

Chapter 9 The Role of the Ministry of the Environment

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Chapter 9 The Role of the Ministry of the Environment

9.1 Introduction

9.1.1 Overview

In this section I will address the role of the Ministry of the Environment (MOE) in relation to the events of May 2000.¹ The MOE was and continues to be the provincial government ministry with the primary responsibility for regulating – and for enforcing legislation, regulations, and policies that apply to – the construction and operation of communal water systems.

Before addressing the MOE's role in detail, I want to repeat a point I made in Chapter 5 of this report. Stan Koebel and the others at the Walkerton Public Utilities Commission (PUC) are responsible for their own actions and for the consequences of those actions. Failures by the MOE in overseeing the operation of the Walkerton water system do not excuse those actions, nor do they lessen the responsibilities of the individuals involved. But given that the MOE was responsible for overseeing the construction and operation of the Walkerton water facility, its activities must also be considered in order to determine if it adequately fulfilled its role and, if not, whether a proper exercise of its responsibility would have prevented the outbreak, reduced its scope, or reduced the risk that the outbreak would occur.

At the Inquiry, the government argued that I should find that Stan Koebel was the sole cause of the tragedy in Walkerton and that I should also find that government failures, if any, played no role – the suggestion being that if it were not for Stan Koebel's failures, the tragedy would not have happened. I reject that argument completely. It totally misconceives the role of the MOE as overseer of communal water systems, a role that is intended to include ensuring that water operators and facilities perform satisfactorily. When there is a failure in the operation of a water facility, as there was in Walkerton, the question arises whether the MOE in its role as overseer should have prevented the failure or minimized the risk that it would occur. If the answer is yes, I am satisfied that the Inquiry's mandate directs me to report on any deficiencies in the manner in which the MOE exercised its oversight role.

¹ In this chapter, I do not address the issues of the privatization of water testing and the notification procedures to be followed when adverse test results are found. I discuss those issues in Chapter 10 of this report.

The government's argument also ignores the fact that the only thing that could have completely prevented the outbreak in Walkerton was the use of continuous chlorine residual and turbidity monitors at Well 5. The failure to use continuous monitors at Well 5 resulted from shortcomings of the MOE in fulfilling its regulatory and oversight role, not from failures of the Walkerton PUC operators. The MOE knew (or should have known) that the PUC operators lacked the training and expertise necessary to identify the vulnerability of Well 5 to surface contamination and to understand the resulting need for continuous monitors.

In Chapter 5 of this report I identified two serious problems in the operation of the Walkerton water system that contributed to the tragedy in May 2000.

The first problem was the failure to install continuous chlorine residual and turbidity monitors at Well 5. As a result of an amendment to the Ontario Drinking Water Objectives (ODWO) in 1994, continuous monitors were required for water systems that operated without filtration and were supplied by groundwater sources under the direct influence of surface water.² Well 5 was such a system, but continuous monitors were not installed. Continuous monitors would have prevented the outbreak.

The second serious problem with the operation of Walkerton's water system was the improper chlorination and monitoring practices of the Walkerton PUC. The PUC's personnel routinely failed to maintain the required minimum total chlorine residual of 0.5 mg/L after 15 minutes of contact time, failed to monitor chlorine residuals daily, and made false entries in the PUC's daily operating sheets. It is very likely that proper chlorine residual monitoring on a daily basis would have significantly reduced the outbreak's scope, although it would not have prevented the outbreak.

I have concluded that the MOE failed in several respects to fulfill its oversight role in relation to Walkerton's water system. Some MOE programs or policies were deficient because they should have identified and addressed one or both of the two operational problems at Walkerton referred to above, but did not do so. Other programs or policies were deficient because they reduced the likelihood that the two problems would be identified and addressed. In summary, the deficiencies are as follows:

² The phrase "under the direct influence of surface water" appears in the ODWO. Throughout this report, in my discussion of Well 5 I use the phrase interchangeably with "vulnerable to surface (water) contamination."

- After the 1994 amendment to the ODWO, the approvals program should have identified Well 5 as a water system supplied by a groundwater source that was under the direct influence of surface water and therefore should have required the installation of continuous monitors. The approvals program should also have attached a condition to Well 5's Certificate of Approval mandating the PUC to maintain a minimum total chlorine residual of 0.5 mg/L after 15 minutes of contact time.
- The inspections program should have detected the vulnerability of Well 5 to surface contamination and noted the need for continuous monitoring. It should also have detected the improper chlorination and monitoring practices of the Walkerton PUC and ensured that the PUC took the necessary steps to correct the practices.
- After the 1998 inspection, the MOE should have issued a Director's Order to compel the Walkerton PUC to comply with MOE water treatment and monitoring requirements.
- The MOE did not have an information system that made critical information about the history of vulnerable water sources, like Well 5, accessible to those responsible for ensuring that the proper treatment and monitoring were taking place.
- The MOE's training requirements for water operators (e.g., Stan Koebel and Frank Koebel) should have been more focused on drinking water safety issues and more strictly enforced.
- In recent years, a serious decline occurred in the training made available to MOE employees. Some of those with responsibility for overseeing Walkerton's water system did not fully understand the requirements of the ODWO or that *Escherichia coli* (*E. coli*) could be lethal.
- The MOE used guidelines rather than legally enforceable regulations in setting out the standards and procedures to be followed in ensuring the safety of drinking water.

I have used the word "deficiencies" to describe the problems I identify in the MOE because they all fall into the category of omissions or failures to take appropriate action, rather than positive acts. As a result, the effects of those deficiencies on the events in Walkerton must be measured by their failure to

prevent the outbreak, to reduce its scope, or to reduce the risk that the outbreak would occur. Viewed in this light, some of the deficiencies are more closely connected to the tragedy than are others. In the sections where I discuss each of the deficiencies separately, I will set out my conclusions on the effect, if any, of each deficiency on the events of May 2000.

In measuring the effects of the MOE deficiencies on the events of May 2000, it is necessary in some instances to assess whether the Walkerton PUC or Stan Koebel would have acted differently if the treatment and monitoring requirements³ had been legal obligations – for instance, a regulation, a condition in a Certificate of Approval, or a Director’s Order – rather than a legally unenforceable guideline. There is no certainty, of course, about how the PUC would have reacted in such circumstances. However, on balance, I conclude that with proper oversight and enforcement, it is likely that the PUC would have treated and monitored the water as required. It is possible that the fact of a legal requirement would in itself have been sufficient to compel compliance. Assuming, however, that this was not the case, then a proper inspections program would probably have detected the improper practices (at this point, breaches of legal requirements) and ensured that proper treatment and monitoring took place.

It is worth noting that since the Walkerton tragedy, the government has recognized that improvements were needed in virtually all of the areas where I identify deficiencies and has taken steps to strengthen the MOE’s regulatory or oversight role.

9.1.2 The Oversight Role of the Ministry

The MOE sets the standards according to which communal water systems are built and operated. It also approves the construction of new water facilities, certifies water plant operators, and oversees the treatment, distribution, and monitoring practices of communal water facilities. The overall objective is to

³ Although the requirements were established by guideline and thus were not, strictly speaking, legally required, I refer to the maintenance of a minimum total chlorine residual of 0.5 mg/L after 15 minutes of contact time and the monitoring of chlorine residuals as “treatment and monitoring requirements” throughout this report, in view of their necessity for the safe operation of a water system relying on disinfection through chlorination.

ensure that water systems are built and operated in a manner that produces safe water and does not threaten public health.⁴

Many of the deficiencies I identify are, in part, a reflection of the general level of comfort among MOE personnel regarding the safety of treated water in systems operated by municipal authorities. Before the year 2000, Ontario had experienced relatively few instances in which contamination of municipally operated treated drinking water systems had led to a publicly reported outbreak, although in recent years there had apparently been an increase.⁵ During the years immediately preceding the Walkerton outbreak, an attitude developed within the MOE that municipalities, as the owners of Ontario's water systems, should bear more of the responsibility for the safety of the water and that the MOE, as overseer, should assume a lesser role.

For years there had been a culture within the MOE of working cooperatively with municipalities and trusting the municipalities to do what was expected of them. Budget and resource reductions in the 1990s significantly increased the pressures to limit MOE activities and to prioritize workloads differently. Overseeing communal water systems became less of a priority.

By way of example, in 1995, in anticipation of budget cutbacks, MOE managers across the province were asked to identify non-core programs. They viewed communal water as one of the few non-core MOE programs. As well, the MOE's priorities policies, developed after 1995, viewed the ministry's role in relation to communal water systems as being an advisory role: the municipality was considered responsible for delivering safe water, and the local Medical Officer of Health was considered responsible for determining when water was unsafe.

It clearly makes sense for the MOE to cooperate with municipalities and to rely on them to do those things that are expected of them, but in my view the MOE went too far in this direction. This was particularly so for small municipalities, like Walkerton, where the operators were less likely to be sophisticated

⁴ As an example, an MOE document titled "Approval Process and Drinking Water Sampling and Monitoring" (June 1996) provided that "[t]he public also expects the MOE/government to take the lead role in protecting the public health through the production of uniformly safe drinking water. This has been achieved with numerous MOE programs that include approval of treatment plant design and operation, development of guidelines, procedures and collection of data."

⁵ Here I refer to the *Cryptosporidium* outbreaks in Waterloo in 1993 and in Collingwood in 1996, and the *Giardia* outbreak in Thunder Bay in 1998.

and knowledgeable about threats of contamination and about requirements for ensuring the safety of drinking water. It was also the case for municipalities, again like Walkerton, that had shown a pattern of failing to follow MOE requirements or to do what they said they would do. In such situations, careful oversight was essential.

The process of supplying drinking water raises serious public health concerns. A properly structured system for ensuring the safety of drinking water should have multiple barriers: if one protective measure fails, there must be another to back it up. The experts who testified at the Inquiry repeatedly emphasized the need for multiple barriers – that is, for a robust system with built-in safeguards.

Having the MOE serve as overseer provides an important safeguard to ensure that the practices of water operators are sufficient to deliver safe drinking water to the public. Proper provincial oversight reduces the risks arising from the failure of an operating system. In my view, the MOE failed in several respects to fulfill its oversight role in the case of Walkerton.

9.1.3 The Organization of the Ministry

The MOE is organized into divisions, branches, and district and area offices to carry out its functions. Those functions include setting standards, planning and monitoring activities that have an impact on the environment, and delivering programs. Since its creation in 1971,⁶ the MOE has undergone a number of reorganizations.

Currently, the Operations Division of the MOE is its most “front-line” division. “Environmental officers” in the Operations Division deal with the public daily. Most of the front-line services of the Operations Division are regionalized and divided among the Northern, Central, Eastern, West Central, and Southwestern Regions. The regions are further subdivided into districts and area offices, which together may be referred to as “local” offices. Walkerton is the responsibility of the MOE’s area office in Owen Sound (“the Owen Sound office”), which is part of the Barrie District and the Southwestern Region. For the purposes of this Inquiry, the other important branch of the MOE is the Environmental Assessment and Approvals Branch (“the Approvals

⁶ At the time of its creation in 1971, the MOE was known as a department; it was designated a ministry in 1972.

Branch”) of the Operations Division. The Approvals Branch, located in Toronto, is staffed by specialists in scientific and technical issues relating to the issuance of approvals for activities that are regulated by the MOE.

Although the MOE has a number of other divisions, none had a direct responsibility for the water system in Walkerton, so I need not discuss them here. For the purposes of this chapter, the most significant MOE components are the Owen Sound office and the Approvals Branch. An organizational chart of the MOE is set out at the end of this chapter.

From 1974 until the present, the MOE’s Owen Sound office has been responsible for overseeing the Walkerton water system. The Owen Sound office has always been part of the MOE’s Southwestern Region. In 1997, it was downgraded from a district office to an area office and was placed within the Barrie District. After the reorganization in 1997, the Owen Sound office was responsible for the geographic areas of Bruce and Grey Counties. Huron County, for which it had previously been responsible, was transferred to the Sarnia District office.

Environmental officers are the MOE’s front-line employees: they are responsible for carrying out the ministry’s programs. The responsibilities of the environmental officers in the Owen Sound office were broad and varied. Their responsibilities included responding to pollution incidents as well as overseeing municipal water and sewage treatment facilities, private communal water systems, wastewater disposal sites, and industrial activity. The Owen Sound office was also the government overseer for the Bruce nuclear power plant.

Environmental officers who were not assigned full-time to inspections were assigned to address a wide range of responsibilities in their geographic area. As a result, they were generalists who required knowledge of a broad spectrum of activities that fell within the office’s mandate. The MOE’s local offices administer a number of programs. Since the mid-1980s, this number has increased significantly. By the year 2000, environmental officers were responsible for 15 programs, one of which was the communal water program.

The Owen Sound office normally had a staff of six environmental officers. From August 1999 onward, however, the number fluctuated between four and five. The amount of time each environmental officer devoted to the communal water program was relatively small in relation to his or her overall workload. During 1999–2000, for example, the environmental officers in the Owen Sound

office spent about 5% of their time on the communal water program. In all, the office had 54 municipal water systems within its jurisdiction. Therefore, the amount of time environmental officers spent on the Walkerton water system was a very small fraction of their overall workload.

I discuss the role of staff at the Owen Sound office throughout this chapter. However, I first discuss the role of the MOE's Approvals Branch as it relates to the approval of Well 5 in Walkerton.

9.2 Approvals

9.2.1 Overview

In this section, I address the process by which Well 5 was approved in 1978–79. I also address the MOE's failure to attach operating conditions to the Certificate of Approval issued for Well 5 on January 24, 1979.

Well 5 was approved without any operating conditions. Of significance to the May 2000 outbreak, there were no conditions relating to treatment, monitoring, and notification, and there was also no condition requiring continuous chlorine residual and turbidity monitoring. This approval was given despite the concerns of MOE personnel at the time about the well's location and about the vulnerability of the well to surface contamination. However, I am satisfied that the MOE's approval was consistent with the standards and practices prevailing at the time.

Over time, MOE practices and procedures relating to waterworks approvals changed: it began to routinely attach operating conditions to Certificates of Approval, including conditions relating to water treatment and monitoring. By 1992, the MOE had developed a set of model operating conditions that were commonly attached to new Certificates of Approval for municipal water systems, as appropriate. There was, however, no effort to reach back to determine whether conditions should be attached to existing certificates, like the one for Well 5.

The Ontario Drinking Water Objectives (ODWO) were amended in 1994 to provide that water supply systems using "groundwater under the direct influence of surface water" without also using filtration should continuously monitor

chlorine residuals and turbidity.⁷ The MOE did not, however, put in place a program to examine the water sources supplying existing wells to determine whether a condition requiring continuous monitoring should be added to their Certificates of Approval. Well 5 used groundwater that was under the direct influence of surface water, and the MOE should therefore have required the installation of continuous monitors at that well following the 1994 ODWO amendment.

The MOE's failure to "reach back" and systematically review existing Certificates of Approval, once it became standard practice in the 1990s to attach operating conditions to new Certificates of Approval, was very significant for Walkerton. The MOE never did add any conditions to the Certificate of Approval for Well 5. I am satisfied that a properly structured approvals program would have addressed the need to update the Certificate of Approval for Well 5 – both after the 1994 amendment to the ODWO and when the MOE practices for newly issued certificates changed in the 1990s.

I conclude that had the Walkerton PUC been required to install continuous chlorine residual and turbidity monitors at Well 5, the Walkerton tragedy would have been prevented. I also conclude that the inclusion of the model operating conditions relating to the maintenance of a total chlorine residual of 0.5 mg/L after 15 minutes of contact time, coupled with effective enforcement, would very likely have significantly reduced the scope of the outbreak.

Before addressing the approval of Well 5 in detail, I will briefly describe the nature of two instruments: the Certificate of Approval and the Permit to Take Water.

⁷ ODWO (1994 revision), section 4.2.1.1. More specifically, the amendment provided for the continuous monitoring of "disinfectant residual (equivalent to free chlorine)" – a type of chlorine residual. The amendment also provided an option for turbidity level monitoring: grab samples could be taken every four hours, or turbidity levels could be monitored continuously. (The ODWO defines "turbidity" in water as a measurement that reflects "the presence of suspended matter such as clay, ... plankton and other microscopic organisms," noting that turbidity's most important health effect ... is its interference with disinfection and with the maintenance of a chlorine residual.") For convenience, I will refer to these options as "continuous turbidity monitoring." Also, I note that in many documents the terms "continuous monitor" and "continuous analyzer" are used interchangeably.

9.2.2 Approvals Instruments

The instrument now known as a Certificate of Approval existed before the passage of the *Ontario Water Resources Act* in 1957. Originally, instruments of this type were issued under provincial public health legislation. In Ontario, they date from 1884, if not earlier.

As the name suggests, the purpose of a Certificate of Approval is to grant approval for an undertaking; in this case, the construction of a municipal water system. Under the *Ontario Water Resources Act*, an approval of this sort may be granted by the MOE with certain conditions, or conditions may be imposed or altered over time.⁸ It is an offence under this legislation to operate a municipal water system as large and complex as Walkerton's without MOE approval.⁹

The Permit to Take Water is of more recent origin. This instrument was introduced when the *Ontario Water Resources Act* was amended in 1961 to authorize the regulation of water taking after disputes arose in connection with the taking of water to irrigate tobacco crops. Permits to Take Water are concerned with water quantity rather than water quality. Section 34 of the *Ontario Water Resources Act* generally requires that a Permit to Take Water be obtained where a total of more than 50,000 L of water is to be taken in a single day. Permits are issued by the MOE's regional offices.

Although I heard evidence concerning the evolution and use of the Permit to Take Water, I conclude that there are no provincial government policies, procedures, or practices in relation to permits of this type that are relevant to the Walkerton outbreak. I therefore focus my discussion on the MOE's approval of Well 5.

Before May 2000, the MOE addressed most operational requirements for municipal water systems by way of a guideline or policy directive, neither of which is legally binding. Certificates of Approval authorize the construction of water systems and are not, by definition, operating licences. Nonetheless, a practice has evolved of attaching operating conditions to Certificates of Approval for water systems. When this occurs, Certificates of Approval are at least akin to operating licences. The importance of this development is that operating

⁸ *Ontario Water Resources Act*, R.S.O. 1990, c. O-40, ss. 5, 52(4).

⁹ *Ibid.*, s. 52(7).

conditions that would otherwise have been addressed by way of legally unenforceable guidelines or policy directives become legally enforceable obligations.

When operating conditions like those relating to water treatment and monitoring are included in a Certificate of Approval, the likelihood of compliance increases. Water system operators can be reasonably assumed to be more likely to comply with legal obligations – and if they do not, enforcement by the MOE is more readily achieved.

Over time, Certificates of Approval evolved to the point where those that included operating conditions became a means of ensuring greater vigilance by the MOE over the safety of drinking water supplies.

9.2.3 The Approval of Walkerton Well 5

9.2.3.1 *The Construction of Well 5*

In 1978, when the Walkerton PUC applied for a Certificate of Approval for what became Well 5,¹⁰ three wells existed in Walkerton: Wells 1, 2, and 3. All three produced very hard water – a condition widely considered undesirable. The water from Wells 1 and 2 was described as extremely hard and very high in sulphates. The water from Well 3, although chemically superior to that from Wells 1 and 2, was nevertheless very hard. Following its construction in 1963, Well 3 had not lived up to the hopes of Walkerton residents that it would solve the town's water problems.¹¹ Moreover, the Walkerton water system lacked any reserve capacity to accommodate new development in the town. It was essential that Walkerton find a new water supply.

The Walkerton PUC applied for a Certificate of Approval for Well 5 on September 27, 1978. The application indicated that construction was to begin in October of that year and would take two months. In fact, Well 5 had already been built. Its construction had been completed three months earlier, in June 1978, but the new well had not yet been connected to the distribution system.

¹⁰ Initially, Well 5 was referred to as Well 4.

¹¹ Conventional water softeners of the time operated on an ion exchange principle, in which sodium ions replace calcium and magnesium ions. The result was that softened water had sodium concentrations as high as 575 mg/L, almost 29 times the concentration at which sodium intake was considered a risk factor for people suffering from hypertension (high blood pressure).

It was highly unusual for a municipality or PUC to construct waterworks without first obtaining a Certificate of Approval.

Despite these circumstances surrounding the construction of Well 5, I am satisfied that the fact that Well 5 was constructed before the PUC applied for approval did not influence the MOE's decision to approve it. Although the circumstances were unusual, I accept that once the MOE was satisfied that there would be sufficient disinfection at the well, it would have approved the well even if it had not already been built.

9.2.3.2 The Wilson Report and the Ministry Review

As part of its application to the MOE for approval of Well 5, the Walkerton PUC submitted a hydrogeological report prepared for the MOE by Ian D. Wilson Associates, dated July 28, 1978 ("the Wilson report"). The Wilson report raised concerns about the vulnerability of Well 5 to contamination. It described the thin overburden in the area supplying the well, the shallow aquifer from which water was drawn, and the effect of pumping on two nearby springs. The report also noted that when the well was operated, water flowing from the springs "stopped completely, showing that water normally reaching these two discharge points was intersected by the well," and suggested that when the well was in production, the springs would flow only intermittently.

Importantly, during a pumping test, fecal coliforms were found in water samples taken 24, 48, 60, and 72 hours after the well pump was started. Chemical analysis showed that nitrates were elevated but still within acceptable limits. Among the five conclusions reached in the Wilson report, two are set out below:

The results of the bacteriological examination indicate pollution from human or animal sources; however, this was not confirmed by chemical analyses. The supply should definitely be chlorinated and the bacteria content of the raw and treated water supply should or would [*sic*] be monitored. The nitrate content should also be observed on a regular basis ...

The Town of Walkerton should consider establishing a water-protection area by acquiring additional property to the west and south in the vicinity of Well [5]. Shallow aquifers are prone to pollution, and farming and human activities should be kept away from

the site of the new well as far as possible. If this area is large enough, additional, relatively soft-water supplies could perhaps be proved sometime in the future ...

These conclusions are significant because they reveal concerns, from the beginning, regarding Well 5's vulnerability to surface contamination.

MOE staff at the Owen Sound office reviewed the Wilson report as part of the ministry's consideration of the PUC's application. The results of this review are set out in an October 24, 1978, memorandum from Willard Page, then the district officer of the Owen Sound office, to the Approvals Branch.

This memorandum raised several concerns, including some of those identified in the Wilson report, about the security of the water source supplying the proposed well. Mr. Page's memorandum discussed the shallowness of the aquifer, the shallowness of the overburden, the possibility that a "nearby agricultural operation ... could be contributing to elevated levels of nitrates in the groundwater," the resultant need to monitor chemical and bacterial parameters that might reflect surface contamination, and the advisability of considering controlling any activities adjacent to the well that might contribute to aquifer contamination.

In addition, Mr. Page inquired whether the MOE's policy relating to surface water sources, which required continuous chlorine residual analysis and recording, also applied to groundwater sources with a known bacterial history. As William Hutchison, an engineer in the Owen Sound office at the time, said in his testimony, "This obviously was a sensitive source of supply and we did not know whether or not Approvals staff would consider this, for all intents and purposes, to be a surface water [source] or whether or not they would consider it to be a groundwater source."

9.2.3.3 *The Meeting of November 23, 1978*

As a result of concerns arising from the construction of Well 5 without approval, a meeting took place among representatives of the MOE, the Town of Walkerton, the Walkerton PUC, and the PUC's engineering consultants on November 23, 1978. Willard Page's memorandum was used as an agenda for the meeting.

The understandings reached at that meeting are critically important to what happened in May 2000. An understanding was reached that the PUC would maintain at Well 5 a minimum total chlorine residual of 0.5 mg/L after 15 minutes of contact time before the water reached the first consumer. It was also agreed that the PUC would monitor these residuals daily, and that it would record the results in daily operating sheets. Over the ensuing years, the PUC routinely failed to follow these practices. As I conclude above, this failure by the PUC had a direct impact on the events of May 2000. The importance of the meeting leads me to discuss it in some detail.

The minutes of the meeting indicate that the MOE representatives expressed concern that the Town of Walkerton had proceeded with the construction of Well 5 without first having obtained approval from the MOE. The discussion then turned to the vulnerability of the aquifer to contamination and the corresponding need to consider controlling land use in the area, the need for 15 minutes of chlorine contact time due to the presence of bacteria found in the aquifer during the pumping test, and the sampling program to be followed.

The meeting minutes reflect that in referring to the shallowness of the overburden and the aquifer and to the water's resulting vulnerability to contamination, MOE staff members from the Owen Sound office stressed that consideration should be given to controlling any activities in areas adjacent to the new well that might contribute to aquifer contamination. Specific reference was made to the nitrate concentration found in the well's water during the pumping test and to the possibility that this result may have been due to farming activity on the nearby farm owned by Percy Pletsch. Walkerton's mayor, Neil MacDonald, indicated that Mr. Pletsch would probably be very hesitant to sell the farm to the PUC. Nonetheless, the PUC representatives agreed that Mr. Pletsch should be approached so that the potential effects of his farm on the new well could be fully discussed.

In Chapter 7 of this report, I address the failure of the Town of Walkerton¹² to control land use in the vicinity of Well 5 in the years after the well was constructed and approved. I conclude that the town lacked the jurisdiction to expropriate the Pletsch farm for the purpose of safeguarding the water supply. Under the *Public Utilities Act*, it was, however, open to a PUC to expropriate property to preserve the purity of the water supply.¹³ There is no evidence as to

¹² The Town of Walkerton was amalgamated into the Municipality of Brockton in 1999.

¹³ *Public Utilities Act*, R.S.O. 1990, c. P- 52, ss. 4(4), 41(1).

whether the Walkerton PUC considered exercising this power. But in any case, acquiring the Pletsch farm would not have prevented the outbreak. As I conclude in Chapter 4 of this report, the contaminants that entered Walkerton's water system through Well 5 originated from the farm of Dr. David Biesenthal and possibly from other locations. There is no evidence to suggest that the contaminants originated from the former Pletsch property.

Those present at the meeting reached three important understandings about the treatment and monitoring of the water at Well 5. First, it was understood and agreed that the PUC was to maintain a chlorine residual of at least 0.5 mg/L after 15 minutes of contact time before the water reached the first consumer. That was the standard mandated by the Chlorination Bulletin¹⁴ unless, in the case of a groundwater source, the supply had been proven free of bacterial contamination.

Everyone at the meeting knew that Well 5 was supplied by a vulnerable source, susceptible to contamination from surface activities. Willard Page's October 24, 1978, memorandum referred to the well's "known bacterial history." Mr. Hutchison, whose testimony described the source as "sensitive," assumed that Well 5's chlorination met the standard established by the Chlorination Bulletin. Indeed, immediately after Well 5 was put into operation, the PUC operators began to enter chlorine residuals of at least 0.5 mg/L on the well's daily operating sheets.

Second, although Mr. Page had raised the issue in his October 24, 1978, memorandum, the minutes do not reflect any discussion of the issue at the meeting. However, I am satisfied that it was understood that Well 5 would not require a continuous chlorine residual monitor, and the evidence is unequivocal that no such monitor was ever installed.

At the meeting, Ian McLeod, the general manager of the Walkerton PUC, stated that "the well supply system is manned on a 24-hour basis, 7 days per week." It is difficult to know what Mr. McLeod meant in making this statement: he died in 1993. However, it is apparent that given the size of Walkerton's water system, Mr. McLeod did not mean that someone would be present at Well 5 at all times. He probably meant that someone would be on call if an emergency arose.

¹⁴ MOE, "Chlorination of Potable Water Supplies," Bulletin 65-W-4 (March 1987).

I am satisfied that the MOE representatives at the meeting did not interpret Mr. McLeod's statement to mean that a PUC staff member would in effect take the place of a continuous chlorine residual monitor: they would have known that such a plan was completely impractical. There was no suggestion in the evidence or in the submissions that anyone from the MOE understood Mr. McLeod's comment to amount to an undertaking that there would be a 24-hour-per-day surveillance of chlorine residuals.

The MOE personnel testified that in 1978, continuous chlorine residual monitors were not required for groundwater sources with known bacterial histories. I accept that this appears to be the way the Chlorination Bulletin was interpreted at the time.¹⁵ The general disinclination to require the installation of continuous chlorine residual monitors may have stemmed from the fact that at that time, continuous monitors were costly, complicated to operate, and prone to be unreliable.

I am satisfied that on the basis of the information available to the review engineer when the PUC applied for the approval of Well 5, approval without attaching an operating condition requiring continuous chlorine residual monitoring was consistent with the standards of the day. The evidence established that the mere fact of a known bacterial history was not at that time sufficient to prompt the MOE to require continuous chlorine residual monitoring.

The third important understanding reached at the November 23, 1978, meeting was that the PUC would measure chlorine residuals on a daily basis. Only by doing that could they ensure that the proper residual was being maintained. According to the minutes, "[t]he importance of maintaining a chlorine residual at all times was emphasized in light of the presence of bacteria in the well water."

The use of daily operating sheets for the Walkerton wells had its origins in the October 24, 1978, memorandum and the November 23, 1978, meeting. The minutes of that meeting indicate that the MOE gave the town's consulting engineers a sample sheet outlining the records that the ministry recommended that the municipality keep. Most importantly, the records to be kept on a daily basis included those relating to the chlorine solution level and strength (that is,

¹⁵ At the time, the Chlorination Bulletin provided that a continuous monitor was required when "poor raw water quality and/or minimum supervision indicated a hazard," regardless of whether the source was surface water or groundwater.

the amount and strength of the chlorine added to the raw water), and the chlorine residual in the treated water at the well.

Mr. Hutchison pointed out in his testimony that daily operating sheets are critical for the proper operation of a water system. Recording this information helps the MOE inspectors assess the water system and helps the water operator monitor chlorine demand¹⁶ at the well. This information is essential because it alerts the operator to the presence of contaminants that require a higher chlorine dose. A significant variation in chlorine demand also provides a good reason to install a continuous chlorine residual monitor.

The understandings reached at the November 23, 1978, meeting about how the PUC would treat and monitor the water at Well 5 were not included as conditions in the well's Certificate of Approval. There is no question, however, that these were the understandings regarding how Well 5 would be operated. In the years that followed, the PUC nevertheless routinely underchlorinated the water, failed to monitor residuals daily, and made false entries in the daily operating sheets.

9.2.4 The Terms of the Approval

9.2.4.1 *The Failure to Impose Conditions*

Consistent with the practice that prevailed at the time, no operating conditions were attached to the Certificate of Approval issued for Well 5 in January 1979. Instead, the MOE relied on assurances given by the PUC at the meeting on November 23, 1978, that it would treat and monitor the water as agreed. At the time, it was not considered practical to impose conditions relating to land use in the vicinity of groundwater sources. Donald Carr, an engineer in the Approvals Branch at the time, testified that he had understood that enforcing such a condition would have been very difficult or even impossible.

¹⁶ As discussed in Chapter 4 of this report, the amount of chlorine added to disinfect water is known as the "chlorine dose." Reactions, including those that inactivate micro-organisms, consume some or all of the chlorine dose: these chlorine-consuming reactions are called "chlorine demand." The chlorine dose minus the chlorine demand provides the "chlorine residual." The presence of a chlorine residual after enough time has passed for a chlorine-consuming reaction to be completed indicates that there was enough chlorine available in the chlorine dose to react with all the chlorine-demanding substances, including micro-organisms – and thus indicates that the water has been successfully disinfected (i.e., harmful or disease-causing micro-organisms have been inactivated).

I am satisfied that the practice in 1979 was to issue Certificates of Approval without attaching express (i.e., explicit) operating conditions relating to treatment, operating, monitoring, and notification, and also without conditions relating to land use in the vicinity of groundwater sources. I accept the evidence that the approval of Well 5 without conditions was consistent with the standard practice at the time.

In the evidence, MOE staff suggested that the understandings reached at the meeting of November 23, 1978, such as those relating to treatment, monitoring, and possible land-use protection measures, were implied conditions in the Certificate of Approval for Well 5. Along these lines, James Jackson, a senior MOE lawyer and principal adviser to the Approvals Branch, testified that all the foundation material underlying an application for a Certificate of Approval dictated the scope of the resulting certificate. In that sense, the material could be said to impose implied conditions on the certificate. However, implied conditions of the kind he was referring to are not enforceable by way of prosecution or legal proceeding. They would become legally enforceable only if the Certificate of Approval were amended to impose an express condition or if a Director's Order were issued.

I am satisfied that in practical terms, the concept of implied conditions, in the sense referred to by Mr. Jackson, was no substitute for express conditions on a Certificate of Approval.

A direct consequence of the MOE's failure to impose operating conditions on Certificates of Approval was that this approach denied the MOE a mechanism for the immediate enforcement of treatment and monitoring requirements. To rectify this situation, the MOE eventually began attaching conditions to newly issued Certificates of Approval. However, as I discuss below, the ministry never reached back in a systematic way to attach conditions to existing Certificates of Approval like the one for Well 5.

9.2.4.2 Sending the Wrong Signals

An important consequence of issuing an unconditional Certificate of Approval was that it might communicate the wrong signals. Water operators might be inclined to treat their assurances to the MOE more casually than they would treat legally binding conditions in a Certificate of Approval. Moreover, a more casual approach was reinforced by the MOE's reliance on legally unenforceable

guidelines, rather than on enforceable standards, as a means of setting out operating requirements such as those involving chlorination and monitoring.

The events immediately following the issuance of Well 5's Certificate of Approval also sent an unfortunate message to the Walkerton PUC that the requirements for treating the water for Well 5 that had been discussed at the November 23, 1978, meeting were not actually as important as the MOE had indicated at the time.

Shortly after the November 23 meeting, the PUC's consulting engineers wrote to the Approvals Branch to propose a means of providing the necessary 15 minutes of chlorine contact time at Well 5 before the treated water reached the first consumer. The purpose of requiring 15 minutes of contact time is to give the chlorine the opportunity to disinfect the water effectively – that is, to destroy any bacterial contaminants in the water. According to the consultants' proposal, the most effective method for achieving the required contact time was to install a 55-m section of oversized pipe, or "force main," running parallel to the existing watermain from Well 5. The force main would allow water from Well 5 to circulate long enough to allow adequate contact time for disinfection.

The MOE accepted this solution and included a requirement to construct the force main in the Certificate of Approval for Well 5 that the ministry issued on January 24, 1979. However, the Approvals Branch did not require the PUC to certify that Well 5 had been constructed in compliance with the Certificate of Approval before the well was put into operation. As it turned out, the force main was never built. The PUC put Well 5 into service in January 1979, pumping water to the first consumer without the required contact time.

The MOE inspectors who prepared an inspection report on June 4, 1979, noted that Well 5 was being operated without the force main, which they recognized was necessary for achieving the required contact time. They noted that the PUC had said that the force main would be installed by the spring of 1979, but that by the time of the report's preparation in June, the PUC was giving consideration to an alternative proposal. A June 4, 1979, letter from Willard Page to the Walkerton PUC enclosing the inspection report clearly recognized that the force main had not been installed and noted the potential public health implications of failing to ensure adequate chlorine contact time.

In August 1979, seven months after Well 5 was put into operation, the Town of Walkerton applied for a Certificate of Approval to cover a proposed alternative

method of ensuring that houses near Well 5 would be provided with water only after at least 15 minutes of chlorine contact time. This solution, which involved connecting those houses directly to the existing distribution system rather than to the pipe that connected Well 5 to the system, was approved on October 19, 1979, and a second Certificate of Approval was issued.

However, there is no evidence that during the nine months in which Well 5 operated without providing 15 minutes of contact time, the MOE directed the PUC not to use Well 5 until a solution was found. The implicit message from the MOE to the PUC was that the 15-minute requirement was not important enough to insist on. Clearly this was the wrong signal to send about the importance of adequate chlorination at Well 5.

9.2.5 The Follow-up to the Approval

9.2.5.1 *The 1979 Inspection*

After Well 5 began operating, the MOE carried out a number of on-site inspections. The first inspection report – which was issued, as discussed above, on June 4, 1979 – presented further information about the surface connection to the aquifer supplying Well 5. It referred to the coincidence of an increase in Well 5's pumping level with either spring thaw or a period of rain. When presented with this information at the Inquiry, William Gregson, formerly of the MOE's Approvals Branch,¹⁷ agreed that it was consistent with the view that Well 5 was under the influence of surface water, and he agreed that this was known by the MOE in 1979.¹⁸ The 1979 report went on to note that any efforts to control land use near the well should be continued.

Despite the information referred to in this inspection report about the influence of surface water on Well 5, there was no communication from the Owen Sound office to the Approvals Branch, and no steps were taken to require a continuous chlorine residual monitor for the well.

¹⁷ Mr. Gregson was formerly the assistant director and the acting director of the Approvals Branch. At the time of his testimony, he had recently retired as manager of the branch's Certificate of Approval Review Section.

¹⁸ This information became very important in 1994, when the ODWO was amended to require continuous chlorine residual and turbidity monitors for water supply systems using groundwater sources that are under the direct influence of surface water. Because Well 5 was such a system, the MOE should at that point have required the installation of continuous monitors at the well.

In addition, the inspection report noted what was probably the origin of the improper chlorine residual monitoring practices followed by the Walkerton PUC over the ensuing years. The report said that “on February 27, 1979, a chlorine residual measurement taken at Well #5 indicated a residual of approximately 0.30 mg/L. This was less than the residual of 0.5 mg/L which was measured by the operating authority.” The MOE did nothing to ascertain a reason for the discrepancy.

9.2.5.2 *Well 5: A Temporary Solution?*

Anecdotal evidence existed that Well 5 was initially considered to be a temporary solution to Walkerton’s water problems and that it was not intended to be operated indefinitely. Some called it a “band-aid solution.” However, the Certificate of Approval was not time limited, and there is no document recording an intention that the well was not to be used by the Walkerton PUC over the longer term.

Over time, both the Walkerton PUC and the MOE’s Owen Sound office seem to have lost sight of the initial thought that Well 5 was a temporary solution to Walkerton’s water problems. This is perhaps understandable, because in the years after the 1980 inspections, the well had performed reasonably satisfactorily.

There were no formal, structured inspections of the Walkerton water facility between 1980 and 1991. In the years after the 1980 inspections until the 1991 inspection, few, if any, adverse microbiological results were reported. It was Mr. Hutchison’s evidence that the inspection carried out in November 1991 disclosed virtually no problems with Well 5. Although Well 5 remained a source that was vulnerable to contamination from surface activities, that concern was alleviated by what he termed “14 years’ history of half-decent operation.”

9.2.6 The Failure to Update the Certificate of Approval

9.2.6.1 *Evolving Practice: 1980s–1990s*

The Approvals Branch began to impose express conditions on Certificates of Approval in the mid-1980s. This practice evolved very slowly and sporadically, on a site-specific basis, and in time moved to the inclusion of model conditions in new or amended Certificates of Approval.

Initially, the ODWO formed the basis for express conditions attaching to newly issued Certificates of Approval for waterworks. As an example, adherence to the ODWO was mandated through the inclusion of a condition requiring the applicant to “comply with the requirements of the Ontario Drinking Water Objectives, as amended from time to time.”

As early as 1986 or 1987, an MOE committee studied the development of model conditions for inclusion in waterworks Certificates of Approval, but given the atmosphere of cooperation with municipalities that the MOE had enjoyed, the committee did not consider this initiative to be a priority.

Over time, however, Approvals Branch staff developed generic conditions that were included in the guide used by engineers who were reviewing applications for approval. In September 1992, the MOE’s Approvals Branch issued its “Review Procedures Manual for Approval of Municipal and Private Water and Sewage Works,” which contained model conditions for waterworks Certificates of Approval. In June 1996, the MOE published a document titled “Approval Process and Drinking Water Sampling and Monitoring,” which further refined the model conditions to be attached to waterworks Certificates of Approval. These model conditions included requirements for maintaining a total chlorine residual of 0.5 mg/L¹⁹ after 15 minutes of contact time and for the water system owner to notify the district manager and the local Medical Officer of Health when results failed to meet the ODWO standards or when unchlorinated water was introduced into the distribution system. MOE staff testified that the former condition could be appropriate when (as was the case with Well 5) the water source had a known bacterial history or in cases where there was relatively direct communication between the aquifer and the surface. The latter condition would likely have been included in all new Certificates of Approval for facilities with chlorinated groundwater.

However, despite increasing recognition within the Approvals Branch of the value of imposing operating conditions on Certificates of Approval relating to the operation of the water system, there was no centralized system of tracking Certificates of Approval issued before 1989. This situation significantly impeded any concerted effort to review existing Certificates of Approval to determine whether they should be updated by including operating conditions.

¹⁹ The conditions actually refer to a residual of “0.2 (0.5) mg/L.” The higher requirement, 0.5 mg/L, would have applied to Walkerton Well 5 because it was a water supply that had not been shown to be free of hazardous bacterial contamination. See s. 3.1 of the Chlorination Bulletin.

The Approvals Branch was not alone in recognizing the merit in imposing express conditions on Certificates of Approval. Citing the lack of “enforceable criteria or Certificate of Approval limits with which to regulate and ensure compliance for most ... water facilities,” the 1992 report of the provincial government’s Sewage and Water Inspection Program (SWIP) proposed either the enactment of a legally binding regulation regarding the operation of sewage and water treatment facilities or the issuance of a new Certificate of Approval to every facility, providing uniform operating conditions that established standards for such items as monitoring and water quality criteria. This proposal was not acted upon by the MOE until after the Walkerton outbreak. Only then was the absence of operating conditions in existing Certificates of Approval comprehensively addressed.

Prior to the Walkerton outbreak, Approvals Branch staff waited until applications to amend unconditional Certificates of Approval were made before adding conditions to them. They reasoned that approved equipment had a limited lifespan and that Certificates of Approval could be updated to include conditions when an application was made to alter, extend, or replace existing water supply systems.

In addition to waiting for applications for amendments, the Approvals Branch also relied on local MOE offices to identify municipal water systems requiring the imposition of operating conditions. But it was uncommon for the local offices to suggest the amendment of existing Certificates of Approval in order to provide for the inclusion of express conditions. Moreover, although there existed a process by which the MOE’s Investigation and Enforcement Branch could sponsor amendments of existing Certificates of Approval, Julian Wieder, currently a program manager with that branch, testified that this process was used to amend Certificates of Approval involving solid and hazardous wastes but did not point to any instances involving water supply systems.

The hit-and-miss process followed by the Approvals Branch of waiting for an application from an operator to amend a Certificate of Approval before adding operating conditions resulted in the uneven inclusion of such conditions in Certificates of Approval across the province. The Walkerton PUC did not apply for an amendment for the Certificate of Approval for Well 5, and thus the need for including operating conditions did not come to the attention of the Approvals Branch.

9.2.6.2 *The Failure to Add Model Conditions for Well 5*

I am satisfied that when the MOE in the 1990s, and by 1996 at the latest, began to routinely attach model conditions to newly issued Certificates of Approval, it would have been reasonable to have developed a program or practice of reviewing all existing certificates to see if such conditions were appropriate. The practice of waiting for applications for an amendment or of relying on MOE local offices before doing so was random and inexact.

In his testimony, William Gregson agreed that had a review of the Certificate of Approval for Well 5 been conducted in 1996, when the MOE published the refined model conditions, it would have been appropriate to amend the certificate by including the following model conditions:

1. construction and operation of disinfection facilities in such a manner that the total chlorine residual in the treated water reaching the first consumer connection and the effective contact time are maintained at all times to a minimum of 0.5 mg total chlorine per litre of water after 15 minutes of contact time;²⁰
2. installation of continuous water quality monitors and indicators with alarm systems in order to monitor free or total chlorine residual in treated water at the point(s) of entrance to the distribution system;²¹
3. maintenance of bacteriological and chemical monitoring programs, as required by the 1994 ODWO revision;
4. the taking of all necessary steps within the owner's authority "to ensure protection of the source of water supply (the groundwater aquifer) from contamination";
5. notification of the MOE district manager and the local Medical Officer of Health by the water system's "owner" – a term that is defined in the Certificate of Approval and that could therefore include the operator – if

²⁰ Although Mr. Gregson's evidence was that a condition requiring the maintenance of a chlorine residual of only 0.2 mg/L after 15 minutes of contact time would have been appropriate, this higher standard would actually have been required, given that the source had not been "proven free of hazardous bacterial contamination" and therefore did not fall under the Chlorination Bulletin's exception permitting the maintenance of a chlorine residual of 0.2 mg/L.

²¹ By this time, the 1994 amendment to the ODWO, referred to in note 7, was in effect.

any analytical result exceeds the maximum acceptable concentration of a health-related parameter or shows deteriorating bacteriological water quality as defined in the ODWO; and

6. notification of the MOE district manager and the local Medical Officer of Health by the “owner” when unchlorinated water is introduced into the distribution system.

I have already noted that despite having had the legislative and policy tools to conduct a review of existing Certificates of Approval, the MOE did not carry out a systematic review to identify certificates in need of updating. I am satisfied that if the MOE had conducted such a review, it would have added the model conditions to the Certificate of Approval for Well 5.²²

The MOE’s failure in this regard did not escape the attention of the Provincial Auditor. In a report finalized in March 2000 but not issued until October of that year, the Provincial Auditor found that the MOE did not have an adequate system for reviewing the conditions of existing Certificates of Approval in order to ensure that they met current environmental standards. The Provincial Auditor pointed out that the approximately 130,000 approvals issued before 1986 were recorded on a manual card index system, which made it impractical to determine whether they required updating.

The Provincial Auditor recommended that the MOE improve its information systems so that all Certificates of Approval could be assessed regarding the extent to which they needed to be updated with new conditions, develop systems that would allow for updating certificates in a timely and efficient manner, and establish action plans and timetables for updating certificates. The MOE agreed with these recommendations: its response stated that reviews of priority sectors, including water, had already been undertaken or were in progress to improve the currency of certificates. It also stated that the Integrated Divisional System (IDS) – the information management system that the ministry is developing – would, once fully implemented, enable the MOE to assess over time the extent to which Certificates of Approval needed to be updated.

²² Model condition 2, set out above, includes the “installation of continuous water quality monitors.” I discuss the MOE’s failure to require continuous monitors after 1994 in section 9.3.

9.2.6.3 *The Failure to Update After the 1994 ODWO Amendments*

In 1994, the ODWO was amended to provide that water systems using groundwater that is under the direct influence of surface water and without filtration should continuously monitor chlorine residuals.²³ In Chapter 4 of this report, I conclude that the water drawn from Well 5 was groundwater that was under the direct influence of surface water. After the 1994 ODWO amendment, the Certificate of Approval for Well 5 should have been updated to include a condition requiring the installation of continuous chlorine residual and turbidity monitors to allow an adequate response when the chlorine residual fell below the prescribed minimum or the turbidity exceeded a pre-determined level.

The 1994 revision to the ODWO also provided that water supply systems using groundwater that is under the direct influence of surface water and without filtration should monitor turbidity levels, either continuously or by taking grab samples every four hours. By then, continuous chlorine residual monitors had improved and no longer required chemical buffers and pH adjustment. They were also less expensive and more reliable than they had been in 1979, when Well 5 was approved. One witness estimated that a continuous chlorine residual monitor equipped with an alarm and a recorder would cost approximately \$8,000 and that a continuous turbidimeter would cost approximately the same amount. An automatic shut-off device would add only minimal additional cost for each of the monitors.

Before the 1994 ODWO amendment, the Chlorination Bulletin required continuous chlorine residual monitors for “sources where poor water quality and/or minimum supervision indicates a possible health hazard.” That requirement was less precise than the one in the 1994 ODWO amendment, and apparently the MOE did not interpret it as requiring continuous monitoring in situations like the one that existed at Well 5. In any event, I am satisfied that after the 1994 amendment to the ODWO, there ceased to be any reason for failing to properly assess Well 5.

The importance of continuous monitoring is clear. The 1994 amendment to the ODWO was directed at providing increased protection for safeguarding public water supplies. The inclusion of the more specific test for “groundwater under the direct influence of surface water” should have triggered steps by the

²³ ODWO (1994 revision), s. 4.2.1.1. See note 7 regarding the specific requirement for continuous monitoring.

MOE to ensure that municipal water supply systems received the protection of continuous monitoring where warranted.

After the 1994 amendment, the MOE did not initiate any program or practice for assessing existing municipal water sources to determine if they were groundwater sources under the direct influence of surface water and thus required continuous monitoring. The new requirement was applied to newly issued Certificates of Approval or in some instances to situations in which Certificates of Approval required updating. The result of not reaching back to review existing certificates was that some municipal water systems – either newly approved systems or those seeking amendments to existing Certificates of Approval – had the increased protection offered by continuous monitoring, while others did not. In a matter so important to public health, this inconsistent approach was not acceptable.

This situation was exacerbated by the MOE's failures to instruct inspectors of municipal water systems to assess whether existing wells posed problems when reviewed in the light of the new provision, to notify water system operators of the amendment, and to direct them to assess whether continuous monitors should be installed.

Moreover, the evidence showed that as late as the spring of 2001, the MOE had yet to formulate criteria for determining what constituted "groundwater under the direct influence of surface water." Instead, this determination was left to the discretion of review engineers.

Because there was no systematic review of existing Certificates of Approval, the MOE did not require continuous monitoring for Well 5. Had a proper review and assessment taken place, along with proper follow-up, I am satisfied that Well 5 would have been identified as a groundwater source under the direct influence of surface water and that continuous monitors would have been installed. I have found above that continuous monitors would have prevented the outbreak in May 2000.

I am satisfied that the Walkerton PUC operators did not have the training and expertise either to identify the vulnerability of Well 5 to surface contamination or to understand the resulting need for continuous monitors. The MOE knew or should have known that this was the case. It is no answer to the failure of the MOE to carry out a systematic review of existing Certificates of Approval to say that it relied on water operators like Stan Koebel to do so: the

MOE did not even bring the 1994 ODWO amendment to the attention of water operators.

Further, I reject the submission of counsel for the Province of Ontario that if continuous chlorine residual and turbidity monitors with alarms had been installed at Well 5, and if in May 2000 the alarms had shut Well 5 down, Stan Koebel would have reacted by turning the well back on and allowing it to continue to pump contaminated water into the distribution system. First, I note that Stan Koebel was not in Walkerton at the critical time when the monitors would have shut the pump off: Frank Koebel was in charge of the system during the relevant period.

In any event, Stan and Frank Koebel's deficient chlorination and recording practices were born not out of malice or lack of industry, but out of the misguided conviction the water was safe without proper chlorination. Had Well 5 been shut down because the chlorine demand had used up all of the chlorine injected or because the turbidity had exceeded acceptable levels, the shutdown would have made it clear to them that the water was contaminated and unsafe. I do not accept that either Stan or Frank Koebel would have pumped what they knew to be contaminated water into the system.

9.2.6.4 *Resources in the Approvals Branch*

In Chapter 11 of this report, I discuss the budget and resource cuts experienced by the MOE between 1992 and 1998. As the need for a systematic review of existing Certificates of Approval became apparent, staff reductions in the Approvals Branch compromised the branch's ability to conduct that review. In his evidence, however, Mr. Gregson seemed to suggest that the failure to conduct such a review was not connected to staff reductions.

He testified that a "relatively small number of additional resources" would have been required in order to undertake a systematic review of existing waterworks' Certificates of Approval to determine whether to attach conditions relating to the following issues: continuous chlorine residual and turbidity monitoring, maintenance of minimum chlorine residuals, adherence to the minimum

bacteriological sampling program,²⁴ and notification of the local Medical Officer of Health regarding adverse samples. If that was in fact the case, one wonders why it was not done.

The Provincial Auditor's report of the year 2000 set out a different view from that held by Mr. Gregson. It said that MOE management had advised that updating existing approvals would require "significant workload and expense" for the MOE. Whatever the size of the additional resources needed, I am satisfied that a systematic review would have required additional work at a time when staff reductions were taking place and that the shortage of resources made it most unlikely that such a review would be carried out.

As previously mentioned, it was only after the Walkerton tragedy that the MOE took steps to review and update existing Certificates of Approval. All Certificates of Approval for municipal water treatment plants must now be renewed every three years. Municipalities are now required to submit a professional engineer's report to the MOE in relation to each waterworks. The intent is to consolidate all Certificates of Approval so that there will be a single certificate for each of the 700 municipal water supplies and to include in each certificate the appropriate conditions.

9.2.6.5 *The Impact on the Events of May 2000*

Had the MOE included a condition in its Certificate of Approval for Well 5 requiring the maintenance of a chlorine residual of 0.5 mg/L, it is likely that with proper oversight and enforcement, the PUC would have complied with the requirement. I refer to proper oversight and enforcement because if the PUC had not complied with such a condition, a proper inspections program would probably have detected the improper practices – by then, breaches of legal requirements – and ensured that proper treatment and monitoring took place.

As I pointed out above, it is very likely that daily chlorine residual monitoring would have significantly reduced the scope of the outbreak in May 2000. Had the MOE required continuous monitors for Well 5, the protection would have

²⁴ The "minimum bacteriological sampling program" was set out under the ODWO as a guideline. In 1995, the MOE initiated the Minimum Recommended Sampling Program, based on the ODWO. Both of these programs are referred to as the "minimum sampling program" or "minimum bacteriological sampling program" throughout this report.

been even greater. I am satisfied that continuous monitors would have prevented the outbreak.

9.2.7 The Approval of Wells 6 and 7

Walkerton had two other operating wells in addition to Well 5. Well 6 was approved in 1983, and Well 7 in 1987. I have found that although Well 6 may be susceptible to surface contamination, there is no evidence to support a conclusion that the contamination entered the system through Well 6 in May 2000. In view of this fact, I do not propose to review the approvals process for Well 6.

I have also found that the contamination did not enter the system through Well 7. However, the process involving the approval for Well 7 provides another example of the implicit messages sent by the MOE to the Walkerton PUC and to Stan Koebel that it was not essential that they follow MOE requirements, even when these requirements were a legal obligation, as they were in this case.

The Certificate of Approval for Well 7 was issued on October 22, 1987. An October 15, 1987, memorandum from Mr. Hutchison of the MOE's Owen Sound office to the Approvals Branch suggested including conditions that required (1) a monitoring program addressing the impact of operating Well 7 alone, and Wells 6 and 7 together, on shallow and deeper aquifers in the area, and (2) the submission of a report concerning that program within 15 months. Monitoring the performance of conditions attached to Certificates of Approval was the responsibility of the MOE's regional and local offices.

The Walkerton PUC failed to satisfy the condition in the Well 7 Certificate of Approval for seven years. The MOE treated the issue in a most offhand manner. When the 15-month period passed, there was no follow-up. When Brian Jaffray, who conducted the November 19, 1991, inspection of the Walkerton water system, noted that the condition required the submission of a report by June 1, 1989, he gave the PUC until June 1, 1992, to provide it. The report was not submitted to the MOE until September 26, 1994 – seven years after the condition was attached to the Certificate of Approval and more than five years after the report was due.

Although this situation was unsatisfactory, apparently it was not uncommon. A 1996 MOE internal audit of the approvals process referred to the fact that between 6,000 and 7,000 Certificates of Approval were issued annually and found that:

given the volume, the district staff are unable to plan site visits effectively, except for the most critical Certificates of Approval. Our review of procedures at district offices disclosed that few site visits are being done. In fact, as documented in the workplan of the regional offices, monitoring of approvals conditions is assigned the lowest priority.

As for ensuring the operators' compliance with reporting conditions of the kind imposed on the Walkerton PUC in relation to Well 7, the internal auditors concluded:

Our review of procedures at district offices disclosed that due to the large volumes of certificates of approvals and due to lack of resources district staff were unable to monitor reporting requirements imposed on the proponents effectively.

9.2.8 Recommendations

The following recommendations will form part of the broader set of recommendations that will be set out in the Part 2 report of this Inquiry.

Recommendation 9: The MOE should develop criteria for identifying "groundwater under the direct influence of surface water."

Recommendation 10: The MOE should maintain an information data system that includes all relevant information arising from an approval application process – in particular, information relating to the quality of source water and relevant details from expert reports and tests.

Recommendation 11: The MOE should require continuous chlorine and turbidity monitors for all groundwater sources that are under the direct influence of surface water or that serve municipal populations greater than a size prescribed by the MOE.

Recommendation 12: All Certificates of Approval should be limited to a specific period of time, probably five years, and be subject to a renewal process that considers the current circumstances, including recent indicators of water quality. Conditions should be added as required.

In the Part 2 report, I will be making recommendations about the nature and form of operating conditions for municipal water systems.

9.3 Inspections

9.3.1 Overview

An essential element of the MOE's oversight role of municipal water systems is its inspections program. The frequency and nature of inspections have varied over time. In the years immediately preceding the outbreak in May 2000, the MOE inspected the Walkerton water system on three occasions, the last being in February 1998, more than two years before the outbreak.

At the time of the three inspections, problems existed relating to water safety. Inspectors identified some of these problems, but unfortunately two of the most significant – the vulnerability of Well 5 to surface contamination, and the improper chlorination and monitoring practices of the PUC – went undetected. As events turned out, these problems had a direct impact on the May 2000 tragedy.

During the three inspections, Well 5 was not assessed, and therefore was not identified as a groundwater source that was under the direct influence of surface water. The inspectors proceeded as if Well 5 were a secure groundwater source, and their reports made no reference to the surface water influence. This occurred even though information existed in MOE files that should have prompted a close examination of the vulnerability of Well 5 – that is, the 1978–79 material relating to the MOE's approval of Well 5, along with the reports from the 1979 and 1980 inspections, the first inspections completed after the well was put into operation.

Even after problems with the water quality at Well 5 began to emerge in the 1990s, the inspectors who saw these results did not refer to the critical information on file describing the vulnerability of the well. There were no instructions

from the MOE directing inspectors to refer to this type of information, even in the face of indicators of deteriorating water quality.

The second problem not addressed in the three inspection reports from the 1990s was the improper chlorination and monitoring practices of the Walkerton PUC. Evidence of these improper practices was readily apparent in the operating records maintained by the PUC. A proper examination of the PUC's daily operating sheets for any extended period would have shown a pattern of entries for chlorine residuals – repeatedly either 0.5 or 0.75, with almost no other entries (whether higher, lower, or in between those two measurements) for more than 20 years – that should have raised suspicion about the integrity of the numbers and led to questions about the chlorination and monitoring practices. Unfortunately, inspectors were never instructed to carry out this type of thorough examination. Michelle Zillinger, the 1998 inspector, looked only at the current month's daily operating sheets for two of the three wells and did not notice anything unusual. Because those sheets did not contain only 0.5 or 0.75 entries, they showed a more believable range of residuals.

Although the MOE was not aware of the Walkerton PUC's improper chlorination and monitoring practices, I am satisfied that if the ministry had properly followed up on the deficiencies noted in the 1998 inspection report, the unacceptable treatment and monitoring practices would have (or at least should have) been discovered.

However, two years and three months later, when the tragedy struck, no further inspection had even been scheduled. That was a serious failure on the part of the MOE, because a follow-up inspection could have made a significant difference to the outcome in May 2000.

The failure to detect these two significant problems in the Walkerton water system is the result of four flaws in the inspections program:

1. the failure to give inspectors adequate instructions to review relevant material in MOE files, especially following the 1994 ODWO amendments that required continuous chlorine residual and turbidity monitors for groundwater sources under the direct influence of surface water;
2. the failure to give inspectors clear instructions concerning the review of operating records for the purpose of assessing the operator's treatment and monitoring practices;

3. the failure to conduct a follow-up to the 1998 inspection; and
4. the failure to make unannounced inspections.

The MOE inspections program was thus seriously flawed as it applied to Walkerton. A properly structured and administered inspections program would have discovered, before the May 2000 outbreak, both the vulnerability of Well 5 and the PUC's improper chlorination and monitoring practices. Had these problems been uncovered, corrective action could have been taken to address them. With proper follow-up, such steps would either have prevented the outbreak or substantially reduced its scope.

9.3.2 The Ministry Inspections in Walkerton

By way of background, it is useful to review briefly the history of inspections of the Walkerton water system. Since the MOE took over the functions of the Ontario Water Resources Commission in 1972, it has conducted on-site inspections of municipal water systems for the purposes of ensuring that the facilities are properly maintained and operated to enable them to meet treated water quality standards. In 1974, when the MOE was decentralized, creating six regions and 22 districts, the responsibility for conducting inspections was transferred to the district offices. The policy-making role, including providing instructions about the nature, process, and frequency of inspections, remained with the provincial level of the MOE.

During the late 1970s, the MOE conducted regular inspections. For example, inspection reports were prepared for Walkerton in 1979 and 1980, and both were preceded by several site visits by the inspectors. Starting around 1980, however, the frequency of formalized inspections declined dramatically. Inspections became essentially reactive, and after the 1980 inspection, the MOE did not conduct a formal inspection again until 1991. During the intervening period, environmental officers made periodic visits to Walkerton, but there was no formalized inspection and no records were maintained setting out the results of these informal visits.

In 1988, the Provincial Auditor conducted an audit of the MOE's inspections program and found that most treatment plants had not been inspected in at least two years. He noted that the purpose of regular inspections was primarily preventive and proactive, and recommended annual inspections of all water

treatment plants. In response, the MOE established the Sewage and Water Inspection Program (SWIP), under which, after an initial inspection, water facilities were to be inspected every two years. Initially SWIP was administered by the regions, but in 1994 the responsibility for conducting inspections under SWIP was returned to the district offices. After this transfer, the frequency of inspections varied but the program emphasized the need to more frequently inspect facilities that had historical problems or significant deficiencies.

In the 1990s, the Walkerton water facility was inspected on three occasions: November 1991, October 1995, and February 1998. The inspections disclosed several serious problems. In each instance, the Walkerton PUC was not complying with the minimum sampling program and the total chlorine residuals measured by the inspectors of the treated water at the wells then in operation were all less than the required 0.5 mg/L. The review of the bacteriological results in 1995 and 1998 showed that adverse results were noted in the Walkerton system on three and eight occasions respectively, including the presence of *E. coli* on a significant number of occasions. In their reports, the inspectors pointed out the seriousness of these findings and emphasized the need to maintain a minimum chlorine residual of 0.5 mg/L after 15 minutes of contact time.

The inspections also had notable failures. Most significantly, they did not address the vulnerability of Well 5, nor did they uncover the improper chlorination and chlorine residual monitoring practices of the Walkerton PUC. These failures resulted from the flaws in the program that I discuss below. Although the conclusions regarding the failures of the inspections program apply, to some extent, to all three inspections, I will focus on the last inspection, in February 1998. The failure of that inspection to detect the problems at Walkerton is most closely related to the outbreak. In addition, by that time the problems were both well established and readily apparent.

The 1998 inspection was conducted by Michelle Zillinger, who was an experienced environmental officer. She had joined the MOE in 1986 as an environmental officer level 3 and served in various positions until October 1997, when she was transferred to the Owen Sound office. By then, she had been promoted to environmental officer level 4. In Owen Sound, her duties were mainly confined to proactive routine compliance inspections of municipal water and sewage treatment facilities. She had considerable experience in conducting inspections. In the early 1990s, she completed a two-year secondment to SWIP,

and she continued as a SWIP inspector after 1994, when the program was delivered by local MOE offices. Over the years, Ms. Zillinger had attended regular meetings for SWIP inspectors, at both the regional and provincial level.

I am satisfied that Ms. Zillinger carried out her inspections, including her 1998 inspection of the Walkerton water system, in accordance with what she understood her instructions from the MOE to be. Although it was not necessary to hear evidence from Brian Jaffray and John Apfelbeck, the inspectors who conducted the 1991 and 1995 inspections, I have no reason to doubt that they were also competent and carried out their inspections as directed by the MOE. The inspection flaws I have identified are not those of the individual inspectors; they are the responsibility of the MOE. The flaws relate to the directions the MOE gave its inspectors and the manner in which the inspection program was applied to Walkerton. Let me turn, then, to each of these flaws.

9.3.3 The Lack of Instructions to Inspectors Regarding Ministry Files

The quality of a well's source water is critical to determining the types of treatment and monitoring that may be required. I am satisfied that when positive *E. coli* results appear repeatedly in the raw and treated water from a particular well – as in the case of Well 5 in the years leading up to the 1998 inspection – a properly structured inspections program should direct an inspector to look for information in MOE files, and elsewhere if necessary, that addresses potential problems with the source water for that well.

Operators of small water systems like Walkerton's are unlikely to have the same level of expertise or sophistication as the environmental officers who conduct MOE inspections. Interpreting the implications of deteriorating water quality results may entail more experience and knowledge than some operators have. One of the purposes of an inspection should be to identify situations that require analysis, assessment, and possibly action – especially where those situations may go beyond the expertise of the local operator.

For this type of assessment to be thorough and effective, it is essential that an inspector be armed with the relevant available information. None of this is particularly surprising or demanding. Nonetheless, the inspections program in which Ms. Zillinger operated did not point her in this direction. Like the two

previous inspections in the 1990s, the inspection conducted by Ms. Zillinger in 1998 did not address the significant concerns about Well 5's vulnerability to surface water contamination.²⁵

The primary source of instructions to inspectors of water treatment facilities during the 1990s was the standardized inspection forms prepared by the MOE. Although the content of inspection forms varied from time to time, the matters to be reviewed in MOE files as part of an inspection did not change significantly.

The inspection forms used by the three Walkerton inspectors required them to examine the Certificates of Approval and Permits to Take Water for wells in use at the time. However, neither the inspection forms nor any other instructions provided to inspectors directed them to review historical data or MOE files that might contain information about the quality of the water sources, even in the face of water test results showing deteriorating water quality from a particular source.²⁶ Moreover, no time was allocated to inspectors for the extensive effort that may have been involved in locating and assessing information of this nature.

9.3.3.1 *The 1998 Inspection*

In preparation for the inspection, Ms. Zillinger reviewed the most recent inspection report, the Certificates of Approval for the three wells then in use, and the Permits to Take Water from those wells. All of these items were in the Walkerton water file in the Owen Sound office. Significantly, she did not review several very important pieces of information that were kept in other MOE files or storage facilities. She did not consider important material that was assembled when Well 5 was approved in 1978 and 1979. This included the Wilson Report of 1978, Willard Page's memo of October 24, 1978, and the minutes of the meeting of November 23, 1978 – all of which addressed the vulnerability of Well 5. Ms. Zillinger was unaware that the MOE had recommended land-use protection measures because of what had been found in the chemical and

²⁵ Information that was critical to making a proper assessment about the quality of the water entering the system through Well 5 was available in MOE files or storage areas. However, it was contained in files or storage areas that the inspectors were not directed to review; some of these files or storage areas were not even accessible to an inspector. I discuss these issues in section 9.6.

²⁶ Other sources of instructions were found in "how-to" tools such as the Compliance Guideline and Delivery Strategies documents, management correspondence, and presentations to staff.

microbiological testing of the well's water. She was also unaware that these measures had never been implemented. She did not review the 1979 and 1980 inspection reports, or a letter of October 21, 1982, from Mr. Page of the MOE's Owen Sound office to the Walkerton PUC – all of which expressed concern about the vulnerability of Well 5 to surface contamination.

In her report, Ms. Zillinger expressed serious concerns about the eight occasions on which adverse bacteriological results had occurred since the last inspection, several of which included the presence of *E. coli* in the Walkerton system. Five of those results were labelled as coming from Well 5. If Ms. Zillinger had considered all the material in MOE files relating to Well 5, she would have learned that the siting and hydrogeological features of the well rendered it vulnerable to surface contamination.

The need for having available the relevant information of the type I am referring to was at least indirectly recognized in 1999, in an internal review and evaluation of the MOE's inspections program. That review recommended developing an information management system and standard business practice for the planned inspections program, to be used, in part, "as a tool for identifying and targeting high risk facilities." As it stood, the information systems available to MOE inspectors did not include such critical information as that indicating the vulnerability of Well 5 to surface contamination. I will be addressing the deficiency of the MOE's information systems in section 9.6.

Significantly, Ms. Zillinger's supervisor, Philip Bye, was not aware of either a written protocol or a direction regarding how an inspector should prepare for an inspection of a water treatment plant, other than the instructions implicit in the inspection form itself. He testified that it was his expectation that the inspector would review the file to prepare for the inspection, at least to the extent of reviewing the previous inspection report. However, the absence of a written protocol opened the door for inconsistencies in the material an inspector would review before carrying out an inspection.

A related flaw in the MOE's inspections program arose in 1994, when the ODWO was amended. As discussed above, the 1994 amendments introduced a requirement for continuous chlorine residual and turbidity monitoring for groundwater sources under the direct influence of surface water.

By the time Mr. Apfelbeck and Ms. Zillinger conducted their inspections in 1995 and 1998, respectively, the 1994 ODWO amendment – intended to

provide greater protection for more vulnerable groundwater sources – was in effect. After making this amendment, the MOE should have drawn this new requirement to the attention of inspectors. This would have allowed inspectors to ensure, as part of an inspection, that they reviewed all material and information in MOE files that might be helpful in assessing whether the new requirement applied to wells they were inspecting – especially if there were recent adverse *E. coli* test results in the water from those wells.

The MOE did not, however, give inspectors any instructions relating to the amendment.²⁷ The inspection forms were not amended to reflect this new category of water source – groundwater under the direct influence of surface water – and its increased monitoring requirements.

In the same vein, the inspectors were not invited to bring the 1994 amendment to the attention of water systems operators, nor were they invited to inquire into the operators' competency either to assess the vulnerability of water sources to surface contamination or to understand the resulting need for continuous monitors. As a result, Ms. Zillinger had no discussion with Stan Koebel about the need to consider the installation of a continuous monitor at Well 5.

9.3.3.2 *The Impact on the Events of May 2000*

It is not possible to say with certainty whether Ms. Zillinger, armed with this additional information about the vulnerability of Well 5, and especially with knowledge of the 1994 ODWO amendments, would have done anything differently in conducting the 1998 inspection. In her testimony, she said that if she had known of the concerns about Well 5, it would have heightened her level of concern. She said she might “have pursued different directives or different courses of action” had she possessed that knowledge. Two other MOE witnesses, John Earl of the Owen Sound office and Donald Carr of the MOE's Water Policy Branch, said that if they had possessed all of the available information about Well 5 before the outbreak, they would have taken steps to

²⁷ Nor, as I point out in section 9.2, did the MOE institute a systematic review of existing Certificates of Approval to assess whether water sources supplying wells came within the amendment so as to require continuous monitoring. To make matters worse, the MOE did not have any program or practice of drawing the amendment to the attention of water facility operators so that they could assess whether their source(s) came within the amendment.

look into the possibility of a problem, and possibly would have ordered a hydrogeological study of the well. William Gregson, formerly a senior member of the Approvals Branch, was of the view that the 1979 inspection report alone showed Well 5 to be “hydraulically under the influence of surface water.”

I am satisfied that a proper review of the available material would have led to the conclusion that Well 5 was under the direct influence of surface water – or, at a minimum, that a hydrogeological study of Well 5 was required. The conclusion, however reached, would have led to the installation of continuous chlorine residual and turbidity monitors at the well.

Moreover, had inspectors been directed to inquire, after the 1994 ODWO amendments, into the issue of whether groundwater sources then in use were under the direct influence of surface water, a review of the historical data and hydrogeological information in MOE files would have been essential. I am satisfied that if Mr. Apfelbeck in 1995 or Ms. Zillinger in 1998 had looked at this information, they would have set in motion a process to conclude that Well 5 was under the direct influence of surface water. That process would have resulted in the installation of continuous monitors at Well 5.

9.3.4 The Lack of Clarity in the Instructions to Review Operator Records

The instructions given to inspectors about what operator records should be reviewed as part of an inspection have varied from time to time, and there has been a lack of consistency and clarity in those instructions. When Ms. Zillinger inspected the Walkerton water facility in February 1998, neither the inspection form she used nor any other instruction she received from the MOE directed her to examine the daily operating sheets for any specific period before the month of the inspection. She examined only the sheet for the current month, February 1998, and as a result she did not see the suspicious pattern of daily chlorine residual entries for the months and years preceding her inspection. She did not, therefore, detect the unacceptable treatment and chlorine residual monitoring practices of the Walkerton PUC. I am satisfied that the inspections program was deficient in that inspectors were not directed to review the records of an operator for a period of at least one year before the time of an inspection.

A protocol in the *Report on Municipal Sewage and Water Treatment Plant Inspections*²⁸ directs inspectors as to how they should plan for the inspection of a water system. It indicates that before the inspection, the inspector should request certain information from the operator, such as a summary of the bacteriological sampling results for the previous year. It also offers guidelines on how to conduct the inspection itself. The inspector is required to review the previous three years of bacteriological and chemical data to determine whether the treated water quality meets the ODWO. Further, the inspector is required to document the method and frequency of the chlorine residual monitoring performed on the water.

James Mahoney, an MOE employee²⁹ who had had considerable experience in the MOE's inspections program, testified that there was no written protocol to supersede the 1989 protocol. He said that this was because inspections had not changed significantly since 1989. However, the 1989 protocol was not circulated widely, nor was it available on the MOE Web site. Tim Little, who also had had broad experience in the MOE,³⁰ testified that he never saw the 1989 protocol and that at least since 1995, when he worked there, it was not available in the Southwestern Region, which included Walkerton. Even if an inspector was aware of the 1989 protocol, it did not provide clear direction regarding the review of chlorine residuals.³¹

A sample inspection form in the 1989 SWIP report did make express reference to an "annual review of records" under the disinfection heading. It seems to direct the inspector to review chlorine residuals for a one-year period. Mr. Mahoney testified it was his experience that an inspector would review one year of chlorine residuals in the course of an inspection. However, he also said that the extent of the review is a matter of professional judgment by the inspector.

The three inspection reports of the Walkerton system in the 1990s are also of interest in terms of the instructions they give to an inspector. The 1991 and

²⁸ This report created the Sewage and Water Inspection Program (SWIP) in 1989. The protocol referred to is found in Appendix 4 of the report.

²⁹ MOE, Regional Program Coordinator, Kingston, seconded to the Drinking Water Regulation Implementation Team.

³⁰ MOE, Supervisor in the Assistant Director's Office, Southwest Region, seconded to the Drinking Water Regulation Implementation Team.

³¹ On this topic, the protocol required the inspector to document only the method and frequency of the measurement of chlorine residuals.

1995 reports each have a section entitled “Record Keeping/Data Submission,” which asks the question “Is a daily operational sheet maintained?” However, there is no specific direction as to the documents or period that should be addressed with respect to daily operating sheets. Sometime after 1995, the inspection form was redesigned by the MOE and the “record keeping” section was removed. Thus, Ms. Zillinger did not have the benefit of this section during her inspection in 1998.

The 1991 and 1995 inspection forms also required the inspector to record the annual average chlorine residual. This might imply that the inspector should review more than one month of chlorine residual entries on the daily operating sheets. However, this requirement was also unclear. In the absence of a specific direction to review the operator’s records, an inspector might choose to rely on information provided by the operator to compile the annual average residual.

It appears unlikely that the two inspectors in Walkerton in 1991 and 1995 reviewed the operating sheets for any extended period, since they made no mention of suspicious repetitive entries. These suspicious entries went back as far as 1979. In any event, as previously mentioned, the inspection form used by Ms. Zillinger in 1998 did not require the annual chlorine residual to be set out.

The important point here is that the inspection form used by Ms. Zillinger in 1998 did not instruct her to review daily operating sheets of the water system, let alone to review the operating sheets for any specific period. The significance of this lack of instructions should not be understated. An inspector like Ms. Zillinger has a great many things to prepare and review in the course of an inspection. She also has a limited time to do them. In these circumstances, it would be unreasonable to count on an inspector to divert time and effort away from the parts of an inspection that he or she has been instructed to complete, in order to pursue other areas. Given the importance of chlorine residual monitoring to the safe operation of a water system, it was very important for inspectors to be given clear written instructions concerning how to evaluate an operator’s residual monitoring practices.

9.3.4.1 *The 1998 Inspection*

During her inspection of February 25, 1998, Ms. Zillinger examined the operating sheets for Wells 6 and 7, but only for the month of February. She did not

examine the February operating sheet for Well 5. In the sheets she did examine, the entries for chlorine residuals departed somewhat from the usual pattern, which was to record only residuals of either 0.5 mg/L or 0.75 mg/L. Instead, the February sheets showed a few residuals under 0.5 mg/L. Operating sheets for the months preceding February 1998 were not available at the well sites, and Ms. Zillinger did not ask to see them.

When Ms. Zillinger was shown the earlier operating sheets at the Inquiry, with the repeated entries of 0.5 mg/L or 0.75 mg/L, she observed that there was no variability from day to day or from week to week. This, she suggested, might have led her to be “somewhat suspicious” of the results. She said it would “bring into question the reliability of the data to see the same result every day.” I agree with that observation.

Ms. Zillinger’s suspicions would likely have been further aroused if she had noticed the unusual coincidence that the only month in which lower-than-required levels were recorded was February 1998, the month of the inspection. She also might have thought it unusual that the chlorine residuals obtained by the previous inspector in 1995 for the five wells then in use were also below the required level, ranging from 0.12 mg/L to 0.4 mg/L. The “coincidence” that the only unacceptable chlorine residuals were those noted at the times of inspections would probably have raised questions about the other entries and, from there, would have led to questions about the PUC’s actual chlorine monitoring practices. If the entries of residuals were not in fact accurate, obvious questions would arise about the amount of chlorine being used and the way in which the residuals were being measured. The fact of inaccurate entries, one would hope, would enable a competent inspector to uncover what was actually taking place.³²

When Ms. Zillinger was asked about her responsibility as an inspector with regard to the daily operating sheets, she replied that it was to conduct a “cur-sory” or “brief” review of these sheets in order to determine whether the operator was regularly recording information about flow and chlorine use. She would

³² I note that all but one of the entries in the daily operating sheets for the days of the 1995 and 1998 inspections were 0.5 mg/L. These are inconsistent with the measurements taken by the inspectors. However, I do not attach any significance to the difference because there was no evidence that the entries had been made at the time the inspectors were on site. It is worth noting that when environmental officer John Earl examined the daily operating sheets for Well 5 on May 22, 2000, he found it “questionable” that the chlorine residuals were all 0.75 mg/L, and he advised his superior, Philip Bye, about this. Not surprisingly, Mr. Earl was suspicious.

ensure that the operator was in fact performing a chlorine residual test each day for the operating well. She would confirm that the residuals did not fall below a certain prescribed minimum level that would ensure adequate disinfection. Although these are the types of things that she would look for in the daily operating sheets, it was not her practice to go behind the current month's sheet, especially if, as she recalled was the case in Walkerton, those sheets were not at the well site. She testified that she understood her practice was in accordance with what was expected of her by the MOE.

The credibility of Ms. Zillinger's evidence in this respect is strongly supported by a memorandum she wrote to her superior, Mr. Bye, on June 4, 1998, within a month of completing her report on the Walkerton water system. The memo dealt with a new inspection form introduced by the MOE in 1998 that differed from the previous form in not including a number of sections that had existed in the previous form.

In her memo, Ms. Zillinger raised concerns about the new form's lack of clear directions from the MOE regarding what inspectors should do when conducting inspections of water systems. The "plant treatment requirements" section of the new inspection form, she wrote, was the only section that related directly to chlorination. That section required inspectors to simply indicate whether chlorination was being provided. Ms. Zillinger asked Mr. Bye whether this meant inspectors were no longer required to consider other issues, such as whether the operator maintained adequate chlorine residuals and contact time, among other issues. Further, she asked her supervisor whether inspectors were still expected to check chlorine residuals at the time of the inspection and compare the results to those of the operator.

Ominously, Ms. Zillinger also asked in her memo whether inspectors were expected "to review any plant records for completeness/accuracy," such as "daily operating logs" and "water quality analysis records." Further, she called for a written protocol to clarify what management expected of its inspectors and to promote consistency across the ministry.

Several months later, Mr. Bye included Ms. Zillinger's comments in a memo to the chair of a committee responsible for the review of the planned inspection reports. In the memo, Mr. Bye suggested there was a need to formulate protocol documents for each type of planned inspection. He said the protocols should clearly define the specific factors to be assessed under each heading of the inspection report. He suggested that, with the protocol documents,

inspectors would have a more clear understanding of their inspection responsibilities.

Apparently there was no response.

9.3.4.2 *The Impact on the Events of May 2000*

Chlorination and chlorine residual monitoring practices are critical to the safe operation of drinking water systems that rely on chlorination for disinfection. It is difficult to think of anything more important. If nothing else, a properly structured inspections program should determine the adequacy of operators' practices relating to chlorination and the monitoring of chlorine residuals. Such a program should do so by clearly instructing inspectors to review an operator's daily operating sheets, where the relevant information is recorded. Further, inspectors should be instructed to review a historical sampling of operating sheets beyond the month in which the inspection occurs. An operator's typical practices are unlikely to be revealed simply by examining the operating sheets for a single month. A proper assessment of the adequacy of chlorination and monitoring practices therefore requires a more extensive examination of the operating sheets.

Some MOE inspectors examined daily operating sheets for the previous year. Others, like Ms. Zillinger, did not; but in either case there was no clear direction from the MOE as to what should be done. Ms. Zillinger's memo of June 4, 1998, speaks directly to the issue.

The 1989 sample inspection form referred to an "annual review of records," apparently referring to chlorine residuals. By the time Ms. Zillinger came to inspect the Walkerton system in February 1998, the reference to an annual review was no longer in the inspection form, at least not in the one used by the MOE's Owen Sound office. No evidence was presented about why this was the case. I am satisfied that the MOE's inspections program was lacking in that it failed to clearly set out which operator records should be examined by an inspector.

In the case of Walkerton, if Ms. Zillinger had reviewed the previous year's daily operating sheets, she would likely have uncovered the unacceptable treatment and monitoring practices of the PUC. In this event, she or others in the MOE would certainly have taken steps to ensure that in the years that followed, the

PUC properly monitored chlorine residuals daily, as it was expected to do. It has been suggested that even if she had unearthed the problems, it would not have mattered, because despite any steps the MOE might have taken, the PUC operators would have continued as they always had. I simply do not accept that. Surely if the MOE had known what had been going on in Walkerton, with proper follow-up it could have ensured conformance with the treatment and monitoring requirements. To suggest otherwise is to accept an abdication of responsibility by the MOE.

Although it may be true that in some cases a dishonest operator could avoid the detection of his or her improper practices, even by a competent and thorough inspection, that is not the case here. The PUC operators, perhaps because of their incompetence, made entries that would have rendered their improper practices easily detectable by a properly structured inspections program.

As I point out above, if the PUC had been monitoring chlorine residuals daily, the influx of contamination through Well 5 would very likely have been detected within 24 hours of its entry into the system. A proper response would have been to take corrective action, which could have significantly reduced the scope of the outbreak.

9.3.5 Follow-up Inspections

Walkerton was inspected three times in the 1990s. After the last inspection, in 1998, two years and three months elapsed before the tragedy. No further inspection had been scheduled. By the time of the 1998 inspection, at the very latest, it was clear to the MOE that Walkerton's water system had significant operating deficiencies. As a result, there should have been a follow-up inspection in 1999 and, if necessary, another in 2000. Unfortunately, this was not done. I find this failure to be a serious flaw in the way in which the MOE's inspections program was applied to Walkerton.

9.3.5.1 Inspection Frequency

The MOE's policy regarding both the frequency and the use of follow-up inspections has varied greatly over the years. There were frequent inspections of the Walkerton PUC in the 1970s, one overall inspection in 1980, and three inspections in the 1990s.

When the Sewage and Water Inspection Program was implemented in 1990, the goal of the MOE was to inspect all water treatment plants annually for compliance. However, due to staffing limitations and other program requirements, it was recognized that some time would pass before this goal would be reached. It was also recognized that larger, more complex plants or “problem plants” might require more frequent inspections.

In fiscal year 1991–92, most plants, including Walkerton’s, were inspected. In 1992, it was decided that inspections were to be undertaken once every two years, again with “problem plants” receiving greater attention.

In 1994, the Provincial Auditor recommended that the MOE give priority to follow-up inspections for those plants identified as having significant compliance problems, instead of relying on a two-year inspection cycle of all water treatment plants. In response, the MOE stated that “inspection frequency will be based on risk assessment factors rather than routine cycles so that plants with historic problems will be inspected more frequently.”

One senior MOE witness, Robert Shaw,³³ testified that after 1994, inspections were to be completed once every four years unless a significant deficiency was found, in which case a plant was to be inspected in the following year. After 1998, the MOE considered inspections of water treatment plants to be optional. However, when inspections were undertaken, priority was to be given to those with significant deficiencies.

9.3.5.2 Red Flags Regarding the Walkerton Water System

Over the years, many “red flags” had indicated that Walkerton required careful supervision by the MOE. On many occasions, the PUC had disregarded MOE requirements and directions. This started as early as 1978, when the PUC constructed Well 5 without the MOE’s prior approval and then put it into operation without complying with the specifications in the Certificate of Approval. It continued in 1982, when the PUC, again without obtaining a Certificate of Approval, began installing a 2.5-km-long trunk main connecting Well 3 with the then-proposed Well 6. The MOE ordered the PUC to cease construction on that project until a Certificate of Approval was granted. In

³³ Regional Director, Central Region, Operations Division.

1987, when Well 7 was approved, a condition was included in the Certificate of Approval that was to be met within 15 months. It took the PUC almost seven years to comply.

In the 1990s, two even more serious problems became apparent to the MOE. The first was that the PUC continued to disregard the requirements for microbiological water testing that are set out in the ODWO. The 1991 inspection revealed that Walkerton was not complying with the ODWO and led to a recommendation that its microbiological monitoring program be upgraded. In a June 6, 1995, letter to the PUC, Mr. Page stated that it was essential for the monitoring program required by the ODWO to be implemented and maintained and that he trusted the PUC to take the necessary steps in order to comply. Shortly afterward, the PUC received a province-wide MOE letter, dated June 23, 1995, directing the PUC to implement and maintain a minimum sampling program. The program, which was set out in an appendix to the letter, included provisions for bacteriological, physical, and chemical sampling based on ODWO requirements.

In the 1995 inspection, it was found that the minimum sampling program had not been implemented. In response, Stan Koebel stated that he would comply. He did not. In July and August 1997, Walkerton was placed on a list of municipalities that were not conforming to their minimum sampling programs. This list had been compiled for the purpose of issuing Director's Orders. However, that fall, Walkerton was taken off the list after Mr. Koebel again undertook to comply. Because of Mr. Koebel's undertaking, the MOE did not issue an order. At the same time, it took no steps to confirm compliance.

During her inspection in 1998, Michelle Zillinger discovered that the PUC was still not meeting the requirements of the minimum sampling program. At the time of the inspection, Mr. Koebel told her that he would comply immediately. By the time the report was issued on May 6, he still had not complied. In a letter responding to the 1998 inspection report, dated nearly five months after the inspection, Mr. Koebel advised: "*We will be up to the minimum sampling program by the end of July 1998*" (emphasis added). In other words, he was still not complying. Although Philip Bye testified that through Michelle Zillinger, he had instructed Donald Hamilton, the environmental officer responsible for Walkerton at the time, to monitor the situation and to follow up, the 1998 visit by the MOE to the Walkerton water system was the last before the events of May 2000.

The second problem that should have become apparent to the MOE was that the Walkerton PUC was not adequately chlorinating the water. During each of the three inspections in the 1990s, the inspectors measured the chlorine residual of the treated water at the wells in Walkerton. All nine samples measured the chlorine residual at below the recommended level of 0.5 mg/L after 15 minutes of contact time.³⁴

In 1995 and 1998, the inspectors recommended and emphasized the importance of maintaining adequate chlorine residuals after 15-minute contact time. Evidence at the Inquiry disclosed that the PUC may have changed its practice of underchlorinating for a brief time after the 1998 inspection. However, it soon reverted to the practice of inadequately chlorinating the water and entering false chlorine residuals in the daily operating sheets. The MOE, of course, was unaware that Walkerton continued to underchlorinate its water after the 1998 inspection because there were no further inspections before the outbreak.

The PUC's failures to follow the minimum sampling program and to adequately chlorinate the water went to the core of what is necessary to provide safe water. By 1998, the seriousness of these failures was compounded by increasing signs that the quality of the water in the Walkerton system was deteriorating. The 1995 inspection report refers to three adverse results in which *E. coli* was found in the distribution system. The 1998 report refers to an additional eight occasions on which there were adverse bacteriological results, several of which included *E. coli*. Five of these results were labelled as having come from the treated water at Well 5, and several others from within the distribution system.

Both reports emphasized that the presence of *E. coli* in treated water is an indicator of unsafe drinking water quality. Other witnesses agreed. Dr. Richard Schabas and Dr. Colin D'Cunha, the former and present Chief Medical Officers of Health for Ontario, respectively, testified that the adverse results disclosed in the 1998 inspection report were of sufficient concern to warrant follow-up action. Goff Jenkins, a long-time MOE employee with expertise in drinking water, agreed.

³⁴ In the 1991 report, Brian Jaffray recommended maintaining a level of between 0.3 mg/L and 0.5 mg/L. The residuals he obtained during that inspection were 0.3 mg/L and 0.35 mg/L, and therefore conformed with what he understood a proper residual requirement to be. But his reference to 0.3 mg/L was in error for Well 5, because from the time of its approval the expectation had been that the Walkerton PUC would maintain a minimum total chlorine residual of 0.5 mg/L after 15 minutes of contact time at that well. In any event, at the time of the 1995 inspection report, four of the five samples taken by the inspector were under even 0.3 mg/L, reaching as low as 0.12 mg/L. The remaining sample was 0.4 mg/L.

I recognize that Garry Palmateer of G.A.P. EnviroMicrobial Services Inc. testified that the frequency of adverse results at Walkerton between 1996 and 2000 was not unusual and that he did not perceive a potential public health hazard there. However, I am satisfied that these results indicated a potential problem, particularly in view of the operating deficiencies of the Walkerton PUC that were known to the MOE.

Willard Page said that after the 1995 inspection, it was evident that the Walkerton water system was a problem that should have been observed or monitored carefully. Even more serious problems were found during the inspection in 1998. In her report, Ms. Zillinger set out three items under the heading “Action Required”:

1. A minimum total chlorine residual of 0.5 mg/L, after 15 min. contact time, must be maintained in the water discharged to the distribution system for all active wells, at all times. A disinfectant residual must be detected in 95% or more of the monthly samples collected from the distribution system.
2. The municipality must ensure that records are maintained documenting that a minimum of 40 hours of waterworks-related training has been provided to each operator each year. These records must contain all of the information outlined in s. 17(3) of Ontario Regulation 435/93.
3. The operating authority must immediately modify its water quality monitoring program to meet the requirements of the Ministry’s minimum recommended sampling program. Failure to meet all of the requirements of the program will result in the issuance of a s. 52(2) *Ontario Water Resources Act* Direction.

Ms. Zillinger recommended to her supervisor, Mr. Bye, that he issue a Director’s Order with respect to the third item. He decided against issuing such an order, and I will review that decision in section 9.4. Instead, Mr. Bye sent a strongly worded letter *threatening* to issue an order if the PUC failed to comply. On July 14, 1998, Stan Koebel responded that he would comply with each of the items set out in Ms. Zillinger’s report. There was no follow-up inspection to ensure that he did.

9.3.5.3 *The Failure to Conduct a Follow-up Inspection*

Apart from the issue of whether the MOE should have issued a mandatory order after the 1998 inspection, I am satisfied that it should have followed up that inspection with another inspection in 1999 and, if necessary, yet another after that.

One of the primary purposes of an inspections program should be to address problems like those found at Walkerton during the period leading up to and including the 1998 inspection. Time and again, the PUC general manager's assurances that the faulty practices would be corrected had proved unreliable.

The time had come when it was no longer acceptable for the MOE to rely on Mr. Koebel's assurances. It needed to follow up the 1998 inspection with a further on-site inspection within the following year in order to satisfy itself that the PUC was employing proper operational procedures that were critical to the safety of the water. It is reasonable to expect that a proper inspections program would have done so.

Robert Shaw, currently the director of the MOE's Central Region, seemed to suggest in his testimony that the ministry's policy at the time did not require a follow-up inspection in these circumstances. The problems at Walkerton were very serious. If in these circumstances the MOE policy did not mandate a follow-up inspection in the following year, it should have.

9.3.5.4 *The Resources of the Inspections Program*

Starting in 1995, the number of inspections began to decrease significantly. This coincided with and was likely related to significant budget and staff reductions in the MOE.³⁵ It is also likely that the overall reduction in inspections resulted in fewer follow-up inspections. James Merritt, a former assistant deputy minister of the MOE Operations Division, testified that there was a reluctance in some areas to conduct inspections because "the day was eaten up with reactive work" and that the staff would feel this to an even greater extent about follow-ups after inspections.

³⁵ These reductions are discussed in detail in Chapter 11 of this report.

Before his departure in 1997, testified Willard Page, then the district manager in Owen Sound, budget and staffing reductions had resulted in reductions in the frequency of inspections, site visits, and contacts between the MOE and the waterworks. This is consistent with other evidence concerning the activities at the MOE's Owen Sound office. From 1994–95 to 1999–2000, the number of annual planned inspections fell from 25 to 10, the number of actual inspections per year went from 16 to 10, and the amount of employee resources expended on communal water decreased from 10.17% to 5.12%. Starting in 1995–96, the number of inspections fell by about 50% ministry-wide.

There is no direct evidence that the failure to conduct a follow-up to the 1998 inspection in Walkerton was related to these reductions. I note, however, that the number of inspections conducted by the Owen Sound office and the amount of time spent on the communal water program in Owen Sound decreased significantly from 1994–95 to 1999–2000. This was due, at least in part, to the program planning process and delivery strategies implemented throughout the MOE to manage increased workloads after the budget and staff reductions.

I am not certain that a follow-up to the 1998 inspection would have been conducted had the budget reductions not taken place. It is fair to say, however, that after the budget reductions, the resulting refocusing of program priorities made it less likely that a follow-up inspection would occur.

9.3.5.5 The Impact on the Events of May 2000

The question then becomes whether a follow-up inspection would have made a difference to the outcome in May 2000. The three earlier inspections did not uncover the improper chlorination or chlorine monitoring practices. However, I am satisfied that a follow-up inspection, particularly if unannounced, should have discovered the unacceptable treatment and monitoring practices.

The 1998 inspection report directed the Walkerton PUC to maintain a chlorine residual of 0.5 mg/L after 15 minutes of contact time. Despite the assurance given by the Walkerton PUC in its letter dated July 14, 1998, it continued to treat the water inadequately at its wells and failed to maintain the required chlorine residual.

During a follow-up inspection, the inspector would have taken chlorine residual measurements and would have seen that, as in the preceding three inspections,

the measured chlorine residuals of the treated water at the Walkerton wells were below the required 0.5 mg/L. By that point, it is reasonable to expect that the inspector would have been put on notice that proper treatment was not occurring on a regular basis. On looking into the matter, he or she would have discovered the pattern of failing to chlorinate adequately, failing to measure chlorine residuals daily, and recording false entries in the daily operating sheets. Once all this was discovered, the MOE had the necessary tools to ensure that adequate treatment and chlorine monitoring would take place in future. Had that occurred, it is very likely that the scope of the outbreak in May 2000 would have been substantially reduced.

It is worth noting that since the Walkerton tragedy, the government has recognized the importance of more frequent inspections and has initiated a program of annual inspections for all municipal water systems.

9.3.6 Unannounced Inspections

9.3.6.1 *Ministry Policy Regarding Unannounced Inspections*

It is self-evident that the enforcement of legislation and government guidelines is enhanced by visits that are made without advance notice. Unannounced inspections enable an assessment to be done under normal working conditions rather than in a situation possibly structured to accommodate the inspection.³⁶

Unannounced inspections were contemplated by the MOE's policy. When the Sewage and Water Inspection Program (SWIP) was created in 1990, the MOE provided for unannounced visits to water treatment plants. The report of the meeting that created SWIP provided that, starting in April 1991, unannounced visits would be the normal way to conduct inspections. However, the 1989 protocol, which gave instructions to inspectors, directed them to contact the operating authority in advance to obtain certain information. For example, the operator was to be asked to provide summaries of the bacteriological sampling program and results for the previous year.

³⁶ Three MOE witnesses with experience in enforcement, Julian Wieder, Gordon Robertson, and Nancy Johnson, testified that they agreed that unannounced inspections were valuable for these reasons.

James Mahoney of the MOE testified that at the beginning of SWIP, the intent was to conduct unannounced inspections but that this was not carried out for a practical reason: smaller systems have facilities that are not continuously staffed. If an inspector was traveling some distance to do an inspection, it was prudent to have a person available at the facility to provide the inspector with the records to review. The practice was to provide notice of less than a week. This did not provide a great deal of time for the operator to “falsify things in a way that’s going to really escape detection.”

During the 1990s, unannounced inspections were within the discretion of an inspector, but there was no policy or practice within the MOE to give an inspector guidance or criteria on which to rely in exercising that discretion. Very few unannounced inspections were conducted in the Owen Sound office.

9.3.6.2 The Impact on the Events of May 2000

The three inspections of the Walkerton water system in the 1990s were announced in advance. In each case, the inspector made arrangements with Stan Koebel to attend on an arranged day.

It is not surprising that some operators might take advantage of announced inspections by creating an appearance of compliance. Stan Koebel testified that once inspections were arranged, he took steps to ensure that the pumphouses looked appropriate and that the chlorinators were working properly.

Mr. Koebel may also have taken the following steps to prepare for Ms. Zillinger’s inspection in February 1998. The daily operating sheets for the month of February were the only operating sheets available at the well sites. They recorded varying chlorine residuals, some of which were less than the required 0.5 mg/L. These entries broke from the pattern of the previous months and years, during which either 0.5 mg/L or 0.75 mg/L was almost always recorded. The timing of this variation seems to be more than merely coincidental. Stan Koebel knew that the practice of not monitoring chlorine residuals and making false entries was wrong. He may also have known that chlorine demand can vary and that by making what I have called “suspicious repetitive entries,” he ran the risk of being caught. He may well have changed the usual practice in anticipation of the inspection. As it turned out, Ms. Zillinger looked only at

the February operating sheets for Wells 6 and 7 and therefore did not become suspicious about the integrity of the numbers recorded.

That said, it is difficult to say with any certainty whether, had the MOE used unannounced inspections in the 1990s, the inspectors would have discovered the unacceptable practices. At most, I can say that unannounced inspections would have increased the likelihood that those practices would have been discovered.

I am satisfied that the MOE should have carried out unannounced inspections, particularly for a problem water system like Walkerton's. If it had done an unannounced inspection to follow up on the 1998 inspection, the improper practices of the PUC would likely have been discovered and corrective action could have been taken.

9.3.7 Recommendations

Here I will set out recommendations for improving the inspections program that arise from the evidence I heard in Part 1. The Part 2 report of this Inquiry, which will address broader issues for the regulation and oversight of municipal water systems, will incorporate these recommendations.

Recommendation 13: The MOE's inspections program for municipal water systems should consist of a combination of announced and unannounced inspections. The inspector may conduct unannounced inspections when he or she deems it appropriate, and at least once every three years, taking into account such factors as work priority and planning, time constraints, and the record of the operating authority.

Recommendation 14: The MOE should develop and make available to all MOE inspectors a written direction or protocol, for both announced and unannounced inspections:

- outlining the specific matters to be reviewed by an inspector in preparing for the inspection of a water system;
- providing a checklist of matters that an inspector is required to review, as well as matters that it may be desirable to review, during an inspection of a water system; and

- providing guidance concerning those matters to be discussed with the operator of a water system during an inspection.

Recommendation 15: As a matter of policy, inspections of municipal water systems, whether announced or unannounced, should be conducted at least annually. The government's current program for annual inspections should be continued.

Recommendation 16: There should be a legal requirement that systems with significant deficiencies be inspected at least once per year. Ontario Regulation 459/00, also known as the Drinking Water Protection Regulation, should be amended to require that an inspection be conducted within one year of any inspection that discloses a deficiency as defined in the regulation. In this regard, deficiencies include any failure to comply with the treatment, monitoring, or testing requirements, or with specified performance criteria, set out in the regulation or in the accompanying drinking water standards.

Recommendation 17: The government should ensure that adequate resources are provided to ensure that these inspections are thorough and effective.

Recommendation 18: Copies of MOE inspection reports should be provided to the manager of the water system, the members of the operating authority, the owner of the water system, the local Medical Officer of Health, the MOE's local office, and the MOE's Approvals Branch.

Recommendation 19: The MOE should establish and require adherence to time lines for the preparation and delivery of inspection reports and operator responses, and for the delivery of interim status reports regarding remedial action.

9.4 Voluntary and Mandatory Abatement

9.4.1 Overview

Closely connected with the MOE's failure to conduct a follow-up to the 1998 inspection was the ministry's failure to make use of mandatory abatement measures after the 1998 inspection in order to address the operational problems at

the Walkerton PUC. Instead, the MOE relied on a voluntary approach to abatement.

After the 1998 inspection report, the MOE should have invoked mandatory measures to require the PUC, among other things, to maintain a minimum chlorine residual of 0.5 mg/L. Had the MOE done so, and had there been proper follow-up, it is possible that the PUC would have complied. If the PUC had not complied, it is quite likely that the MOE would have detected a failure to comply and would have been in a position to ensure that appropriate corrective actions were taken. In either event, it is likely that the scope of the outbreak would have been significantly reduced.

One of the serious consequences of continually using a voluntary approach to correcting the operating deficiencies at Walkerton was to reinforce Stan Koebel's belief that the MOE requirements – found in guidelines, not in legally binding regulations – were not essential to the safety of the drinking water. The MOE's failure to insist that Mr. Koebel conform to MOE requirements, as well as its continued use of a voluntary approach, tended to support Mr. Koebel's misplaced confidence in the safety of the water even when the PUC's treatment and monitoring did not comply with MOE requirements.

9.4.2 Ministry Policies and Practices

9.4.2.1 *Voluntary and Mandatory Abatement*

Abatement is a term that describes measures taken by the MOE to bring about compliance or conformity with its requirements. In the case of water treatment plants, those requirements, in broad terms, focus on ensuring that treated water is free of contamination and that public health is protected.

When the MOE encounters a situation of non-conformance or non-compliance requiring corrective action,³⁷ it has the choice of proceeding by way of either voluntary or mandatory abatement. Voluntary abatement, as the term suggests, describes the process under which the MOE asks or directs an operator to take certain measures, without resorting to legal compulsion.

³⁷ “Non-compliance” is a term used to describe the failure to adhere to a legal obligation. “Non-conformance” describes a situation in which there is a failure to follow a non-legal requirement contained in a guideline or a policy statement.

Voluntary abatement may take a variety of forms: a letter, a violation notice, a recommendation in an inspection report, a phone call, or even an oral instruction during a field visit. Depending on the nature of the problem, voluntary abatement may involve establishing a program to be undertaken by a water utility within prescribed time limits.

Mandatory abatement is a more prescriptive response to a problem. It too may take several forms. The MOE may issue a control document – either a Director’s Order or a Field Order³⁸ – requiring the operator to carry out the desired measures. Alternatively, the MOE may choose to amend an authorizing document, such as a Certificate of Approval, in order to direct the operator to do what is required. The hallmark of mandatory abatement, whatever form it takes, is that the required measures are compelled by a legal obligation and are subject to enforcement proceedings. Thus, mandatory abatement can convert a non-binding requirement under a government guideline or policy into a legally enforceable prescription, similar to a provision in legislation or a regulation.

Breaches of legally enforceable requirements – whether they are set out in legislation, regulations, ministry orders, or authorizing documents – are subject to enforcement proceedings. In the case of the MOE, those proceedings are generally handled by the Investigation and Enforcement Branch, although an MOE abatement officer may also lay charges. However, when the breach is only of a guideline or policy, and not of a legally binding obligation, enforcement proceedings are not an option.

9.4.2.2 The Ministry’s Compliance Guideline

Environmental officers are frequently called upon to use either voluntary or mandatory abatement measures. After 1995, the key document that assisted them in choosing one or the other was the MOE Compliance Guideline. In 1995, the ministry conducted a program to train environmental officers from across the province in applying this guideline.

The Compliance Guideline has several criteria for pursuing mandatory abatement, including an unsatisfactory compliance record, deliberate non-

³⁸ Director’s Orders and Field Orders are provided for under the *Ontario Water Resources Act*, R.S.O. 1990, c. O-40, and the *Environmental Protection Act*, R.S.O. 1990, c. E-9.

compliance, repeated violations, and unsatisfactory progress in a voluntary program. In these situations, the guideline suggests that mandatory abatement should be pursued unless it is decided that a voluntary program would be appropriate. The reasons for this decision are documented in an occurrence report. The guideline also provides that the MOE will issue no more than two written warnings before mandatory abatement is initiated. In no case will the MOE tolerate unsatisfactory progress on a voluntary abatement program beyond 180 calendar days.³⁹

Despite the direction in the guideline, evidence at the Inquiry showed that MOE officials believed that a great deal of discretionary latitude existed even when the criteria for mandatory abatement were present. This came from a deeply rooted culture across the MOE that favoured a voluntary abatement approach whenever possible.

9.4.2.3 *The Culture of Voluntary Abatement*

MOE staff appear to have been reluctant to use mandatory abatement instruments, such as orders; rather, they sought voluntary compliance. The former district manager of the Owen Sound office, Willard Page, testified that in the late 1970s the MOE took a voluntary compliance approach in dealing with municipal water systems. He said that he was a proponent of voluntary abatement, as opposed to legal action, and that this philosophy had guided his career. In his view, it was more productive to avoid mandatory enforcement unless there was no alternative. Mr. Page saw municipalities as cooperative institutions that, for the most part, voluntarily followed recommendations relating to drinking water. He stated that his emphasis on voluntary compliance, prevailed in the MOE, and that he had followed it until his retirement in 1997.

According to Kevin Lamport, an MOE investigator from the Owen Sound office, some abatement officers were more likely than others to prefer voluntary abatement, as opposed to mandatory abatement or to passing matters on quickly to the Investigations and Enforcement Branch (IEB) for investigation. He said that in the Owen Sound office, the MOE staff who had started in the 1970s or earlier tended to prefer a voluntary approach. However, he did not

³⁹ This 180-day limit relates to any one period of unsatisfactory progress and not to the length of the program.

think that the Owen Sound office was any less willing than other MOE offices to refer matters to the IEB.

9.4.2.4 *The Shift Toward Mandatory Abatement*

In 1997, the culture of favouring voluntary abatement gradually began to change. In the fall of that year, the MOE compiled a list of municipalities that were not conforming with the ministry's minimum sampling program. This list ultimately led to a number of Director's Orders being issued.⁴⁰ In 1999, an internal MOE audit noted studies that had concluded that enforcement measures provide a better assurance of compliance than do voluntary approaches.⁴¹

In March 2000, the MOE issued a directive to its staff to follow a mandatory abatement approach. The directive stated that the MOE needed "a stronger/ tougher enforcement program." To implement this, it instructed staff to move the "pendulum ... more towards mandatory abatement and further away from voluntary abatement." Unfortunately, this directive had no effect on the MOE's supervision of the Walkerton waterworks before the events in May 2000. Since the Walkerton tragedy, the MOE has introduced policies strongly favouring mandatory abatement and the strict enforcement of government requirements.

9.4.3 Voluntary Abatement for the Walkerton Water System

In section 9.3, I described the checkered history of the Walkerton PUC with respect to MOE requirements for treatment and monitoring. I will not repeat the details here, but will recap briefly. During the 1990s, the PUC continually failed to follow the MOE's minimum sampling program. Further, on each of the three occasions on which the MOE had inspected the Walkerton PUC, the PUC had failed to maintain the required chlorine residual of 0.5 mg/L.

⁴⁰ As I have mentioned, Walkerton, which was initially on the list, was taken off in the fall of 1997 because Mr. Koebel assured the MOE that he would follow the program.

⁴¹ In 2000, the culture of pursuing voluntary rather than mandatory abatement also generated external criticism. In the 2000 Provincial Auditor's report, the MOE was called upon to strengthen its enforcement activities by taking appropriate actions in response to violations, and by following up on a more timely basis. The Provincial Auditor also recommended that the MOE ensure that its policies and procedures manuals encourage the use of more stringent compliance measures where appropriate.

When Stan Koebel responded by letter, in July 1998, to the 1998 inspection report, the Walkerton PUC was still not conforming with the minimum sampling program. By then, the MOE had issued at least seven directives, in one form or another, telling the PUC to conform with the sampling program. Some of these directives were accompanied by threats that the failure to conform would result in a Director's Order. None of this made any difference to Mr. Koebel. In most instances, he responded by saying that he would conform and then not doing so. The pattern repeated itself time and again. By July 1998, he was still not complying; once again, he said that he would.

In his letter, dated July 14, 1998, Mr. Koebel stated that the PUC "will be maintaining a minimum total chlorine residual of 0.5 mg/L for all of our active wells." He also referred to continuous monitoring: "Hopefully, we will be purchasing equipment in the future to ensure a residual of 0.5 mg/L is kept at all times." The MOE accepted these assurances. Mr. Koebel, of course, did not maintain a chlorine residual of 0.5 mg/L: there was no legal requirement to do so. Once again, the MOE accepted his representations.

9.4.3.1 *The Failure to Issue a Director's Order in 1998*

In section 9.3, I concluded that the MOE should have conducted a follow-up inspection after Ms. Zillinger's 1998 report to ensure that the PUC had addressed the deficiencies she noted. I am also satisfied that, for essentially the same reasons, the MOE should have used mandatory abatement to ensure that the PUC complied with Ms. Zillinger's directions in the inspection report.

In her report, Ms. Zillinger identified three deficiencies and directed specific corrective action for each. Briefly, the actions required were to maintain a minimum chlorine residual of 0.5 mg/L, to keep proper training records, and to comply with the minimum sampling program.

Ms. Zillinger recommended to her supervisor, Philip Bye, that he issue a Director's Order with regard to the third matter – the need to comply with the minimum sampling program. He declined to do so. Instead, he instructed Ms. Zillinger to write a strongly worded letter, for his signature, *threatening* to issue a Director's Order if the PUC continued to fail to comply.

In his evidence, Mr. Bye gave a number of reasons for his decision not to invoke mandatory measures. He mentioned that the PUC was taking

bacteriological samples and that the water was being chlorinated, although he acknowledged that the number of samples being collected was five fewer than required per month and that the chlorine residual occasionally fell below the required minimum. Mr. Bye also pointed out several other facts: that an MOE environmental officer was instructed to follow up in order to ensure compliance; that Mr. Koebel's July 1998 letter gave assurances that he would comply; and that throughout the fall of 1998, Mr. Bye did not receive any calls from the laboratory, the operating authority, or the Bruce-Grey-Owen Sound Health Unit about problems with Walkerton.

In my view, the wrong decision was made. I am satisfied that the MOE should have resorted to mandatory abatement in response to Ms. Zillinger's report and that the mandatory measures should have included each of the three corrective actions noted in her report. Mandatory abatement could have taken the form of a Director's Order. Alternatively, it could have been accomplished by amending the Certificates of Approval for the operating wells. The legal effect of either response would have been the same. The key point is that by this time, the MOE should have converted the corrective actions noted in Ms. Zillinger's report into legal obligations.

There was some suggestion at the Inquiry that the situation at Walkerton did not fit squarely within the Compliance Guideline's criteria for mandatory abatement. This was supposedly because the most serious issues with the PUC involved *non-conformance* with MOE guidelines, rather than *non-compliance* with legal obligations.⁴² Several of the criteria in the Compliance Guideline refer to situations involving non-compliance, as opposed to non-conformance. The guideline also speaks of moving to mandatory abatement only after issuing two warnings and only in situations where there has been a failure to follow a voluntary program.

I do not propose to analyze whether the criteria in the Compliance Guideline, if interpreted narrowly, captured the Walkerton situation as it existed in 1998. If they did not, they should have. It is inconceivable to me that the MOE would issue guidelines for the use of mandatory abatement that would not have applied to the situation in Walkerton as described. Surely the repeated failures to conform, the broken promises, and the ignored warnings were enough to require mandatory measures.

⁴² For an explanation of the difference between these terms, see note 37.

Before issuing a Director's Order, the MOE must first send a notice of its intention, which provides the operator with an opportunity to respond. The director of the Central Region, Robert Shaw, testified that even if Mr. Bye had issued a notice of a Director's Order in May 1998, that order would likely not have been issued, because Mr. Koebel, in his letter of July 14, 1998, agreed to comply with everything required by the inspection report.

I disagree with that approach. By July 1998, Mr. Koebel's assurances had no value. Mr. Shaw's view may have been influenced by the MOE culture favouring voluntary rather than mandatory measures. Mr. Bye's decision not to issue a Director's Order was consistent with that culture. I accept that many others in the MOE at that time would likely have made the same decision as Mr. Bye.

When Mr. Bye decided not to issue a Director's Order, he was unaware of Well 5's history of vulnerability. Like Ms. Zillinger, he had not seen the earlier files on Well 5 and did not know about the well's susceptibility to surface contamination. Had he known about these concerns, he would probably have attached more importance to the recent adverse results that showed *E. coli* in the treated water at Well 5 and in the distribution system. This underlines the significance of the MOE's failure to ensure that such information was readily accessible to those in the MOE who were making decisions about the safety of drinking water. I discuss the lack of an adequate information system in section 9.6.

I also observe that at the time he decided not to issue a Director's Order, Mr. Bye was not aware that *E. coli* could be lethal.⁴³ Although it is not possible to say that knowing the potential consequences of *E. coli* would have made any difference to his decision, it was certainly something that he should have known, and it might have tipped the scales in favour of mandatory measures.

I said above that a Director's Order should have been issued for each of the three action items in Ms. Zillinger's report. One of those items was to maintain a minimum chlorine residual of 0.5 mg/L. I appreciate that Ms. Zillinger's recommendation to Mr. Bye related only to the minimum sampling program. But in view of the deteriorating water quality at Walkerton, maintaining an adequate chlorine residual was so important that it should have been made a legal requirement.

⁴³ For that matter, neither Ms. Zillinger nor any of the other environmental officers who had oversight responsibilities for Walkerton were aware of this fact.

By 1998, the MOE had for several years been routinely attaching conditions regarding minimum chlorine residuals to Certificates of Approval for newly approved water systems. This approach made the minimum residuals a legal requirement. I see no reason why the same effect could not have been achieved by imposing a Director's Order as part of the abatement process on Walkerton's water system, where the PUC had shown disregard for the chlorination requirements. To comply with the requirements that would have been included in such a Director's Order, the PUC would have had to provide adequate chlorine and to monitor residuals regularly.

It is possible that if the MOE had taken the mandatory measures I suggest, either the PUC operators would have complied or the PUC commissioners, having been made aware of those measures, would have ensured compliance.⁴⁴ If, despite the legal requirement, the PUC had continued to fail to comply, then the MOE, with proper follow-up, should have discovered the non-compliance and ensured that the necessary corrective steps would be taken. Such actions would very likely have significantly reduced the scope of the outbreak in May 2000.

9.4.3.2 *The Impact on Stan Koebel*

I have found that Stan Koebel was primarily responsible for the inadequate chlorination and monitoring practices at Walkerton, which contributed to the outbreak in May 2000. Mr. Koebel was clearly wrong in failing to follow the MOE's requirements, and for that there is no excuse. But Stan Koebel believed the water was safe and, despite what he was told by the MOE about the need to chlorinate, he apparently thought he knew better. He did not fully understand the seriousness of the health risks involved or the importance of proper operating practices. This was due to a lack of training and qualifications; but it was also fuelled, I believe, by the MOE's failure to take appropriate action in the face of Mr. Koebel's repeated disregard of MOE requirements.

The requirements to treat and monitor residuals and to test for bacterial contamination were set out in guidelines, not regulations. They had no legal effect – and that in itself was not conducive to encouraging someone like Stan

⁴⁴ Walkerton's mayor at the time, James Bolden, who was also an *ex officio* PUC commissioner, testified that if the report had been accompanied by a Director's Order, the commissioners would have taken the report more seriously and ensured compliance.

Koebel to adhere to them. No doubt he was aware that disregarding a guideline is very different from breaching a legal requirement.

Added to this was Mr. Koebel's relationship with the MOE. This relationship was characterized, on Mr. Koebel's part, by breaches of MOE directives and broken promises. On the MOE's part, it was characterized by idle threats and failures to follow up. Although Mr. Koebel eventually complied with the minimum sampling program, the MOE's latitude on this issue for an extended period sent the message that, although the program might be a good idea, it was by no means essential to the safety of the drinking water. This message was reinforced by the very title of the program: the *Minimum Recommended Sampling Program*.

So too with the requirement to maintain a minimum chlorine residual of 0.5 mg/L. At the time of the three inspections, and likely on some other occasions when *E. coli* was found in the Walkerton system, Mr. Koebel was told about the importance of maintaining the minimum residuals. Unlike the situation with the minimum sampling program, though, he never met this requirement, at least on a regular basis. To do so, he would have had to increase the chlorine dosage normally added at the wells and then measure the residuals daily to ensure that the required residual was maintained.

The MOE clearly told Mr. Koebel on many occasions that it considered his deficient operating practices to be matters of concern and emphasized the importance of conforming to its guidelines. However, its failure to use mandatory measures to ensure compliance likely undermined the seriousness of this message.

9.4.4 The Ministry's Responses to the Adverse Results in Walkerton in 2000

Between the end of January and mid-April 2000, the MOE received five confirmed reports of total coliforms in samples taken at Walkerton – all relating to the treated water at Well 5 and the distribution system.⁴⁵ Counsel for the

⁴⁵ The first adverse result was from the treated water at Well 5 on January 31. The next three results were from the water at Well 5 (one sample) and from the distribution system (two samples) on April 3. The fifth result was from, once again, the treated water at Well 5 on April 17.

Municipality of Brockton argued that, in light of the multiple occurrences of total coliforms, the MOE should have pursued a more active response and, indeed, that this was required under the MOE's Delivery Strategies policy.⁴⁶ The policy states that repeat or multiple occurrences may indicate a systemic problem with a water system warranting further evaluation or action.⁴⁷

The MOE staff responded to these reports of adverse results in various ways. First, they did nothing with respect to the adverse sample taken on January 31, 2000, because it was not from the distribution system.

Second, with respect to the adverse samples taken on April 3, Larry Struthers, of the MOE's Owen Sound office, testified that he considered them to be indicators of "deteriorating" water quality under the ODWO and that he therefore called the Walkerton PUC on April 10. However, because there were two adverse results from different points in the distribution system, these samples were actually indicators of "unsafe" water quality, and the local health unit should have been notified. Through an oversight, Mr. Struthers did not notify the Bruce-Grey-Owen Sound Health Unit.

Third, John Earl, of the Owen Sound office, telephoned the Walkerton PUC on May 2 after he became aware of the "questionable" samples collected on April 3 and April 17. The PUC advised him that resamples had proved satisfactory and faxed him these results to confirm.

These adverse results – three from the treated water in Well 5, and two from the distribution system – over a period of roughly three months, raised concerns about the security of the water source for that well. It would have been preferable for the MOE to have responded by doing more than telephoning the PUC. However, in the result, I do not think that a stronger response would have affected the outcome in May 2000.

The January 31 and April 17 samples showed total coliforms in a single sample from Well 5 treated water. At worst, these samples were indicators of

⁴⁶ The Delivery Strategies policy was developed by the MOE to prioritize tasks undertaken by ministry personnel.

⁴⁷ The policy further states that, if any program priority is known or can reasonably be expected to be present, there is a need for staff to be involved in order to assess the issue and determine whether there are any adverse effects, environmental impairments, or other violations.

“deteriorating” drinking water quality under section 4.1.4 of the ODWO,⁴⁸ and the specified response is to notify the MOE district officer “so that an inspection of the sampling sites can be undertaken to determine the cause.” Further, section 4.1.4 states that “[s]pecial samples should be taken” as provided by section 4.1.3.1,⁴⁹ and, if these samples are positive, “then corrective action ... will be initiated” as provided by section 4.1.3.⁵⁰

In response to the April 17 result, MOE staff telephoned the PUC and determined that the follow-up samples were negative. It appears that this response did not conform to the most obvious interpretation of section 4.1.3.1, in that special samples were not taken. However, the evidence showed that MOE officials routinely interpreted this section as requiring only telephone calls to ensure that follow-up samples tested negative for total coliforms and *E. coli*.

With regard to the April 3 samples, Mr. Struthers simply made a mistake in failing to note that the two samples from the distribution system were taken on the same day and that this was an indicator of “unsafe” water quality that

⁴⁸ Section 4.1.4 of the ODWO reads as follows:

Any of the following conditions indicate a deterioration in drinking water quality:

- a) total coliforms detected as a single occurrence (but not *Escherichia coli* or other fecal coliforms);
- b) samples contain more than 500 colonies per mL on a heterotrophic plate count analysis;
- c) samples contain more than 200 background colonies on a total coliform membrane filter analysis;
- d) *Aeromonas* spp., *Pseudomonas aeruginosa*, *Staphylococcus aureus*; *Clostridium* spp. or members of the Fecal Streptococcus (*Enterococcus*) group are detected.

If any of these conditions occur, the MOEE district officer should be notified so that an inspection of the sampling sites can be undertaken to determine the cause. Special samples should be taken as indicated in 4.1.3.1, if these are positive then corrective action as outlined in 4.1.3 will be initiated.

⁴⁹ Section 4.1.3.1 reads, in part, as follows (emphasis in original):

Special sampling shall consist of a minimum of 3 samples to be collected for each positive sampling site. ... The measurement of the chlorine residual in the vicinity of the positive sampling site may assist in determining the extent of the contamination within the distribution system, and may be used to determine the appropriate corrective action.

⁵⁰ Section 4.1.3 provides for specific corrective action to be taken, based on the presence of indicators of unsafe water quality, including notification “of the MOEE District Officer who will immediately notify the Medical Officer or Health and the operating authority to initiate collection of **special samples** and/or take corrective action” (emphasis in original). Corrective action includes “immediately increasing the disinfection dose and flushing the mains to ensure a total chlorine residual of at least 1.0 mg/L or a free chlorine residual of 0.2 mg/L to all points in the affected part(s) of the distribution system.” If satisfactory chlorine or disinfectant residuals are not detected, then a boil water advisory may be issued by the Medical Officer of Health.

should have been reported to the local health unit. Even if he had reported those results, however, it is unlikely that this would have made any difference to the actions taken by the Bruce-Grey-Owen Sound Health Unit in response to the outbreak in May 2000. The evidence indicated that the health unit would not have issued its boil water advisory earlier than Sunday, May 21, even if it had been informed by Mr. Struthers of the April 3 results.

I do not think that the adverse samples received in January and April 2000, disclosing total coliforms but not *E. coli* in the water system, should have by themselves led to mandatory abatement. However, I have concluded that by this point, the MOE should have taken mandatory measures. The significance of the samples is that they gave a further opportunity to review the situation at Walkerton in order to determine whether mandatory measures were necessary. However, given that it was the district supervisor at the Owen Sound office who decided, in 1998, not to issue a Director's Order, it seems unlikely that an environmental officer, such as Mr. Struthers or Mr. Earl, would have reached a different conclusion in 2000 after addressing the adverse samples. The problem is not so much with the way in which the environmental officers responded to the samples, but rather with the MOE's general failure to take mandatory measures.

9.5 Operator Certification and Training

9.5.1 Overview

Stan and Frank Koebel had extensive experience in operating the Walkerton water system but lacked knowledge in two very important areas. First, they did not appreciate the seriousness of the health risks arising from contaminated drinking water. Second, they did not understand the seriousness of their failure to treat and monitor the water properly. They believed that the untreated water supplying the Walkerton wells was safe: indeed, they themselves frequently drank unchlorinated water.

Managing a communal water system entails enormous responsibility. Competent management includes knowing more than how to operate the system mechanically or what to do under "normal circumstances." Competence, for those managing a water system, must also include appreciating the nature of the risks to the safety of the water as well as understanding how protective measures, such as chlorination and chlorine residual and turbidity monitoring,

protect water safety and why they are essential. Stan and Frank Koebel lacked this knowledge. In that sense, they were not qualified to hold their respective positions with the Walkerton PUC.

In this section, I will review two MOE programs that are relevant to the issue of the qualifications of the Koebel brothers: the operator certification program and the operator training program. Under the operator certification program, Stan and Frank Koebel were certified as water distribution class 3 operators⁵¹ at the time of the outbreak. They had obtained their certification through a “grandparenting” scheme based solely on their experience. They were not required to take any training courses or to pass any examinations in order to be certified. Nonetheless, I conclude that given the standards of the day and the practical considerations that arise when introducing a certification program, it was not unreasonable for the MOE to use grandparenting when introducing mandatory certification in 1993, provided that adequate mandatory training requirements existed for grandparented operators.

After 1993, under the operator training program, the MOE required 40 hours of training per year for each certified operator. Stan and Frank Koebel did not take the required amount of training, and the training they did take did not adequately address drinking water safety. I am satisfied that the 40-hour requirement should have been more clearly focused on drinking water safety issues and, in the case of Walkerton, more strictly enforced.

It is difficult to say whether Stan and Frank Koebel would have altered their improper operating practices if they had received appropriate training. However, I can say that proper training would have reduced the likelihood that they would have continued those improper practices.

9.5.2 The Walkerton PUC Employees

I have described the qualifications of Stan and Frank Koebel in Chapter 5 of this report, which deals with the role of the operators. I will briefly review their backgrounds here.

⁵¹ Throughout this report, I refer to this licence as a “water operator’s licence” or “operator’s licence.”

9.5.2.1 *Stan Koebel*

Stan Koebel began his employment with the Walkerton PUC when he was 19 years old, having completed Grade 11. He started as a labourer in 1972 and, after completing an apprenticeship and an examination, was a hydro lineman from 1976 to 1980. In 1981, he was appointed to the position of foreman, and in 1988, upon the retirement of his predecessor, Ian McLeod, he became general manager.

Stan Koebel described his initial training in how to operate a water system as “basically seeing and hands on.” He never completed a course in which he had to pass an examination in order to qualify as an operator of a water system. He first obtained certification in 1988, through a voluntary grandparenting scheme.

In the mid-1990s, the MOE increased the classification of the Walkerton water distribution system from a level 2 to a level 3 classification. The 1995 inspection report indicated that, although the system had been upgraded to level 3, operating staff had not yet been upgraded to that level. Mr. Koebel subsequently applied for upgrading, and the MOE upgraded his designation in 1996 to a class 3 operator.⁵² Throughout all of this, the MOE did not require him to take any courses or examinations.

As of May 2000, Mr. Koebel held a class 3 operator’s licence with an expiry date of February 2002. No one had ever interviewed Mr. Koebel about his level of knowledge or competence. He believed that the Walkerton water sources were “okay,” and he regularly drank unchlorinated water. He did not believe that the water needed to be treated to the extent required by the MOE, that is, having a minimum total chlorine residual 0.5 mg/L after 15 minutes of contact time. Although he had received some information on chlorination, his comfort about the safety of the Walkerton water resulted, in part, from his superficial knowledge of both the threat posed by potential contaminants and the importance of disinfection by chlorine.

I recognize that Mr. Koebel stood to benefit at the Inquiry by taking the position he was not qualified to operate the Walkerton water system and by attempting to minimize his level of knowledge about the risks that his practices posed to his community. One cannot excuse his repeated failures to do what he was told. However, I am satisfied that his improper practices were not

⁵² This designation was as a class 3 distribution operator, as opposed to treatment operator.

the result of any malice or ill will. He did not properly appreciate the risks that his practices posed, nor did he understand the necessity of chlorination and monitoring.

9.5.2.2 *Frank Koebel*

Frank Koebel was hired by the Walkerton PUC in 1975, when he was 17 years old. His older brother, Stan, was already working there. Frank Koebel had completed Grade 12 and had attended trade school to learn to be an auto mechanic. He never took any courses related to the operation of a water system. He was given the opportunity to do so, but felt that he was too busy and could not take the time off. Over the years, he did attend between 13 and 20 water systems conferences sponsored by the Georgian Bay Waterworks Association.

When Stan Koebel became the PUC's general manager in 1988, he recommended that Frank Koebel replace him as foreman, which he did. Like his brother, Frank Koebel first obtained a waterworks operator licence in 1988 through a grandparenting process, without taking a course or passing an examination. After the Walkerton water system was upgraded, his certification was upgraded to a class 3 operator's licence⁵³ without any training or examination. As of May 2000, Frank Koebel held a class 3 licence that was due to expire in February 2002.

Since becoming the PUC's foreman in 1988, Frank Koebel had spent about 25% of his time dealing with water and the other 75% dealing with electricity. He testified that he did not think he had sufficient technical training to do his job and that he should have been more aware of the regulations and requirements. The PUC did possess manuals relating to water systems, but Frank never read them, nor did he ever see any other PUC employees reading them. He thought that Walkerton had good-quality water, and if the chlorinator broke down for a short period of time, "it wasn't a major issue."

⁵³ As with Stan Koebel, this was a licence for a class 3 distribution operator, as opposed to treatment operator.

9.5.2.3 Other PUC Employees

Robert McKay was first employed in Walkerton in May 1998. While employed at the PUC, he held a journeyman lineman certificate and a water operator's class 1 licence.⁵⁴ He had obtained the latter designation in 1991 through the grandparenting process while employed by another community's PUC.

Mr. McKay was employed almost exclusively on the electrical side of the Walkerton PUC. He rarely collected water samples from any of the wells in Walkerton, nor did he see water test results while he was employed by the PUC. He was unaware of the PUC's improper treatment and monitoring practices. None of his actions as a PUC employee are connected to the outbreak of May 2000.

Allan Buckle was hired by the PUC in 1992 as a maintenance worker. He did not have a waterworks operator's licence. With the approval of Stan and Frank Koebel, he read the chlorine residuals at the wells in Walkerton, made entries on the daily operating sheets, and took samples for laboratory tests. Frank Koebel had shown Mr. Buckle how to take water samples, check the meters, and complete the daily operating sheets. When Frank was busy with other tasks, he permitted Mr. Buckle to check the wells. Because he did not have an operator's licence, Mr. Buckle should not have been taking water samples and measuring chlorine residuals. However, Stan and Frank Koebel bear responsibility for involving an uncertified operator in these tasks.

9.5.3 The Grandparenting of Water Operators

The certification of water operators began in Ontario in 1987 with a voluntary certification program. The purpose of certifying water operators was to protect Ontario's drinking water by ensuring that operators had the required knowledge and experience to perform their duties, by promoting professionalism, and by establishing and maintaining operator standards.

There was a "grandparenting" provision for operators, meaning that those who had experience and education could be certified without meeting the examination requirements. The educational requirement for class 1 and 2 operators was 12 years of elementary and secondary school education; there was no

⁵⁴ Mr. McKay's licence was for both distribution and treatment.

requirement for training. Relevant work experience could be substituted for education.

The deadline for applying for a grandparented voluntary licence was October 1990. Stan Koebel applied for his certification⁵⁵ in February 1988. His application indicates that he had completed 12 years of school education and 15 years of related employment experience. Although Mr. Koebel signed the application, it does not appear that he was the person who actually filled out the form. He testified that it was Ian McLeod's idea that he apply for grandparenting. In 1988, he was granted certification as a class 2 operator for a three-year period.

Stan Koebel testified that he had had only 11 years of education, rather than the required 12, when he applied for certification. The general practice in such cases would be to refer the application to an advisory board to decide whether his experience could be substituted for the minimum educational requirement. My belief is that Stan Koebel would have been grandparented even if he had accurately stated in his application that he had 11 years of education.

Frank Koebel also applied for voluntary certification in February 1988. He had 12 years of elementary and secondary school, 4 years of trade school, and 10 years of related employment experience. Like his brother, he was granted certification as a class 2 operator in 1988.

Operators who were certified through the voluntary grandparenting process did not have to meet any additional requirements to renew their licences.

Certification was made mandatory for water operators in June 1993 under Ontario Regulation 435/93. When this requirement was introduced, operators were given a second opportunity to apply for grandparenting. The deadline for doing so was February 1, 1994. Stan and Frank Koebel both applied for and received grandparented certification.⁵⁶

Under Ontario Regulation 435/93, grandparented licences expire after three years, within which time the operator must pass an examination. In practice, however, the regulation has been applied in such a way that people who were

⁵⁵ "Certification" refers to the Ontario Water and Waste Water Utility Operator's Certification.

⁵⁶ When an operator applied for grandparenting, employers were required to sign the applications to confirm the operator's length of employment. However, they were not asked to comment on the ability or knowledge of the employee, and the MOE did not check references.

grandparented under the voluntary program, such as Stan and Frank Koebel, are not subject to the requirement to upgrade, prior to renewal, by taking an examination.⁵⁷

Although I will be making recommendations in the Part 2 report of this Inquiry to strengthen Ontario's certification program, it should be noted that Ontario was, and still is, ahead of many other provinces in this area. In 1993, Ontario was one of two provinces, along with Alberta, that required the mandatory certification of operators.⁵⁸

Jurisdictions that have made certification mandatory have used grandparenting as a transitional measure. Alberta used grandparenting when it introduced mandatory certification in 1993. Further, all of the other provinces except Quebec have used grandparenting to some degree in their voluntary certification programs. In the United States, most states use grandparenting as part of their certification programs. Indeed, the Inquiry heard evidence that many U.S. states have legislated the requirement for grandparenting in order to prevent current employees from being negatively affected by certification.

One of the main purposes of the 1987 and 1993 grandparenting provisions was to ensure that experienced operators would maintain their employment.⁵⁹ Another purpose was to ensure that there would be enough experienced licenced operators to meet Ontario's needs. Introducing mandatory certification without grandparenting might have created a serious shortage of water operators. Quite reasonably, transition to a program of full testing was required. As of 2001, approximately 75% of operators had obtained their certification by passing examinations.

It appears that municipalities are becoming more discriminating in their hiring practices. Max Christie, the president of the Ontario Municipal Waterworks Association and an experienced water system manager, testified that he could not think of a municipality that would now hire an operator who did

⁵⁷ Those who were not grandparented under the voluntary program could be grandparented under the regulation for a period of three years; after that, however, they were required to pass an examination for renewal. If they failed, their licence would be downgraded by one class.

⁵⁸ All other provinces except Quebec had a voluntary certification program in place. Since that time, Nova Scotia has introduced mandatory certification programs. Saskatchewan has passed legislation that will require certification over a transition period of five years, and Quebec is also moving in that direction.

⁵⁹ The Canadian Union of Public Employees and the Ontario Public Service Employees' Union were both in favour of grandparenting to protect the seniority rights of employees.

not have at least two years of postsecondary education. Further, both he and Brian Gildner, a former MOE policy adviser, testified that certification by examination is only one way to ensure that operators are competent. It provides the owner of the water system with a measure of the operator's competence in terms of his or her knowledge of the theory behind the operation of a water system.

In the result, I am satisfied that the MOE's use of grandparenting as a means of obtaining certification was consistent with and, indeed, ahead of the practices of many other jurisdictions. Ontario has moved more quickly than most provinces toward mandatory certification and toward requiring training and examination for all operators who are being certified. That evolutionary process should continue.

Although one of the consequences of granting Stan and Frank Koebel certification without a training and examination requirement may have been that they had less knowledge than they should have had, I do not think that it is reasonable to expect the Province of Ontario to have moved toward mandatory training and testing prior to certification any more quickly than it did. However, it was important that the grandparenting process for certification be accompanied by sufficient training for water operators after they obtained certification.

9.5.4 The Training of Water Operators

For years, the MOE offered training courses to water operators. By 1999, it no longer offered such courses. The important issue, however, is not whether the MOE provided the training but whether it took adequate steps to ensure that operators had proper training from some source. For completeness, I will begin by briefly describing the history of the MOE's involvement in the delivery of training programs.

The predecessor to the MOE, the Ontario Water Resources Commission, first offered training to water operators in 1959. In 1970, the MOE created a training centre in Brampton. Partly as a result of voluntary certification measures in 1987, the MOE funded the establishment of the Ontario Environmental Training Consortium (OETC). The aim of the OETC was to provide training for operators across the province, through community colleges. At the same

time, the MOE maintained a training program through its Brampton training centre.

Until 1990, OETC courses were heavily subsidized by the MOE. Participants were charged about \$60 for a course that actually cost \$400–\$500 per week. In 1990, to ensure that the community colleges could offer these courses in a competitive manner, the MOE subsidy for the training of operators was removed and the full price was charged. This had two effects: it encouraged larger municipalities to train in-house and encouraged private sector trainers to enter the market.

Ontario Regulation 435/93, enacted in 1993, made certification mandatory and required 40 hours of continuing education each year for water operators. Between 1990 and 1995, the OETC offered courses using MOE materials through 16 community colleges. In 1995, however, it ceased coordinating operator training, and training was transferred to the Ontario Clean Water Agency (OCWA). Then, in 1999, OCWA restricted training to its own staff.

The role of the MOE is now limited to advertising available courses. It evaluates courses very generally, to see whether they have the correct type of content and duration to assist with certification examinations, but the MOE does not specifically approve or accredit courses.

Between 1974 and 1995, more than 17,600 people participated in the MOE's training courses through its training centre in Brampton. Also, from 1990 to 1995, an additional 1,450 people participated in OETC courses offered through community colleges.

The elimination of MOE training courses was no doubt a part of the budget and staff reductions that took place within the MOE in the 1990s. I discuss these in detail in Chapter 11 of this report.

When the price of courses increased, it became difficult for smaller communities to pay for training. When certification became mandatory in 1993, these communities focused on certification courses for their operators rather than on process-related training. Access to training was still a problem for operators in remote communities because of the cost of the courses, the expenses of travel, and the fact that there might not have been any replacement staff to operate the water system while they attended courses.

According to the MOE files, no operators from the Walkerton PUC attended any of the ministry's courses. This was highly unusual, because it was common for most PUC employees and municipal employees to attend MOE training.

Although Stan Koebel obtained certification under the voluntary certification program, he was unaware that the OETC offered courses to assist with certification or that until 1990 the MOE offered courses at a subsidized rate to operators. There were, however, other training opportunities available, and the important issue is not whether the MOE provided the training itself but whether, as regulator, it took steps to ensure that water operators like Stan and Frank Koebel received adequate training.

9.5.5 Training Requirements Under Ontario Regulation 435/93

In 1993, when the MOE provided for mandatory certification but allowed for a grandparenting regime, the need for operator training became readily apparent, particularly for grandparented operators. It was especially important that the training focus on issues relating to water safety. For grandparented operators, mandatory training could ameliorate some of the concerns that might arise from the lack of a testing requirement.

Ontario Regulation 435/93 requires water operators to have 40 hours of continuing education per year and requires that records be kept detailing such training. I do not think that the amount of training required – 40 hours – is necessarily deficient. However, I find that two problems exist with the training requirements in relation to the operators in Walkerton. The first problem is the failure to require training that is sufficiently focused on water safety issues. The second is the MOE's unwillingness to enforce compliance with the training requirements under the regulation.

Although there may be some benefit in requiring training for other matters, the main focus of the mandatory training program should have been on the protection of public health. However, the regulation does not clearly set out what constitutes training for the purposes of the required 40 hours per year. As examples, the regulation states that the training may include training in new or revised operating procedures, reviews of existing operating procedures, safety training, and studies of information and technical skills related to environmental subjects.⁶⁰

⁶⁰ O. Reg. 435/93, s.17(2).

There is no requirement for the training to focus on technical issues involving water treatment or distribution, or on human health issues such as the significance of pathogens in drinking water. The Inquiry heard testimony from Brian Gildner that if the entire 40 hours of training had been spent entirely on workplace safety issues, that would not have been a contravention of the regulation. Further, Max Christie testified that there should be more definitive guidance in the legislation concerning what is expected.

Importantly, in relation to the events in Walkerton, after the 1994 ODWO amendment requiring continuous monitors for groundwater that is under the direct influence of surface water, there was no requirement for training with respect to assessing the vulnerability of water sources or understanding the need for continuous chlorine residual and turbidity monitoring.

9.5.6 The Training of Walkerton PUC Employees

Stan Koebel testified that he was not aware of specific criteria regarding what constituted training for purposes of Ontario Regulation 435/93. But his interpretation of training seemed to stretch common sense. For example, after the 1998 inspection, he included in his training log the time that he spent during the inspection with Ms. Zillinger (recording six hours, although he spent only two hours with her). He referred to this as “MOE updates.” Mr. Koebel also included time he spent explaining the water system to a new employee as training, both for himself and the new employee. Had the criteria for training been more specific and more focused on water safety issues, it would have been more difficult for Stan Koebel to adopt such a liberal interpretation of training.

The second problem with the training requirements is that the MOE did not strictly enforce compliance with O. Reg. 435/93. Compliance was especially important in the case of certified operators like Stan and Frank Koebel, who had never been tested. Further, in both of the MOE inspections that took place after the regulation came into force, the Walkerton PUC was found to be violating the regulation. In fact, the PUC’s “training log” was created after the 1998 inspection.

Section 17 of O. Reg. 435/93 requires the maintenance of records documenting compliance with the requirement of 40 hours of annual operator training.

At the time of the 1998 inspection, Ms. Zillinger found that the Walkerton PUC did not have a record demonstrating that such training had been provided. There was no follow-up; nor was there an inquiry into whether the PUC employees had completed the required 40 hours of training.

Because the Walkerton PUC did not maintain accurate training logs as required by O. Reg. 435/93, it is impossible now to determine how much training Stan and Frank Koebel underwent between 1993 and 2000 or to determine the exact nature of that training. The regulation stipulates that they should each have taken at least 240 hours of training by the year 2000. I am satisfied from the evidence that neither of them took this amount of training, and I am also satisfied that a great deal of what they considered to be training was not focused on water safety issues. Stan and Frank Koebel are primarily responsible for their failure to take the required amount of training. However, the MOE's failure to require training that was specifically focused on water safety, as well as its failure to enforce the training requirements in O. Reg. 435/93, reinforced the Koebels' lax approach to training.

Although more training focused on water safety would certainly have been preferable, it is difficult to determine whether Stan and Frank Koebel would have altered their practices if they had received that training. What I can say is that if they had received more training directed to important issues concerning water safety, the likelihood that they would have continued their improper practices would have been reduced.

9.5.7 Recommendations

In the Part 2 report of this Inquiry, I will be making extensive recommendations with respect to the operation of municipal water systems. I will include in those recommendations the following, which emerge from the findings I have made above.

Recommendation 20: The government should require all water system operators, including those who now hold certificates voluntarily obtained through the grandparenting process, to become certified through examination within two years, and to be periodically recertified.

Recommendation 21: The materials for water operator course examinations and continuing education courses should emphasize, in addition to the technical requirements necessary for performing the functions of each class of operator, the gravity of the public health risks associated with a failure to treat and/or monitor drinking water properly, the need to seek appropriate assistance when such risks are identified, and the rationale for and importance of regulatory measures designed to prevent or identify those public health risks.

Recommendation 22: The government should amend Ontario Regulation 435/93 to define “training” clearly, for the purposes of the 40 hours of annual mandatory training, with an emphasis on the subject matter described in Recommendation 21.

Recommendation 23: The government should proceed with the proposed requirement that operators undertake 36 hours of MOE-approved training every three years as a condition of certification or renewal. Such courses should include training in emerging issues in water treatment and pathogen risks, emergency and contingency planning, the gravity of the public health risks associated with a failure to treat and/or monitor drinking water properly, the need to seek appropriate assistance when such risks are identified, and the rationale for and importance of regulatory measures designed to prevent or identify those public health risks.

Recommendation 24: The MOE should inspect municipal water systems regularly for compliance with Ontario Regulation 435/93, enforce the regulation strictly, and follow up when non-compliance is found in order to ensure that operators meet certification and training standards.

9.6 The Accessibility of Information

9.6.1 Ministry of the Environment Information Systems

I have discussed above the MOE’s failure on several occasions in the 1990s to take note of the vulnerability of Well 5 to surface contamination and to use that information in making decisions about what to do at Walkerton. Well 5’s vulnerability was well documented in MOE files, dating from 1978 to 1982. On several occasions in the 1990s, it was important to have access to this information in order to make fully informed decisions about current

circumstances and the proper actions to be taken. I refer here to the three inspections of the Walkerton water system, the several occasions when environmental officers received adverse water quality reports showing *E. coli* in the treated water at Well 5 and in the distribution system, and the situation in 1994, after the ODWO was amended, at which point a systematic review of water sources should have been undertaken. On occasions like these, it was important for the MOE to be able to properly assess contamination threats in order to determine whether further steps needed to be taken to ensure the safety of the water.

None of the MOE personnel with responsibility for Walkerton in the 1990s reviewed the information in the ministry's files about the vulnerability of Well 5 to surface contamination. There were several sources of this information. Located in the Approvals Branch file for Well 5 were the PUC's application to construct well 5, the hydrogeologist's report supporting the application, MOE correspondence and memoranda, and minutes of meetings between the MOE and the PUC. Relevant information also existed in the 1979 and 1980 inspection reports and in a letter, dated May 21, 1982, from Willard Page of the MOE's Owen Sound office to the Walkerton PUC.

However, by the mid-1990s, when the water quality at Walkerton began to show signs of deterioration, these documents (or copies of them) were no longer being filed or stored in a manner that was readily accessible to those who were responsible for overseeing the Walkerton water facility.

In 1994, the MOE's Owen Sound office received a directive from the MOE's Records Branch in Toronto concerning the destruction of documents in the office. As a result, many pre-1986 documents were either shredded or archived at a location away from the office. Thus, from the mid-1990s onward, the Owen Sound office's file on Walkerton – the "Walkerton water file" – included the Certificates of Approval and the Permits to Take Water for the three operating wells, copies of the most recent inspection reports, and all adverse test results after 1995.

Four consultants' reports relating to the Walkerton water system were kept in the MOE's Owen Sound office in various places, separate from the Walkerton water file. One report – the 1992 needs study by B.M. Ross and Associates Ltd. – was kept on a shelf in the filing room with other consultants' reports. The other three – including the very important 1978 Ian D. Wilson Associates report on Well 5 ("the Wilson report") – were in the storage area in another

part of the building. The evidence showed that none of the people who were responsible for overseeing the Walkerton system during the mid- and late 1990s had easy access to anything other than the Walkerton water file and the 1992 needs study.

The MOE did not maintain a computerized information management system designed to include information about the quality of source water for municipal water systems. The computerized information system to which MOE personnel, like those responsible for overseeing Walkerton, would routinely have access was the Occurrence Reporting Information System (ORIS). The ORIS was designed to keep track of occurrence reports that were ordinarily prepared to record occasions when water facility operators were not complying with regulations or other legally binding obligations, or to record instances when matters were referred to the MOE's Investigation and Enforcement Branch. Although a report of this nature might refer to the quality of source water, by no means would this always be the case. In the case of Walkerton, the ORIS materials no reference to the vulnerability of Well 5 as described in the 1978 hydrogeology report.

9.6.2 The Impact on the Events of May 2000

The upshot of all of this is that MOE personnel such as Philip Bye, the district supervisor; Michelle Zillinger, the 1998 inspector; and the other environmental officers who dealt with Walkerton did not have ready access to, and did not refer to, the historical information about the vulnerability of Well 5. Knowledge about the source and quality of the water supplying a municipal water system and about the types of contamination threats to which it may be susceptible is critical to determining the proper treatment, monitoring, and microbiological testing requirements for a facility. MOE personnel who are confronted with test results that reveal deteriorating water quality at a particular well may be called upon to determine whether the treatment and monitoring programs used by the well's operator are adequate. To do so, they require as much information as possible about the quality of the water source.

The information about the vulnerability of Well 5 should not have been permitted to disappear from institutional memory. All the MOE witnesses who were asked considered this information to have been important in making effective decisions about Well 5 when the quality of water began to deteriorate

in the mid- to late 1990s. The information should therefore have been readily accessible to the MOE personnel who dealt with Walkerton.

The MOE's failure to have a proper information storage and retrieval system contributed to several of the failures in the oversight programs that I have described above. Had there been a proper information system, the Approvals Branch could have more easily identified Well 5 as a candidate for continuous chlorine residual and turbidity monitoring. Furthermore, the MOE's inspections and abatement programs would have been more likely to identify the seriousness of the problems at Walkerton and to initiate the appropriate corrective action.

9.6.3 Recommendation

As a result of the above, I would make the following recommendation:

Recommendation 25: The MOE should proceed expeditiously to complete the design and implementation of the management information system now under development (that is, the Integrated Development System, or IDS). That system should include the capacity for the creation and maintenance over time, in electronic form, of water system operator profiles consisting of any hydrogeological or other consultant's report relating to the water system; relevant operator chlorine residual measurements; past inspection reports; drinking water test results for a reasonable period; all operator responses to inspection reports; and all applicable Certificates of Approval, Permits to Take Water (PTTW), Field and Director's Orders, occurrence reports, and information concerning the safety and security of public water sources and supplies.

9.7 The Training of Ministry Personnel

9.7.1 The Lack of Adequate Training

Evidence at the Inquiry showed that the MOE personnel in the Owen Sound office who dealt with Walkerton were unaware of certain matters that were essential to carrying out their responsibilities in overseeing the Walkerton water facility. For example, Philip Bye, the Owen Sound district supervisor; Michelle Zillinger, the 1998 inspector; and John Earl and Larry Struthers, the two other

environmental officers who dealt with Walkerton, were all unaware that *E. coli* was potentially lethal. It would seem essential that those who have the responsibility to oversee communal water systems and who might be required to direct or coordinate responses to adverse water quality reports should fully appreciate the nature and potential consequences of important threats to water safety and human health.

In addition, some of the environmental officers were unaware of, or at least unclear about, certain provisions of the ODWO – the government guideline they were responsible for enforcing. In July 1999, for instance, Mr. Earl did not know he was required by the ODWO to notify the Bruce-Grey-Owen Sound Health Unit of the presence of *E. coli* in the Walkerton water system.

Moreover, there were differing views about the interpretation of some aspects of section 4.1.2 of the ODWO, which defined indicators of unsafe water quality. Further, none of those who had responsibility for the Walkerton water system followed the procedures specified in section 4.1.4, which directs the inspection of sampling sites after a notification of indications of “deteriorating” water quality. They also did not follow the procedures specified in section 4.1.3.1, which deals with taking special samples after a notification of indications of “unsafe” water quality. There was evidence that it was not the general practice of MOE personnel to take either of these steps. What this reveals, it seems to me, is the lack of a coordinated ministry-wide training program to address the interpretation and application of the drinking water guidelines.

The failures of MOE personnel to have a uniform understanding of certain provisions specified in the ODWO, or to follow other provisions, are problems that should have been addressed through appropriate training.

I am careful here to point to a lack of training, rather than to the failings of certain individuals. I am confident that if the individuals involved had received the proper training about the health risks associated with *E. coli* or about the content and interpretation of the ODWO, they would have used that information appropriately in carrying out their duties.

9.7.2 The Impact on the Events of May 2000

The effect, if any, of this lack of training on what happened in Walkerton in May 2000 is difficult to measure. I am satisfied that it did not have any direct effect. At most, it may have had an impact on some of the decisions affecting Walkerton that were made in the MOE's inspections and abatement programs.

I have discussed those decisions in detail elsewhere in this report, so in this section I will set out only my conclusions about the lack of training. First, if Philip Bye had known that *E. coli* is potentially lethal, it is more likely that he either would have issued a Director's Order in response to the 1998 inspection report or would have ensured that the 1998 inspection was properly followed up. However, it is by no means certain that knowing this one additional fact would have led him to take either of these steps.

Second, John Earl's failure to notify the Bruce-Grey-Owen Sound Health Unit of the adverse results showing the presence of *E. coli* in the Walkerton water system in July 1999 had no effect on the actions of the health unit in responding to the crisis in May 2000. I accept the evidence that even if the health unit had been informed of that result, Dr. Murray McQuigge and his staff would not have issued the boil water advisory any earlier than they did.

Third, even if the environmental officers who received results indicating deteriorating water quality had then inspected the sampling sites as specified in the ODWO, it is unlikely that they would have become aware of the two operational problems that contributed to the outbreak: the lack of continuous monitors at Well 5 and the improper treatment and monitoring practices of the PUC. Moreover, because the MOE did not in practice perform such inspections, additional training might have reinforced that approach instead of leading to additional inspections.

Fourth, the MOE's failure to insist that PUC operators follow the special sampling procedures specified for use when *unsafe* water quality is indicated falls into the same category as the immediately preceding conclusion, which relates to the less serious situation of *deteriorating* water quality. Although it is surprising, given the clear language of section 4.1.3.1 of the ODWO, that MOE personnel did not require water operators to take special samples, it is nevertheless most unlikely that even if MOE personnel had required the Walkerton PUC to follow the special sampling procedures, there would have been any effect on the outbreak in May 2000. Further, given the ministry-wide practice

of not requiring operators to follow the special sampling procedures, additional training might have led the MOE to question the utility of the provision and to decide to delete the requirements so that the guideline would comply with MOE practices.

Finally, although the environmental officers' differing interpretations of some ODWO provisions is a matter of serious concern, I do not conclude that this confusion led to any of the failures of oversight functions that affected the events of May 2000.

All of that said, it is necessary not to lose sight of the importance of training MOE personnel. The overall approach has been for MOE staff in local offices to act as generalists who can work on the ministry's wide range of program areas. As a result, environmental officers do not normally have specialized expertise in issues relating to drinking water when they begin to work on the MOE's communal water program. For this reason, regular training for MOE staff in technical and regulatory issues that relate to drinking water is very important.

I will be addressing the issue of training in depth in the Part 2 report of this Inquiry. However, because of its importance, I think it is useful to briefly summarize my findings about the deficiencies in the present MOE training program and to set out recommendations that flow from those findings.

9.7.3 The Trends in the Ministry's Training Program

During the 1990s, two trends emerged in the training program for MOE personnel that need to be addressed. First, there was a substantial reduction in the MOE's training budget. Second, there was a reduction of training in technical areas.

The first trend shows that the MOE's training expenditures have substantially eroded over the past decade. MOE training expenditures were reduced by

approximately 30% in the five-year period from 1995–96 to 1999–2000 alone.⁶¹ It can also be seen in the reductions to the MOE's "learning ratio."⁶² The learning ratio declined from 0.92% in 1989–90 to 0.36% in 1993–94. It climbed back up to 0.95% in 1997–98 and to 1.17% in 1999–2000; however, this resulted from the significant staff reductions in 1996 and 1997, rather than from any increase in training programs.

The second trend, the shift away from technical training, was accompanied by a move toward management and administrative training.⁶³ On several occasions, MOE documents expressed concern about the lack of technical training. Most recently, an MOE human resources plan in 2000–2001⁶⁴ reported that the MOE has difficulties attracting and retaining skilled personnel in a number of areas. Science professionals were identified as a priority for the next few years. As such, special efforts should be made to recruit, develop, and retain individuals in designated science positions.⁶⁵ Technical training within the MOE is clearly an essential part of ensuring that an adequate base of technical knowledge exists in the ministry.

The MOE's human resources plan recognized that the MOE competes with other government and private sector organizations to retain technical staff. Skilled personnel often leave the MOE after they have developed their knowledge and expertise. Also, the demographics of MOE staffing indicate that many technical specialists will retire within the next few years.

⁶¹ Specifically, the combined total of Actual Salaries (includes all salaries paid to OPS training staff) and Actual Other Direct Operating Expenditures (includes all OPS training costs other than salaries) fell from \$1,021,200 to \$698,700. (The time periods indicated reflect fiscal years.) Three factors contributed to the significant reductions: (1) there were fewer employees after 1997–98; (2) one position was transferred to the Shared Services Bureau in 1999; and (3) the basic training of water system operators was transferred to OCWA in 1995.

⁶² The "learning ratio" is the amount spent by the MOE on staff development as a proportion of total salaries and wages.

⁶³ The aim was to help career development with courses on career counselling and résumé-writing.

⁶⁴ MOE, "Human Resources Business Plan and Learning Plan for Fiscal Year 2000–2001."

⁶⁵ According to the MOE human resources plan, positions with a strong emphasis on science demand skills that, combined with advanced scientific education, require extensive on-the-job experience and knowledge that is gained only through time and investment in learning.

9.7.4 Recommendations

Recommendation 26: A full needs assessment for training should be undertaken for MOE technical staff, and a component of that assessment should focus on communal drinking water.

Recommendation 27: The MOE, on the basis of the needs assessment, should develop and maintain both introductory and advanced mandatory courses for environmental officers pertaining to communal drinking water systems. These courses should emphasize science and technology, including all matters that could present a risk to public health and safety; emerging pathogen risks; existing, new, and emerging treatment technologies; the limits of particular technologies; and the proper interpretation and application of government regulations, guidelines, and policies.

Recommendation 28: The MOE should devote sufficient resources to technical training to allow the ministry to meet the challenges outlined in its "Human Resources Business Plan and Learning Plan for Fiscal Year 2000–2001."

9.8 The Ontario Drinking Water Objectives and the Chlorination Bulletin

In exercising its regulatory and oversight responsibilities for municipal water systems, the MOE developed and regularly applied two sets of guidelines or policies: the Ontario Drinking Water Objectives (ODWO) and the Chlorination Bulletin.

The ODWO sets out matters critical to the production and delivery of safe drinking water, including the maximum acceptable concentrations in drinking water of substances that could threaten human health, the method and frequency of microbiological testing, the corrective steps to be taken when samples exceed certain limits, and the monitoring requirements for various types of water sources.⁶⁶

⁶⁶ The ODWO also includes a notification protocol to be followed when indicators of unsafe water quality are found. I address this issue in detail in Chapter 10 of this report.

The Chlorination Bulletin contains guidelines for the disinfection of potable water and distribution systems, including detailed information about when disinfection is required, minimum chlorine residuals, chlorination equipment, and monitoring.⁶⁷ The Chlorination Bulletin makes clear that disinfection to kill pathogenic organisms is the most important step in any water treatment process.

The MOE's use of guidelines rather than legally binding regulations to set out the requirements for producing safe drinking water had two possible effects on the events in Walkerton. First was the effect on the PUC operators, particularly Stan Koebel. As I point out above, Stan Koebel routinely failed to follow many of the operational requirements set out in the ODWO and the Chlorination Bulletin. The very nature of a "guideline" implies that it includes practices and standards that are recommended and encouraged but that are not mandatory in all situations.

Stan and Frank Koebel, who genuinely believed that the untreated water in Walkerton was safe, would no doubt be more comfortable about not following a guideline than about not following a legally binding regulation. That said, it must be recognized that the MOE repeatedly informed Stan Koebel of the importance of complying with the guidelines, and still he failed to do so. While it is far from certain that the presence of a regulation would have made a difference to the way in which Stan Koebel operated the water system, it is fair to say that he would have been more likely to follow a legally binding requirement than a guideline.

The second possible effect of the use of guidelines is that it may have affected the MOE's decisions with respect to invoking mandatory abatement measures and conducting a follow-up to the 1998 inspection. Had the Walkerton PUC been found to be in non-compliance with a legally enforceable regulation, as opposed to non-conformance with a guideline, it is more likely that the MOE would have taken stronger measures to ensure compliance, including the use of enforcement proceedings and further inspections. If the MOE had followed either of these courses of action, it would likely have detected the improper practices of the Walkerton PUC and taken steps to ensure that they were corrected.

⁶⁷ The provisions of the ODWO and the Chlorination Bulletin are more fully discussed in Chapter 4 of this report.

It is important to note, however, that before May 2000 there was no initiative, or even suggestion, either from within the MOE or externally, to make a regulation mandating the treatment, monitoring, and testing practices and standards found in the ODWO and Chlorination Bulletin. Although the use of a regulation to address some or all of the matters in the ODWO and Chlorination Bulletin seems like a sensible approach, the culture that prevailed in the MOE, and among those who managed and operated the broader drinking water supply system, apparently did not recognize the advantages of such an approach.⁶⁸ For years, these matters were dealt with by way of guidelines. When it was thought that stronger measures were required, the MOE attached conditions to Certificates of Approval or issued a Director's Order. Both of these responses created legal obligations.

I am satisfied that the use of a regulation, as a general approach, is the most logical way to set out requirements for treating, monitoring, and testing drinking water. Because of the importance to public health, there is a significant benefit in making these requirements legally enforceable, where practical. Relying on conditions in Certificates of Approval and Director's Orders can be a haphazard way of addressing these matters. In August 2000, the government recognized the sense of changing its approach and passed Ontario Regulation 459/00, also known as the Drinking Water Protection Regulation, mandating requirements for treating, monitoring, and testing communal drinking water. I will be commenting on the adequacy of this new regulation extensively in the Part 2 report of this Inquiry.

The evidence disclosed a number of poorly drafted and confusing provisions in the ODWO and the Chlorination Bulletin. Here I refer to the lack of clarity in section 4.1.2 of the ODWO about whether the samples referred to include treated water samples, the uncertainty about the inspection required under section 4.1.4 of the ODWO when conditions of deteriorating water were detected, the difference between the corrective actions required by section 4.1.3 of the ODWO and section 5 of the Chlorination Bulletin, and the difference in the language used in the two guidelines to set out the requirements for continuous chlorine residual monitoring.

⁶⁸ In contrast, there was a strong push to include the notification protocol for adverse water quality results in a legally binding regulation after the privatization of water testing services in 1996. For reasons I develop in Chapter 10 of this report, it never took place.

Although these problems relating to the guidelines are unsettling, I do not find that any of them are linked, even indirectly, to the events in Walkerton.

9.9 The Ministry's Response to the Boil Water Advisory in May 2000

The MOE did not immediately initiate an investigation of the Walkerton water system on May 21 when it was informed that contaminated water was a suspected source of the illnesses and that the Bruce-Grey-Owen Sound Health Unit had issued a boil water advisory for Walkerton. Moreover, when the MOE learned of relevant information about the Walkerton system on May 22, after it had begun its investigation, it did not immediately pass on that information to the health unit. Although it would have been preferable for there to have been more immediate communication by the MOE to the health unit, I am satisfied that nothing turns on this failure. The boil water advisory had been issued on May 21, and it is unlikely that the health unit would have done anything differently if the MOE had provided the information sooner.⁶⁹ Despite reaching this conclusion, I think it useful to describe what, in fact, occurred.

In the early evening of May 21, Philip Bye, the area supervisor at the MOE's Owen Sound office, learned that a boil water advisory had been issued for Walkerton. He was informed by Clayton Wardell, director of health protection at the health unit, and the MOE's Spills Action Centre that two cases of *E. coli* infection and 50 cases of bloody diarrhea had occurred in the Walkerton community. Mr. Wardell reported that the health unit had issued a boil water advisory because contaminated water was suspected as the source of the illnesses. As previously mentioned, Mr. Bye was not aware that *E. coli* O157:H7 in the water system could result in deaths.

Mr. Bye told Mr. Wardell that his staff had not reported any unusual occurrences in relation to the Walkerton system. At the time, Mr. Bye did not recall the 1998 inspection report or the April 2000 sample results. Mr. Wardell indicated that the Walkerton PUC had reassured the health unit that the water was fine and that Stan Koebel had increased the chlorination and was flushing the water system.

⁶⁹ It is possible that, if the health unit had the adverse results of the May 15 samples on May 22, it would have disseminated the boil water advisory more broadly or make the language of the advisory stronger. However, I am not convinced on the evidence that either of these steps would have been taken.

Mr. Bye was aware on May 21 that John Earl was on duty as the emergency response officer for the MOE's Owen Sound office on the May long weekend. However, he decided that it was unnecessary to initiate an investigation of the Walkerton water system at that time because the health unit had issued a boil water advisory, the source of the illnesses was being investigated by the health unit, and the Walkerton PUC had increased the chlorine levels and was flushing the system.

The next morning, on May 22, at 10:00 a.m., Mr. Bye received another call from Mr. Wardell. He was informed that the number of *E. coli* cases had increased to 90 or 100 and that the health unit was reasonably certain the water supply was the source of the illnesses in Walkerton. Mr. Bye indicated that if the health unit required the assistance of the MOE, it should contact the Owen Sound office. Again, he did not initiate an investigation of the Walkerton system despite the increase in the number of individuals with *E. coli* and the health unit's reasonable certainty that contaminated water was responsible for the illnesses. It was only at noon on May 22 – after Dr. Murray McQuigge, the local Medical Officer of Health, stressed the urgency of an MOE investigation – that Mr. Bye requested the Spills Action Centre to dispatch Mr. Earl to the Walkerton PUC.

At 1:00 p.m., the Spills Action Centre instructed Mr. Earl to carry out “a field response to an incident of adverse water quality and disease outbreak in the town of Walkerton.” Mr. Earl was told that the health unit was concerned that the contamination of the water supply was responsible for gastrointestinal illness in Walkerton. He contacted his supervisor, Mr. Bye, who instructed him to speak to David Patterson of the health unit before his departure to the Walkerton PUC and to carry out the health unit's requests.

Mr. Earl was told by Mr. Patterson that an alarming number of cases had been reported to local hospitals and that the health unit had received confirmation of *E. coli* O157:H7 in stool samples. He was told that the health unit had investigated various food sources – community events, group picnics, and barbeques – but was unable to explain the sudden increase in gastrointestinal illness in Walkerton. Mr. Patterson explained that the water system was highly suspect and that the health unit had issued a boil water advisory the previous day. He also told Mr. Earl that the health unit had sent water samples to the Ministry of Health's laboratory in London for testing.

Mr. Patterson asked Mr. Earl to obtain a number of documents from the PUC for the previous two weeks, including bacteriological test results, chlorine residual levels at the wells and the distribution system, and water flow records. The health unit also sought documentation on the recent construction of the watermains, the disinfection of the mains, and any unusual events that had occurred in past weeks. Mr. Earl was asked to investigate breaches in the water system.

Stan Koebel met Mr. Earl at 4:00 p.m. on May 22 at the PUC office. At the request of Mr. Earl, Mr. Koebel provided several documents, including: a copy of Stan Koebel's notes that described his activities at the Walkerton PUC from May 19 to 22 and that confirmed he had been chlorinating and flushing the system throughout the weekend; the A&L Canada Laboratories report of May 5 indicating that positive coliforms were present in samples at Well 5 "raw" and "treated"; the A&L report of May 17, which indicated positive *E. coli* and positive total coliforms in samples labelled "Well 7 treated," "125 Durham Street," and "902 Yonge Street.";⁷⁰ and daily operating sheets for Wells 5 and 6 for May 2000. Mr. Koebel told Mr. Earl that the daily operating sheet for Well 7 was not available and that it would be provided the following day.⁷¹

At the time of Mr. Earl's visit, Wells 5 and 7 were operating. Mr. Koebel explained that a new chlorinator had recently been installed at Well 7. Mr. Earl asked whether there had been any unusual events in the past two weeks, and Mr. Koebel responded that the only significant event was an electrical storm that had "knocked out" Well 6. The heavy rains and flooding on the previous weekend were discussed in the context of the potential contamination of well water by surface water. Mr. Koebel said he had flushed the watermains at various locations during the May long weekend and had increased the chlorine residual levels at the wells.

Mr. Earl also discussed staff qualifications at the PUC with Stan Koebel. Mr. Koebel said that he and Frank Koebel were the primary operators of the water system and that they were certified. Occasionally, however, a PUC employee who was not licensed would monitor the system. Mr. Earl collected

⁷⁰ At Well 7 treated, there were more than 200 counts of total coliforms and *E. coli* per 100 mL, and a heterotrophic plate count of 600 per 1 mL.

⁷¹ Stan Koebel had not produced that sheet because he intended to "revise" it in order to conceal the fact that Well 7 had operated without chlorination.

raw and treated samples from Well 7 and a treated sample from the PUC office on 4 Park Street. He arranged to meet Mr. Koebel the following day.

Mr. Earl did not contact Mr. Patterson to advise him of the information he had obtained at the PUC. He knew the health unit had collected water samples in Walkerton and that it was awaiting results from the Ministry of Health's laboratory. Mr. Patterson had specifically asked Mr. Earl to obtain bacteriological test results from the previous two weeks. Mr. Earl learned from his review of the A&L Canada Laboratories report that there were high *E. coli* counts and total coliforms in water samples collected at the PUC on May 15. Yet Mr. Earl did not convey this information to the health unit. Nor, on May 22, did he inform his superior, Mr. Bye, of the results from A&L. Mr. Earl testified that he did not consider the situation to be urgent because a boil water advisory had been issued for the Walkerton community.

On the morning of May 23, Mr. Earl returned to the Walkerton PUC to collect additional information on the water system. He was provided with the daily operating sheets for Well 7 for May 2000, which, as discussed in Chapter 3, had been "revised" by Frank Koebel on his brother's instructions. Mr. Earl also received the annual water records from 1997. After receiving the documents, he collected samples from each of the wells and from the distribution system.

In reviewing the documents, Mr. Earl observed that none of the wells appeared to have operated between May 3 and May 9. He thought this was highly unusual. He also thought that the chlorine residual levels at Well 5, which were all entered as 0.75 mg/L on the daily operating sheets, were "questionable." Mr. Earl discussed the records, as well as his observations of the Walkerton system, with Mr. Bye. He indicated that there were *E. coli* and total coliforms in treated samples collected on May 15 and that Well 7 had been operating without disinfectant for several days. Mr. Earl also informed Mr. Bye that Stan Koebel had not disclosed this information to the health unit. Nevertheless, the records and information gathered by Mr. Earl on May 22 and May 23 were not provided by the MOE to the health unit.

On May 23, Mr. Bye was informed by Mr. Patterson of the results of the water samples analyzed by the Ministry of Health's laboratory; high counts of *E. coli* and total coliforms were found at a restaurant in Walkerton and at the Bruce County administration building. Mr. Bye was also told that it was clear from the epidemiological curve and patient mapping by health unit staff that

all areas of Walkerton had been affected by the gastrointestinal illness. Nevertheless, Mr. Bye did not disclose to Mr. Patterson the information that Mr. Earl had collected on the Walkerton water system. When asked at the Inquiry why he failed to do so, Mr. Bye replied: “I can only assume that over the weekend, in conversations that Mr. Earl had had with Mr. Patterson, that information had been relayed.”

At a meeting in the afternoon of May 23, attended by representatives of the Bruce-Grey-Owen Sound Health Unit, the MOE’s Owen Sound office, the Town of Walkerton, and the Municipality of Brockton, Mr. Bye announced that the MOE would conduct an investigation of the Walkerton system. He suggested that the chlorine levels in the water system be increased and that an independent authority assume control of the water system.

On May 25, the MOE issued a Field Order to the Municipality of Brockton pursuant to the *Ontario Water Resources Act*. It required the municipality to submit an action plan on the response to the contamination of the system, to prepare a report on the causes of the contamination, and to retain a qualified operating authority to oversee the operation and to ensure the safety of the drinking water. It was on this day that the Ontario Clean Water Agency assumed control of the Walkerton water system.

9.10 Ministry Organizational Chart



