be addressed, with the first drinking water initiative consisting of guidelines for the quality of water in rivers and lakes used as drinking water sources.[190]

The first specific drinking water regulation was the Directive on Drinking Water in 1980 (80\778\EEC), which set binding standards for 44 substances and another 20 non-binding guidelines. As with all European Directives, the requirements were not directly applicable, but member states were required to transpose them into national legislation within a given time period (usually 2 to 3 years).[191] Throughout the 1980s and 1990s, a variety of other water quality Directives were developed to address specific problems. These included Directives on urban wastewater treatment, nitrates, dangerous substances, fish and shellfish waters, bathing water, and groundwater.

A revised Drinking Water Directive (98\83\EC) was approved in 1998, in response to technological developments and other concerns with the 1980 legislation. Most recently, an overall European water policy meant to address all water quality, the Water Framework Directive (2000\60\EC), was introduced in October 2000.

Drinking Water Quality Directive (80\778\EEC and 98\83\EC):

The Drinking Water Directive is the primary vehicle for European drinking water regulation. Both the 1980 Directive and the 1998 revision set specific limits on drinking water contaminants, along with minimum standards for drinking water monitoring and treatment for all European Union member states. The contaminant limits are based on the World Health Organization's Drinking Water Guidelines, in conjunction with advice from the EC Scientific Advisory Committee. As a general principle, the Directives confer a general obligation to provide water that is "wholesome and clean". The Directives apply to all water regardless of origin and whether it is supplied from a distribution network, a tanker, or in bottles or containers - basically everything except natural mineral waters. However, they do not apply to individual supplies serving less than 50 people or less than $10m^3$ a day.

The main change between the old and revised Directives is in the standards for contaminants and the number of contaminants regulated. First, there was an overall reduction in the number of contaminants regulated, with a total of 48 parameters in the new Directive compared to 64 in the 1980 one. These are now divided into mandatory and indicator parameters, similar to the US primary and secondary regulations. In all, the new Directive sets 28 mandatory health-based limits, including 4 microbiological and 24 chemical parameters. There are an additional 20

[190] Barnes, Pamela M. and Ian G. Barnes, Environmental Policy in the European Union. London: Edward Elgar Publishing, 1999, ch. 2.

[191] Environmental policy is administered by the European Commission (EC). The EC is divided into thirty-six Ministry-like Directorates-General (DGs). Environmental policy falls within the Environment DG. It is responsible for ensuring that member states comply with the Directives. The member states themselves are then responsible for enforcing the legislation embodying the Directives. The EC doesn't have the resources to carry out inspections to ensure compliance by member states, but relies on complaints from individuals or groups to trigger an investigation, and if necessary, legal action before the European Court of Justice. The Court has the power to impose a financial penalty if the member state still does not comply, but nonetheless, ensuring compliance is a serious ongoing problem.

indicator parameters, covering limits for substances such as iron and sodium, along with aesthetic qualities such as colour and taste. Several new parameters were added. The revised Directive also introduced a catch-all provision for member states to set values for additional substances if protection of human health warrants it.

One reason for the reduction is that there were significant problems with compliance from countries with the 1980 standards, with few countries managing to meet all of the requirements even by the late nineties. The new Directive was partly intended to make compliance more achievable by all members, particularly where public health would not be affected. As well, European legislation in the early 1990s had introduced the concept of subsidiarity, which sets out the principle of shared responsibility for legislation between the national and supranational levels of government, and that legislation should be made by the level of government best suited to do so. Great differences in water quality and in the ecological characteristics of member states meant that some contaminants were a problem in one area but not in others, with some states complaining about having to monitor for non-problem substances. As a result, subsidiarity also contributed to the decreased EC role in determining standards.

On a positive note, some parameters were made more stringent. There was a reduction in the lead limit from 0.25 mg/L to the WHO standard of 0.1 mg/L. This is a significant reduction that will require large capital investment in some countries to replace lead in distribution systems. Because of this, however, there is a 15-year transition period to implement the new standard. The copper limit was also reduced from 3.0 to 2.0 mg/l. The values for individual and total pesticides remained the same, with more stringent values for certain pesticides. There are also new standards for total trihalomethanes (THMs), although these were accompanied by a less stringent requirement for nitrites to allow the THM goal to be achieved (because of a tradeoff in treatment practices).

Other elements in the new Directive include a statement that "the parametric values are based on the scientific knowledge available and the precautionary principle has also been taken into account", which is important as a statement of principle even if the resulting standards fall short of a truly precautionary approach. Similarly, there is also a statement expressing "increasing concern" regarding endocrine-disrupting chemicals although stating that there is at present insufficient evidence to set parameters for these.

The Directive requires regular monitoring, specifying minimum sampling frequencies for different parameters such as microbiological and aesthetic. In addition, there are specific protocols for monitoring different substances. There is also a requirement for quality assurance for treatment processes, and the equipment and materials used for treatment.

Reporting requirements and mechanisms for public participation are quite weak. There is a statement that member states will ensure that adequate and up-to-date information on drinking water quality is made available to consumers but without specifying what this means. In addition, member states will only be required to submit reports to the European Commission on compliance with the standards every three years, much less useful than annual reports. Another problem is that there is as yet no specified reporting framework, which hampers comparative

analysis, although there is a requirement that one be developed in future. The EC will, however, be required to publish a synthesis report for the entire EC for the three-year period.

Penalties for infringement of the Directive are not specified, with implementation being left up to individual member states.

Currently, the 1980 Directive is still in force, and although the transition to the new Directive is already underway, the new standards will not begin to be legally enforceable until 2003. Starting in 2001, however, utilities or water companies must begin monitoring against any new, tighter standards and to start work to ensure that the standards will be met before they come into force. Future revision is addressed by a requirement for a review of the contaminant limits every five years.

Surface Water Quality for Water Intended as Drinking Water Directive (75/440/EEC):

This 1975 Directive covers all surface water to be used for drinking water. It requires all surface water sources used for drinking water to be classified as A1, A2, or A3, according to the amounts of various contaminants they contain. Surface water that falls short of the limits for the lowest A3 standard is not allowed to be used for drinking water, except under exceptional circumstances. Member states are required to draw up action plans, including timetables, for improvement of surface water sources, particularly for sources that fall in the A3 category. There are requirements for regular sampling to test for a range of parameters, but the specific frequency of sampling is left to the member states to determine.

Water Framework Directive (2000\60\EC):

The Water Framework Directive was introduced in October 2000, and will come into force in three years. The Directive aims to consolidate six existing disparate water quality regulations, including the Surface Water Directive described above, and to move beyond a piecemeal approach by managing all surface water and groundwater in a more integrated manner. It will not encompass the Drinking Water Directive, but it will affect drinking water quality through enhancing source water protection in Europe. The main features of the Directive are:

1. River Basin Management as the model:

- One major change will be to use the river basin as the management unit for the whole range of water quality regulation rather than using separate legislation to address individual problems, for example nitrates or groundwater. The aim of this isto take the natural geographical area and look at it holistically in terms of water quality and water quantity, surface water and groundwater, drinking water, emission limits and environmental protection objectives. Under the Directive, river basin management units will be set up, and river basin management plans for each unit will be established and updated every six years. In recognition of the cross-border nature of natural boundaries, some of these will involve more than one country.

- There is an objective of "good status" for all waters by a set deadline (2015). This will integrate various measures such as aquatic ecology, habitat protection, bathing water, and drinking water protection for each river basin unit.

2. Disposal of hazardous substances:

   There will be an end to the release of hazardous substances into water with gradual reductions aiming at a deadline of 2025 for the first round of substances.

3. Groundwater protection:

   Member states will have to implement measures to prevent or limit the input of pollutants into groundwater, to prevent the deterioration of the status of all bodies of groundwater, and to reverse any significant upward trend in the concentration of any pollutant caused by human activity. However, the Framework does not contain the specific measures to be implemented. These will be addressed by 2002 in a "daughter" Directive. Member states are also expected to achieve “good groundwater status” by 2015, including protection and restoration measures and a balance between removal and recharge.

The public consultation on the Directive was quite contentious, and although the final Directive is generally seen as a positive development, environmental groups have important reservations. Criticisms from one group included:

- the lengthy timeframes, with the possibility of unnecessary extensions

- that there should be a more precautionary approach, particularly with respect to the most hazardous substances

- lack of protection for wetlands[192]

(b) England:

The UK differs from Canada by the fact that a significant percentage of the legislation is determined by requirements established through various European Directives, so there is less latitude for decision-making at the national level than there would be in Canada or the United States. Comparison with the UK is further complicated by the fact that drinking water systems have been privatized in England and Wales since 1989, and there is consequently a somewhat different regulatory structure. While drinking water legislation is similar throughout the UK, England will be used as the example here since devolution has meant that Scotland, Northern Ireland, and increasingly Wales often have their own versions of legislation, along with varying degrees of separate administration. Since privatization, there has been a great deal of public concern in England with water supply and pricing issues, and now with new measures to allow

[192] World Wildlife Fund. European Freshwater Programme, "The EU Water Framework Directive " < http://www.wwffreshwater.organization/initiatives/wfd.html >, accessed November 16, 2000.

competition. The major public health threat has been from *Cryptosporidium*, as there have been several significant outbreaks in recent years.[193]

The current regulatory regime and administrative framework was introduced in 1989 when privatization took effect. Water is supplied by one of 27 water-only or water and sewerage companies, which currently operate in distinct geographical areas. They are monitored regarding water quality by the Drinking Water Inspectorate (DWI), which is part of the Department of Environment, Transport and the Regions (DETR). The Drinking Water Inspectorate is responsible for ensuring that the water companies are providing water that meets the quality and standards set by the UK drinking water quality regulations. Some of their activities include carrying out inspections and audits of water companies, providing a publicly available report each year on each water company's performance, and providing direction and advice to the water companies on fulfilling their regulatory obligations. They also investigate customer complaints and can prosecute water companies found to be providing water unfit for human consumption.

Ofwat (the Office of Water) is the economic regulator of the water industry. Ofwat is responsible for ensuring that the water companies provide good quality service at a fair price, and that they are carrying out their responsibilities under the Water Industry Act 1991. They are also required to administer 10 regional Customer Service Committees to represent customer interests and provide feedback on customer concerns.

The Environment Agency (EA) is responsible for environmental protection, which includes the protection of freshwater quality in England and Wales. The EA undertakes routine monitoring and classification of surface water chemical and biological quality, in order to determine if the water meets minimum standards required for use as a source of drinking water and for other purposes. There is a groundwater protection program as well, although not as rigourous.

The *Water Industry Act 1999:*

The equivalent of the *Safe Drinking Water Act* for England is the *Water Industry Act 1999,* which is the main statute specifically concerning drinking water. It governs the operation of the private water companies and includes:

- licencing, duties and responsibilities of the water companies with respect to issues such as water quality, water supply, information reporting and record keeping, and consumer relations

- the principle that it is a criminal offence to supply water that is "unfit for human consumption", although this term is not defined and is interpreted by the courts on a case by case basis

- enforcement procedures

[193] UK information sources included Milo Purcell, Principal Inspector, UK Drinking Water Inspectorate, and Dr. Gordon Nichols, scientist with the Public Health Laboratory Service

- consumer protection measures

- water pricing and rules for applying charges

- water company powers and rights

The 27 water companies are licenced under the *Water Industry Act*, which governs their appointment and regulation as "water undertakers", and their duties and responsibilities in complying with enforcement orders, providing customer service, maintaining water supply, and providing water quality standards. However, one notable omission is the lack of training requirements for staff at the water companies, as the level of training required is left up to the water companies to determine through their hiring procedures.

One strong feature of the UK system is the existence of a single agency focused on drinking water quality. The Drinking Water Inspectorate (established in 1990 under s. 86 of the *Water Industry Act)* is staffed by specialists and is focused solely on drinking water.[194] The DWI ensures that the water provided to customers is wholesome and fit for consumption. It also ensures that companies carry out monitoring and treatment in accordance with UK standards, and that they provide information on monitoring results to the public. Accountability is aided by the Drinking Water Inspectorate's *Code for Enforcement*, which outlines the role of the Drinking Water Inspectorate and the level of service and performance people can expect. It discusses the role of the DWI in carrying out monitoring and inspection of water companies, and sets out time frames for response and the kind of action the DWI will take in response to various incidents. The *Code* also sets out a policy of openness in responding to public inquiries on drinking water quality and DWI activities.[195] Results of enquiries and actions taken are made available to the public, and are posted on their web site.

The Drinking Water Inspectorate also undertakes a large research program, and administers all of the Water and Land Directorate research for the Department of the Environment, Transport and the Regions (with a £3,600,000 budget in 1999). They play a major role in contributing to drafting regulations and standards on drinking water, and undertake scientific research on their own as well as in conjunction with the water industry and with other groups in the European Union and the United States. They have been particularly active recently in research regarding *Cryptosporidium*.

<u>The Water Supply (Water Quality) Regulations:</u>

Another strength of the UK system is the existence of legally enforceable health-based standards, although these were introduced primarily because of the need to implement the first EC Drinking Water Directive (80\778\EEC), as well as because of the greater regulatory responsibility created by privatization. Prior to 1990, the UK did not have any numerical standards for

[194] Officially, the Secretary of State for the Environment, Transport and the Regions and the National Assembly of Wales are responsible for the regulation of drinking water quality, but in practice the day-to-day work of carrying out this responsibility is delegated to the Drinking Water Inspectorate

[195] UK Drinking Water Inpsectorate, Code for Enforcement, (http://www.dwi.detr.gov.uk/aboutus/code4enf.htm, accessed February 13, 2001)

drinking water quality. The standards are incorporated in the Water Supply (Water Quality) Regulations 1989 under *the Water Industry Act*. These regulations will eventually be superseded by the Water Supply (Water Quality) Regulations 2000, largely to incorporate requirements of the new European Drinking Water Directive (98/83/EC) which requires some tighter standards, so the UK is in the midst of a transition period at present.[196]

The Water Supply (Water Quality) Regulations contain most of the requirements for ensuring drinking water quality in England. With respect to standards, the regulations state that water companies must supply "wholesome" water, which is defined by the requirements which must be met, including the EC drinking water standards along with 11 national standards. The new regulations will have a total of 55 numerical standards and 2 descriptive ones. There is an additional qualitative requirement that water must also not contain anything else at concentrations that would potentially endanger human health. Water supplied must also not contain anything at an amount which, in combination with any other substance in the water, would constitute a potential health threat.

To meet the new EC Directive requirements, many of the limits will be tightened, including lead, copper, and arsenic. The lead standard is being lowered in two stages from 50µg/l to 25µg/l by 2003, and 10µg/l by 2013. Initial improvement to meet the first standard will come primarily from additional treatment, while the 2013 standard will require the replacement of lead pipes in the distribution system. Meeting the copper limit is not expected to be a problem. The arsenic limit is being tightened to 10µg/l from 50µg/l, and there are also a few new parameters. Capital costs for water companies to meet the tighter standards from 2000 to 2005 are expected to be around £480 million.[197]

The new regulations also incorporate the concept of indicator parameters from the new EC Directive, which reclassifies some substances as not requiring remedial action unless there is a perceived health risk. For these substances, the Inspectorate will now have less of an investigative and enforcement responsibility unless the companies exceed the generally higher levels of these substances that will be deemed to be a health risk.[198]

While the EC Directive determines most of the parameters, some national standards are also set. These would normally be set because of a response to apparent local need and public demand, rather than following what is done in other jurisdictions such as the United States. For unforeseen microbial pathogens, the Drinking Water Inspectorate would rely on the Public Health Laboratory Service, the organization in the UK that monitors disease outbreaks, to alert

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[196] Some transitional aspects of the new water supply regulations came into effect as of January 1, 2001, but the full transition won't be until January 1, 2004. This description refers to the 2000 regulations, because the most recent regulations represent current thinking in the UK, with the new elements indicated where applicable.

[197] UK Department of Transport, Environment and the Regions. *The Water Supply (Water Quality) Regulations 2000*, Regulatory Impact Assessment (http://www.environment.detr.gov.uk/wqd/riafinal/, accessed February 15, 2001)

[198] UK Department of the Environment, Transport and the Regions. *The Water Supply (Water Quality)(England) Regulations 2000*: Consultation on Regulations (April 2000), p. 13, (http://www.environment.detr.gov.uk/consult/watersup/index.htm , accessed February 2001.

them to any new dangers. The DWI also undertakes a broad program of research into drinking water issues, including possible new pathogens.

England has set national standards in the *Cryptosporidium* regulations of 1999. These were established in response to public demand (see *Expert Group on Cryptosporidium in Water Supplies* below). Another example where England diverges from the EC is in setting mandatory standards for some substances such as iron and manganese, which the EC Directive lists as non-mandatory indicators. This is related to the privatization of water in England, since these substances affect aesthetic qualities that are considered necessary to ensure that water is fit for human consumption, even though they may not endanger public health. For example, there was a recent case involving "black coffee" water which looked revolting and damaged pipes in Yorkshire, where the company was charged with providing water unfit for human consumption even though the company claimed that the water was just discoloured but otherwise fine.[199] Turbidity is also considered a mandatory standard in *The Water Supply (Water Quality) Regulations* because there has been a strong correlation in England between turbidity and *Cryptosporidium* outbreaks.

Updates to the standards vary. For standards based on the EC Directive, the regulations in the UK are changed where needed in order to meet the requirements. There is a requirement for an overall five-year review of the EC standards at the European level. There is no corresponding requirement in the UK for periodically reviewing national standards, but they can be amended at any time based on evolving circumstances.

The regulations contain quite detailed requirements for how sampling should be done, some of it derived from the EC Directive and some nationally-based. This includes sampling locations, frequencies, and acceptable sampling and analysis methods for particular substances. Sampling is to be done in general at consumers' taps except where this is not considered necessary by the DWI. New sources of water need to be monitored more frequently, while less frequent monitoring is allowed for sources that have been in full compliance for several years. There are stringent monitoring and treatment requirements for *Cryptosporidium.*

The water companies are required to do their own sampling, collectively carrying out approximately 2.8 million tests per year, and are required to send in monthly and twice-yearly reports of results to the Drinking Water Inspectorate. Statistically, reported water quality samples met the required standards in 99.82% of tests in 1999, representing an increase from 98.7% of samples in 1992. This represents a decrease from 50,476 failed test samples in 1992 to 5,148 in 1999, a figure which has been decreasing each year. On its own, this represents a distinct achievement, reflecting the benefit of having enforceable standards backed up by a strong system of regulatory oversight.[200]

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[199] The Guardian, Saturday, December 9, 2000, (www.guardian.co.uk/Archive/Article/0,4273,4102988,00.html, accessed February 10, 2001)

[200] Drinking Water Inspectorate. *Summary of 1999 Results* (July 12, 2000), (www.dwi.detr.gov.uk/pugs/coreport/hgood99.htm , accessed February 15, 2001)

There are rigourous controls in place regarding laboratories. There is a requirement in the water quality regulations that laboratories used for testing have a system of analytical quality control in place that is checked periodically by an independent accredited inspector. The Drinking Water Inspectorate has an agreement with the UK Accreditation Service to set special standards for laboratories accredited to perform drinking water analysis.

In 1999, 388 "events" were reported to the DWI. Of these, 166 were deemed to be non-trivial, potentially health-related incidents, affecting water supplied to around 3.8 million customers. There were 102 non-trivial incidents in 1997 and 124 in 1998, so it is harder to discern a trend for these.[201]

England has a dual approach to enforcement. This involves enforcement orders to handle most problems, with prosecutions to handle serious problems of non-compliance. The water companies are required to initially investigate any failure to meet a drinking water quality standard and to establish the cause and nature of the failure, and must report the results to the Drinking Water Inspectorate. The Inspectorate is then required to investigate any event that could be of concern to public health and to set out the steps that must be taken to correct the situation. This is done through enforcement orders, which initiate an undertaking from the water company requiring an action to fix the problem. These enforcement orders are the primary means of day-to-day enforcement of the regulations, and in the last ten years, there have been around 2,700 enforcement orders issued. The regulations also allow the companies temporary non-compliance with the requirements of the order while action is being taken to work towards compliance. However, this process of correction can take up to three years, during which time the company would only be moving towards full compliance, so it is not available for microbial problems requiring immediate action.

The number of prosecutions is much smaller. In order to prosecute a water supplier under the *Water Industry Act*, the Drinking Water Inspectorate must be satisfied that two factors have been met: first, that water was supplied that was unfit for human consumption, and second, that the company didn't act with due diligence. There have been about 30-40 prosecutions in the last ten years, which tend to be public, high profile events, generally resulting in the imposition of fines.

There are water treatment provisions to conform to EC and national requirements for classifying, withdrawing, and treating water intended for human consumption. A mechanism of approvals for water treatment products and processes is also addressed. The new regulations introduce special treatment provisions where the presence of lead or copper in the distribution system is known, in order to meet the more stringent standards for these substances in the new EC Directive. The water companies are expected to draw up programmes of work for compliance with the standard in 2001. Another new requirement is that if a company discovers that a failure to meet standards at the tap is due to domestic plumbing, they must inform consumers there is a problem and how best to fix it, whether this is due to lead or anything else such as microbial contamination.

[201] Drinking Water Inspectorate. *1999 Annual Report* (July 2000), (www.dwi.detr.gov.uk/pubs/annrep99/index.htm, accessed February 15, 2001).

The regulations also address record keeping and information provisions for drinking water. There is a general requirement to maintain all records, and a requirement to make any record available to the public for inspection free of charge at least one of its offices. They must also notify the public of their right to inspect records of water quality with at least one account statement every year, informing them of the address and hours where they can do this. In addition, the water company must supply an annual report to the local authority containing information on the water quality supplied to the authority's area which is to include information on the number and percentage of samples taken which contravened the prescribed limits for the various parameters and the minimum, mean and maximum concentrations of each parameter in the area's water for each treatment works, each service reservoir, and each overall water supply zone. They must also publish this report. The DWI posts an annual summary of the results for each water company on its Internet site.

There are also clear notification guidelines. With respect to incidents, there is a requirement to notify the local authority, the district health authority, and the customer service committee "as soon as may be" after an event which gives rise to or is likely to give rise to a significant health risk and to send the DWI a copy of every such notification. Local authorities are also given the right to take and analyze their own samples of water supplied to premises in their area, as they require.

The EC Directive only requires reports on the state of drinking water quality every three years, but the UK requires water companies to report to the DWI much more frequently. DWI in turn publishes annual reports on each company and on the comparative overall situation, and will continue to do this. The Drinking Water Inspectorate sets out detailed reporting requirements for water companies in The Water Undertaker's (Information) Direction 1998 under the *Water Industry Act 1991*, which came into force in February 1998. This *Direction* means that enforcement procedures can now be initiated against companies that fail to provide compliance data.

Required information includes:

- annual reports on the number of samples required and the number taken, any contraventions of limits and overall values of substances, information on any authorized relaxation of sampling requirements, any increased or decreased frequency of sampling allowed, and reports on progress on any actions which have been required to meet compliance;

- in addition to the annual reports, the companies must submit monthly reports on any samples which exceeded prescribed values, indicating the parameter exceeded and the amount of variance; and every six months, the companies must report any contraventions of the sampling frequency requirements for their areas;

- water companies which are undertaking improvements to the distribution system must provide an annual report on the state of these; and

- annual reports on concentrations of lead in water supplied, along with any action taken to replace lead pipes and to install any water treatment related to lead.

The *Direction* also contains requirements for water suppliers to notify the Inspectorate in the event of any incident which might affect public health and any reports of disease in the community that might possibly be associated with water supply. They are also to report on any other water supply matter which "is of national significance, has attracted or might attract significant publicity, or that has caused or might cause significant concern to consumers". This notification must be made as soon as the supplier is aware of the problem "by telephone or other appropriate means", and in writing not less than 72 hours later. The notification must include:

- particulars of the event or matter
- an assessment of the effect of the matter on water quality or supply
- an estimate of the population affected and whether sensitive populations are involved
- any available information on the cause or likely cause of the matter
- information on any action taken or proposed to be taken, to inform and protect customers, and to rectify the situation
- a list of persons notified of the matter and a copy of any notices issued to the customers or the press
- the number of complaints from customers and contact information for complainants (or the first 50 if more than that complain)

One month later, a report detailing the results of an investigation into the matter must be submitted. [202]

Much of the strength of the UK system lies in the existence of enforceable standards with an accountable monitoring, reporting, and enforcement system to back them up in day-to-day practice. Necessitated in part by privatization, this system has taken time and effort to achieve. Under privatization, the water companies regulate themselves through carrying out their own sampling, investigating, and reporting. There were problems with false monitoring in the early years of privatization, which were publicized and prosecuted. Ensuring a rigorous system of sampling and reporting was difficult to establish, requiring major changes to the way water sampling, collection, and analysis was organized. Still, without the resources to independently check every sample, the system ultimately has to rely on the threat of publicity about adverse incidents damaging a water company's public reputation and share price.

The main scope for falsifying records was determined to be in three areas, and the Drinking Water Inspectorate instituted provisions to deal with each as follows:

[202] The Water Undertakers (Information) Direction 1998, (http://www.detr.gov.uk/dwi/regs/infolett/1998/pdf/infdir98.pdf , accessed March 10, 2001)

1. where and when the companies take samples - the main protection against falsification here lies in establishing a clear audit trail from the planning stage of a company's testing for the year to the final results that appear on the public record, along with the possibility of random checks, since the DWI has the right, along with the relevant local authority, to appear unannounced and check the company's records at any time.

2. in the laboratory - the existing accreditation system for laboratories in England was not considered to be sufficient to protect drinking water, so the DWI rewrote the entire quality control system for laboratories for drinking water testing and this system now applies

3. through lab information management systems - the point at which test results are received and put on the public record. There are now special data diagnosis systems and audit requirements for these systems in order to ensure the accuracy of information

The *Water Resources Act*

Source water protection in England is primarily governed by the *Water Resources Act 1991*. The *Water Resources Act* is concerned with overall water resources management. The Environment Agency has administered the Act since 1995, when the Environment Agency was established.[203] The Act includes duties to achieve and maintain water quality objectives, the prohibition of certain discharges, requirements to take precautions against pollution, and the power to define certain areas as nitrate sensitive areas or water protection zones with greater controls on pollution. An important impetus for setting water quality standards has been the need to meet various EC Directives applying to water used for bathing waters, freshwater fish and shellfish waters, or drinking water.[204]

In response to the EC Nitrates Directive (91/676/EEC), the *Water Resources Act* allows the EA to establish nitrate sensitive and nitrate vulnerable areas. These are intended to protect water against pollution caused by nitrates from agricultural sources such as chemical fertilizers and livestock manure, in part to safeguard drinking water supplies. Nitrate Vulnerable Zones are designated in areas where surface water or groundwater exceeds or is at risk of exceeding the EC nitrate concentration limit of 50 mg/l. In England and Wales, 68 Nitrate Vulnerable Zones have been designated which have required farmers to reduce nitrate leaching from their land beginning in December 1998, following codes of good agricultural practice.[205]

The Environment Agency also has the authority to establish water protection zones to further protect at-risk surface water sources. A water protection zone is a defined catchment area with additional measures to prohibit or restrict activities such as the storage of use of controlled substances in order to decrease the pollution of surface water. So far, however, it has only established one of these, the River Dee Water Protection Zone, which was established in 1999. The River Dee provides drinking water for over two million people in the area of Merseyside and

[203] Prior to that, the National Rivers Authority administered the Act.
[204] *Water Resources Act 1991* (U.K.), 1991.
[205] UK Department of Environment, Transport, and the Regions, Water Quality Report, < www.environment.detr.gov.uk/wqd/guide/water.htm, accessed Nov 16, 2000; Environment Agency. Environment 2000 and Beyond

Cheshire in Western England, along with northeast Wales. The River Dee zone was set up because there are a lot of industrial sites using chemicals upstream and there had been several serious pollution incidents affecting the drinking water supply. Industries within the catchment zone are required to have materials used or stored assessed for the risk that they might pose, and all materials must be authorized. The implementation of the zone involves additional pollution prevention requirements by industry, and is currently over 50 % complete.[206]

The Surface Waters (Abstraction for Drinking Water) (Classification) Regulations:

For surface water used a source of drinking water, the two EC Surface Water Abstraction Directives (75\440\EEC and 79\869\EEC) are given effect in UK legislation by The Surface Waters (Abstraction for Drinking Water) (Classification) Regulations 1996. The regulations set water quality standards for surface water used as a source of drinking water. Water is classified as either A1, A2, or A3, based on meeting mandatory limits for contaminants, as set out by the EC. The UK has 162 A1 and 298 A2 sources, with no A3 sources. The regulations also set out the methods of measurement and the sampling frequency and analysis, for each site drinking water is taken from. The Environment Agency is responsible for undertaking the monitoring and ensuring compliance with the regulations.[207] The Environment Agency also uses a more detailed General Quality Assessment (GQA) scheme to classify stretches of fresh water in terms of chemical, biological, nutrient and aesthetic qualities; with six categories ranging from Very Good (Class A) to Bad (Class F).

There is less protection for groundwater but the system is based on the EC Groundwater Directive. This allows the establishment of groundwater protection zones to try to diffuse pollution by restricting potentially polluting activities.

Expert Group on Cryptosporidium in Water Supplies:

Cryptosporidium has been an ongoing problem in the UK. From 1990 to 1997, there were eleven suspected waterborne outbreaks of cryptosporidiosis investigated by the Drinking Water Inspectorate, including a serious one in Northwest London and Hertfordshire in 1997 from a groundwater source, where the DWI prosecuted the water company but was unsuccessful because of a technicality. Public pressure in response to this led to the government re-establishing an Expert Group on *Cryptosporidium* in Water Supplies, under the Chairmanship of Sir Ian Bouchier. This group was given the job of studying past waterborne outbreaks of cryptosporidiosis, along with research undertaken since 1995, in order to determine if there was a need for considering strategies such as source water protection, additional water treatment, monitoring programmes, or the management of outbreaks, and whether further research was needed.

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[206] *The Water Protection Zone (River Dee Catchment) Designation Order 1999* (U.K.), S.I. 1999/915*; The Water Protection Zone (River Dee Catchment)(Procedural and Other Provisions) Regulations 1999* (U.K.), S.I. 1999/916; UK Environment Agency. The River Dee Water Protection Zone <www.environment-agency.gov.uk/modules/MOD38.206.html > accessed February 12, 2001; UK Environment Agency. The River Dee Water Protection Zone - Summary of Progress (correspondence)

[207] The Surface Waters (Abstraction for Drinking Water) (Classification) Regulations 1996 (U.K.), S.I. 1996/3001

This Expert Group reported jointly to the Departments of Environment, Transport and the Regions and the Department of Health, recommending controversial, tough new treatment and monitoring requirements. The Group concluded that "outbreaks of water related cryptosporidiosis do not just 'happen'". There was a strong correlation between outbreaks and the existence of inadequacies in either the treatment provided or the treatment process, or in treatment works operating above capacity. Peaks of turbidity in water leaving treatment plants were found to be a unifying factor in all outbreaks, making adequate turbidity monitoring essential. Specific recommendations in the Expert Group included:

- the need for water companies to be vigilant in monitoring for the presence of *Cryptosporidium*

- increased awareness by water companies of situations which increase the risk of contamination, such as turbidity

- the need for effective local outbreak management plans with designated incident and outbreak management teams, and the importance of ongoing coordination and rehearsal as preparation for possible events

- greater coordination between water companies and public health officials in the event of an incident

- monitoring outbreaks at the national level through making human cryptosporidiosis a laboratory reportable disease

- the need to assess all groundwater sources, catchment areas and hydrogeological factors for potential contamination risk

- further application of the Code of Good Agricultural Practice to help protect agricultural impacts on groundwater

- that water companies carry out a risk assessment of risk from *Cryptosporidium* for each source with periodic review, and review monitoring and treatment systems against the level of risk, ensuring that systems are appropriate to the level of risk

- treatment works should have the capacity to handle peak turbidity levels and a range of turbidity monitoring processes should be introduced

- the introduction of continuous monitoring processes for all sites deemed to be at high risk as determined by the risk assessments

- additional research requirements [208]

[208] UK Department of the Environment, Transport and the Regions. *Cryptosporidium* in Water Supplies, November 1998 (http://www.dwi.detr.gov.uk/pubs/bouchier/index.htm , accessed January 31, 2001)

The recommendations resulted in new regulations coming into force in June 1999 (the Water Supply (Water Quality)(Amendment) Regulations 1999), to be implemented by the Drinking Water Inspectorate. Risk assessments of facilities were required by October 1999, based on source water quality and previous monitoring results. As a result, 335 of 1500 sites were considered to be at significant risk. Some of these were abandoned because the cost of bringing them up to the new treatment standards would have been too great. The others have implemented new continuous monitoring and treatment provisions.

Although it is still early to evaluate the impact of the new regulations, health and regulatory officials consider that the *Cryptosporidium* regulations represent the most significant advance in protecting drinking water in the last decade. First, there is the direct benefit of an anticipated reduction in *Cryptosporidium* incidents. To date, there has already been one instance where continuous monitoring indicated a problem with *Cryptosporidium* in time to allow the water supplier to switch to another source.

Also, as in other jurisdictions that have instituted reforms in response to outbreaks, implementing the Expert Group recommendations resulted in increased scrutiny of the entire water treatment system. There has been an enhanced operational surveillance of the overall treatment process with earlier detection of problems. Other benefits include the removal of the most serious at-risk facilities from the system, more serious attention to monitoring and reporting on the part of water companies, rigorous laboratory requirements, and increased preparedness at the local level.

Finally, there is a strengthened enforcement power. In the case that sparked the formation of the Third Expert Group, the criminal prosecution of South West Water for the supply of water unfit for human consumption failed because the epidemiological study linking a serious *Cryptosporidium* outbreak to the water supply was ruled as inadmissible evidence. In the event of a future outbreak, the stronger evidence provided by continuous monitoring would make any future prosecution more likely to succeed.[209]

Commentary

The fact that the European Union sets mandatory standards applicable to all member countries raised the bar for improved water quality generally throughout Europe. In England and Wales aging treatment plants have been upgraded to meet the standards. Thorough oversight of the water companies through the Drinking Water Inspectorate was established as a necessity in England because of the privatization of water suppliers. The Inspectorate carries out inspections and audits of water companies, reports publicly on companies' performance and provides advice and direction to companies about their regulatory obligations, investigates customer complaints and prosecutes water suppliers who don't meet the standards. This single agency concept, with clear responsibility, would be useful in a public sector system as well.

[209] UK Department of the Environment, Transport and the Regions. Public Health and Drinking Water: Preventing *Cryptosporidium* Getting into Public Drinking Water Supplies, June 5, 1998, Annex D: Regulatory appraisal on the proposed Water Supply (Water Quality) (Amendment) Regulations 1998, (www.environment.detr.gov.uk/wqd/consult/*Cryptosporidium*/cryptob.htm, accessed November 16, 2000)

The extensive investigation by the UK Expert Group to deal with ongoing *Cryptosporidium* concerns in the UK is useful to all jurisdictions dealing with these new threats. Its finding that, although *Cryptosporidium* is difficult to detect, there was a high correlation between peaks in turbidity for water leaving treatment plants and the presence of *Cryptosporidium*, led to the conclusion that turibidity monitoring and treatment upgrades were essential. While the establishment of a standard may not be possible, the Expert Group's unambiguous verdict that *Cryptosporidium* outbreaks were very much not a random accident, and that much can be done is encouraging. The resulting regulation resulted in the closing of substandard plants and improvements in others, along with a general strengthening of the entire water treatment framework, which to date has been cause for optimism.

2.5 Australia

Australia has a constitutional structure much like Canada. Although guidelines are set at the national level, the actual regulation of drinking water quality is done at the state and territory level. The Guidelines were developed by the National Health and Medical Research Council (NHMRC). The first water quality guidelines for Australia were developed in 1972. They were updated in 1980, 1987 and 1996.[210]

New South Wales provides the focus for the discussion of Australia's regulatory regime with respect to water. It is the most populous state in Australia, with four metropolitan water suppliers – Sydney Water Corporation, Hunter Water Corporation, Gosford City Council and Wyong Shire Council. The Sydney Water Corporation (Water Corporation) services the metropolitan area of Sydney. There was a suspected *Cryptosporidium* and *Giardia* outbreak in Sydney in 1998, resulting in an inquiry and subsequent legislative and institutional changes arising out of the Inquiry's recommendations.[211] For this reason, the Sydney regime has been emphasized although some reference will also be made to the other metropolitan suppliers and to the non-metropolitan or smaller suppliers.

Sydney Water Corporation supplies more than 3.75 million residential customers and 73,000 businesses. It provides water supply, sewerage services and wastewater disposal. The drinking water is drawn mostly from catchments on four main river systems. Water is filtered, disinfected and flouridated at eleven water filtration plants. Four of these are operated by private companies.[212]

The *Sydney Water Act* 1994 requires the Water Corporation to pursue commercial, environmental and public health objectives equally (s.21(2)). In contrast, statutes creating corporate water authorities in Victoria, Western Australia and England have only commercial aims and objectives, including customer service, efficiency and competition.[213] Specifically, s.21 of the Act requires the Water Corporation to:

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[210] Australian Productivity Commission. *Arrangements for Setting Drinking Water Standards, International Benchmarking* (April 2000), p.16.
[211] See < http://www.premiers.nsw.gov.au/pubs.htm#SYDNEY WATER INQUIRY >for the reports.
[212] Australian Productivity Commission, p.199.
[213] Ibid.

- be a successful business and, to this end operate at least as efficiently as any comparable business, to maximise the net worth of the State's investment in the Corporation, and to exhibit a sense of social responsibility by having regard to the interests of the community in which it operates;

- protect the environment by conducting its operations in compliance with the principles of ecologically sustainable development contained in s. 6(2) of the *Protection of the Environment Administration Act 1991;* and

- protect public health by supplying safe drinking water to its customers and other members of the public in compliance with the requirements of any operating licence.

In 1998 (in response to the Sydney water crisis) the NSW government enacted legislative amendments (Water Legislation Amendment (Drinking Water and Corporate Structure Act) 1998) to make the company a statutory state owned corporation (section 4(2)) with more accountability to a responsible Minister. The amendments also provided the Minister with greater powers to access information and to direct the Corporation on the grounds of urgency, public health and safety.[214]

Accountability

New South Wales still has a relatively fragmented system of accountability, with a mixture of health statutes and other environmental statutes. Sydney's legislative structure provides a good illustration of the myriad of relationships and requirements, even though it has its own legislation, the *Sydney Water Act 1994.*

The Office of the Regulator-General, Victoria (ORG) has been quoted as believing that a single body, such as the Drinking Water Inspectorate that regulates the UK water industry, could better oversee water quality:

> The Office considers that best practice water quality regulation is based on primary responsibility being consolidated within a single body which pro-actively monitors water quality against an appropriate and comprehensive range of standards and ensures a holistic catchment to customer tap approach is followed in preventing water contamination (ORG 2000, p.9) [215]

Licences and Memoranda of Understanding (MOUs) provide the main regulatory tools. MOUs must be reached with the Health department, the Environmental Protection Authority, and the Water Administration Ministerial Corporation (s.35). The MOUs are meant to clarify roles and responsibilities and facilitate cooperative relationships between the signatories, including agreed areas of study and data exchange. NSW Health has powers under its own legislation and the

[214] Ibid, p.200.
[215] Ibid, p.230.

Sydney Water Act 1994 to enforce the MOU obligations.[216] The *Sydney Water Act* binds the Crown (s.98).[217]

The NSW Health Ministry is responsible for assessing whether suppliers comply with monitoring requirements set out in the Guidelines.

Regulations versus Licensing

Regulations are not used to set out requirements. Instead, the national guidelines established by NHMRC apply if they are made applicable and enforceable through licences for the major suppliers. The licence sets out operating and customer standards, including drinking water quality standards. The customer contract provided for in the licence and described later under "Community Right to Know" is legally enforceable by any customer.

The Sydney Water Catchment Management Act 1998 requires the Catchment Authority to enter into arrangements with the Water Corporation relating to water quality standards for water to be supplied, continuity of water supply, maintenance of adequate reserves and the price of water supplied to the Water Corporation.

A Licence Regulator under the Sydney Water Act is to conduct an annual operational audit to assess compliance with the conditions of the Operating Licence.

The licensing system has several problems. An Australian commentator notes the inequalities in the system:

> The failure of licensing as a water quality management system is that it does not implement a program based on the same public health criteria for all Australians. At present mainly metropolitan areas in Australia, Sydney, the Hunter Valley, Melbourne, and Perth have licences that bind the respective authorities to NHMRC guidelines. The irony of this from a public health perspective is that health related parameters included in NHMRC guidelines are extrapolated from case studies of adverse health effects, toxicological and epidemiological studies, where all human subjects are of equal importance and value. At present licensing with health criteria is primarily administered in urban areas, approximately 50 per cent of the nation's population. This approach neither puts in place an impartial program that systematically investigates the feasibility of mandatory water standards for all Australians, or ensures that the ethical obligations of a safe water supply are satisfactorily pursued. Mandatory water standards should set a floor

[216] Ibid, p. 201.

[217] The wording of the provision, slightly different than most Canadian provisions of this type (which merely say "This Act binds the Crown), is:

> This Act binds the Crown in right of New South Wales and, in so far as the legislative power of Parliament permits, the Crown in all its other capacities.

> guaranteeing minimum potable standards for all users, and the procurement of additional standards that are achievable per population served.[218]

The smaller metropolitan suppliers, the Gosford and Wyong Councils operate under the Water Supply Authorities Act 1987. The Act does not establish regulatory arrangements governing their operations, so they are not required to hold an operating licence or to enter into MOUs with NSW Health, the EPA or WAMC, and they are not deemed to have entered into a customer contract. Nor are they subject to annual operational audits. They are subject to price regulation and to licencing requirements for the extraction of water. Probably because of their size and financial ability, metropolitan suppliers comply with the 1996 Guidelines. However, the Wyong and Gosford Councils are not required to meet any particular version of the Guidelines. They do prepare their own plans that require them to meet the 1996 Guidelines. [219]

Non-metropolitan suppliers are separately regulated. The Local Government Act 1993 applies to provision of water supply and sewerage services to country towns as part of the responsibility of local government. These suppliers are subject to price regulation and water extraction licensing requirements.[220]

These smaller suppliers are not required to meet the newest guidelines established at the national level. They are instead encouraged to meet these requirements. Cost is argued to be an issue, since sampling frequency for some parameters has gone from once a month to once a week. Distances in some of the rural areas create a cost issue.[221]

The licensing system has been criticized both in terms of equity and risk management. Specifically, problems include:

- third parties may not be able to intervene or seek information from contractual parties;
- inclusion of health related standards in licences is not consistent
- penalties available for contaminated water may not be flexible or appropriate
- licensing does not provide an equal economic playing field for all water suppliers
- centralization and standardization of data collection and analysis is difficult to achieve under a regional licensing system.
- licences do no provide uniform standards and procedures that could be clearly understood by the general public, they are region and organization specific, leading to unnecessary complexity and lack of clarity

[218] McKay, Jennifer, Anthony Moeller "Is it time for a new model of water quality laws"? Environmental and Planning Law Journal. Vol. 17, i3, p. 165, (June 2000): http://web2.infotrac.galegroup.com/…64446&dyn=6!ar_fmt?sw_aep=mtrl_main, p.5 of 15.
[219] Australian Productivity Commission, p. 204-208.
[220] Ibid, p. 204.
[221] Ibid, p. 208.

- present licences are flexible at the end of their term so their conditions can be easily changed to exclude health and water quality standards without any legal obligation for public consultation or explanative statements elucidating the rationale for such changes.[222]

Monitoring practices are similar for all water suppliers. Compliance monitoring disclosure requirements vary depending on size of supplier. The non-metropolitan areas do not report publicly to the same extent as the large suppliers.[223]

In Sydney, testing is generally done by labs owned by state or federal governments. The Sydney Water Inquiry[224] found that the lab owned by Sydney Water was not sufficiently independent and recommended that an independent testing lab be established and that it provide testing services for all regulatory agencies. These government labs are seen to meet the independence requirement.

Under its MOU with NSW Health (clause 7.5), the Sydney Water Corporation is required to prepare an annual monitoring plan for review and approval by NSW Health. It monitors at every stage of the process: in the catchments and storages, after treatment and in distribution pipes close to consumer taps. Operational monitoring is also required to determine if all processes and equipment are working properly and to allow quick response to malfunctions. [225]

For smaller metropolitan areas and other small suppliers, the only monitoring requirements are those set out in the Guidelines. They are not enhanced by MOU or licence conditions. Limited compliance information is provided through the Water Services Association.

One of the principles used to determine the frequency of sampling is that the level of monitoring should be linked to the number of people at risk. A minimum monitoring requirement is established to protect small communities, but residents of small communities are not required to receive the same level of early warning as those in larger centres.[226]

A NSW Health Department Protocol gives the Chief Health Officer the responsibility for issuing a 'boil water' notice and for deciding when it can be lifted. The MOU with NSW Health requires Sydney Water Corporation to develop a Drinking Water Quality Incident Management Plan to provide for coordinated management of incidents including notice to the public and media communication of health information.

Operational audits are required once a year by the Sydney Water Board (Corporitisation) Act 1994. The Licence Regulator under that Act has part-time members from environmental, consumer, water industry and business interests, including a nominee of the Minister. The Licence Regulator must:

- monitor compliance with the Water Corporation's operating licence conditions;

[222] McKay paper, p. 6 of 15.
[223] Australian Productivity Commission, p. 208.
[224] Third Report, October 1998, Peter McClellan, Q.C.
[225] Australian Productivity Commission, p. 209.
[226] Ibid, p. 229.

- inform the Operating Licence Minister about any failure to meet operational standards or licence requirements; and

- commission an independent annual audit of the Corporation against its licence requirements.

Community right to know:

The *Sydney Water Act* 1994 provides for a licence that establishes, among other things, mechanisms for customer participation. The operating licence also sets out terms and conditions that must be included in a Customer Contract (s.54 (1)) which outlines customers' rights to the supply of water, sewerage and drainage services, consultation, information and assistance, notice of interruption to supply and customer redress.[227]

The Memorandum of Understanding between the Sydney Catchment Authority and the NSW Department of Health, dated 1999 provides that the "Authority will ensure that its customers are adequately informed of the quality of bulk raw water and the appropriateness of any intended uses of such bulk raw water."[228]) The MOU between the Sydney Water Corporation and NSW Health requires that the Water Corporation prepare an annual report on all routine water quality testing results. More interesting, however, is the requirement in the Sydney Water Act, s.101(3), that the Water Corporation publish on the Internet every three months a consumer confidence report on the quality of the water it has on supply for its customers. The report is to include:

- details of the quality and quantity of water in the catchment areas;

- an evaluation of the effectiveness of the Corporation's treatment of water during the immediately preceding three months;

- a review of developments in the literature concerning issues relating to drinking water quality;

- a overview of issues relating to catchment management that were current during the immediately preceding three months; and

- other matters that the regulations may prescribe. (s.101(5))

The Water Corporation also provides daily water testing updates on *Cryptosporidium* and *Giardia* on its web site.[229]

Protection of sources of drinking water:

Drinking water source protection became an issue when the Sydney Water Inquiry found that the water catchments were compromised by sources of contamination and the Water Corporation did

[227] Ibid, p. 201.
[228] See http://www.sca.nsw.gov.au/Info_Reports/memo_index.htm to link to MOU, p. 6, s.5.4.
[229] Ibid, p. 210.

not have sufficient regulatory control of the catchments to guarantee safe drinking water. In response, the NSW government enacted the *Sydney Water Catchment Management Act* 1998. It created the Sydney Catchment Authority which began its operations in July 1999. Among its objectives are the following:

- managing and protecting the catchment areas (both inner and outer and special areas to which access by the public is strictly limited) and catchment infrastructure works. The Water Corporation has established a Special Areas Strategic Plan of Management as a blueprint which redefines best practice for catchment management.

- protecting and enhancing the quality of water taken from catchments;

- undertaking research on catchments generally, and particularly on the health of its own catchments;

- undertaking an educative role within the community on water management and pollution control.[230]

An enhanced monitoring program is also required to assess the likely occurrence of contaminants in the raw water entering the water treatment plants.

The *Sydney Water Catchment Management Act 1998* requires the Catchment Authority to set up a catchment audit within five months of the legislation coming into force.[231] It is to compile indicators and undertake research on the ecological health of the catchments, including vegetative cover, riparian zones and water quality.[232]

Enforcement, Penalties and Compensation

Enforcement is a Health Department responsibility under the Public Health Act 1991, Part 2A. The regulatory powers of the Director-General of NSW Health were strengthened after the Sydney Water Inquiry in 1998 and significant financial penalties have been provided for suppliers who give incorrect information to the public about drinking water safety. The Minister can also require the Corporation to rectify a contravention within a specified period. Although the operating licence can also be cancelled, the Sydney Water Inquiry noted the hypothetical nature of this option given the lack of alternative water providers. Also, the Chief Health Officer has exclusive responsibility for issuing boil water advisories for the two major metropolitan areas.[233]

Rebates to consumers are provided for in the legislation for the two major metropolitan areas. The Independent Pricing and Regulatory Tribunal for New South Wales (IPART) recommended consumer rebates and deferral of a scheduled increase in rates after the suspected *Cryptosporidium* and *Giardia* outbreak in Sydney. These apparently cost the Water Corporation

[230] Ibid, p. 202.
[231] Section 42(1) Sydney Water Catchment Management Act, 1998 and Australian Productivity Commission, p. 202.
[232] Australian Productivity Commission, p. 202.
[233] Ibid, p. 215-216.

a total of A$37 million. Other compensation for businesses was also paid out after claims were made. Rebates are automatic under a voluntary SWC policy when specified service standards are not met.[234]

Compensation may be available through:

- a common law negligence action

- the Trade Practices Act 1974, s. 52 (misleading and deceptive conduct is prohibited); s.71, 74B, 74D (merchantable quality and fitness for purpose); Part VA (different statutory rights, including compensation, for loss caused by defective goods)

- implied customer contracts, so action based on breach of contract (Sydney Water Act 1994 deems a contract between Sydney Water and its customers

- consumer protection under state law (offence provisions and statutory redress provisions).[235]

The deemed customer contract under the *Sydney Water Act 1994* is expressed as follows in s. 55(1):

> An owner of land that is connected to a water main or sewer main owned by the Corporation is taken to have entered into a customer contract with the Corporation, on the terms and conditions set out in the relevant operating licence…

A consumer claims tribunal is created under the Act its jurisdiction extends to the hearing and determination of a consumer claim relating to a service supplied by the Corporation under a consumer contract.[236] Any person may bring proceedings in the Supreme Court for an order to restrain a breach or a threatened or apprehended breach of a consumer contract.[237]

Research, Funding and Technical Assistance

In NSW, the government subsidises capital works to upgrade small systems on equity and public health grounds. IPART, the pricing tribunal (established in 1992 under the Independent and Regulatory Tribunal Act 1992, sets prices to recover the cost of investment to meet current guidelines. It deals with all declared government monopoly services. The government can set prices below, but not above prices recommended by IPART. In making its determinations, it must take into account standards of quality, reliability and safety of the services it is considering. It advertises its investigations, accepts public submissions that are then made available for public inspection, conducts a public hearing for each investigation, conducts public seminars and workshops and submits a public report to the Premier. [238]

[234] Ibid, p. 216-217.
[235] Ibid, p. 350.
[236] The Sydney Water Act, s. 58.
[237] Ibid, s. 103.
[238] Australian Productivity Commission, p. 218-221.

The Minister for Land and Water Conservation provides technical, management and financial assistance through the Country Towns Water Supply and Sewerage Program. As part of its program, it provides advice on infrastructure need to ensure that drinking water quality in country towns meets the Guidelines.[239]

The National Health and Medical Research Council, which sets the national guidelines that may or may not be used in the individual states and territories, is a federal statutory body.

Commentary

Australia's main advantage over Ontario is its initiatives to protect catchment areas, create rights for consumers of water, and provide means for consumers to actually enforce those rights. However, Australia still suffers from many of the problems that Ontario faces. In particular, reporting on water quality is mandatory only if required by an individual water supplier's licence, and there is no centralized database and thus no centrally accessible system.[240]

Although Sydney is quite advanced in its drinking water regime, not much is being done with respect to ensuring that small treatment systems are operating properly or are subject to the same requirements as larger systems. Training is recognized as important in providing safe drinking water, but it is not being provided uniformly, especially for smaller systems. Consumer confidence reporting required by statute is considered a positive step. This reporting relates to the water quality standards or guidelines, however, so if the standards are not adequate the reporting will not be effective.

[239] Ibid, p. 219.
[240] The main source of commentary was Anthony Moeller, Universisty of South Australia, School of International Business, Adelaide, Australia (Anthony.Moeller@unisa.edu.au).