



## CANADIAN INSTITUTE FOR ENVIRONMENTAL LAW & POLICY

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### B A C K G R O U N D E R

#### **Brief of Part One Report of the Walkerton Inquiry**

<http://www.walkertoninquiry.com/>

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#### **Chapter 1 Introduction**

##### **1.1 Background**

In May 2000, Walkerton's drinking water system became contaminated with deadly bacteria, primarily *Escherichia coli* O157:H7.1 Seven people died, and more than 2,300 became ill. The community was devastated. The government of Ontario responded by calling this Inquiry. I have divided. The mandate of the Inquiry into two parts. The first, which I refer to as Part 1, relates only to the events in Walkerton. It directs me to inquire into the circumstances that caused the outbreak – including, very importantly, the effect, if any, of government policies, procedures, and practices. The second, Part 2, goes beyond the events in Walkerton, directing me to look into other matters I consider necessary to ensure the safety of Ontario's drinking water. The overarching purpose of both parts of the Inquiry is to make findings and recommendations to ensure the safety of the water supply system in Ontario.

##### **1.2 Summary of Conclusions**

- Seven people died, and more than 2,300 became ill. Some people, particularly children, may endure lasting effects.
- The contaminants, largely *E. coli* O157:H7 and *Campylobacter jejuni*, entered the Walkerton system through Well 5 on or shortly after May 12,2000.
- The primary, if not the only, source of the contamination was manure that had been spread on a farm near Well 5. The owner of this farm followed proper practices and should not be faulted.

- The outbreak would have been prevented by the use of continuous chlorine residual and turbidity monitors at Well 5.
- The failure to use continuous monitors at Well 5 resulted from shortcomings in the approvals and inspections programs of the MOE. The Walkerton PUC operators lacked the training and expertise necessary either to identify the vulnerability of Well 5 to surface contamination or to understand the resulting need for continuous chlorine residual and turbidity monitors.
- The scope of the outbreak would very likely have been substantially reduced if the Walkerton PUC operators had measured chlorine residuals at Well 5 daily, as they should have, during the critical period when contamination was entering the system.
- For years, the PUC operators engaged in a host of improper operating practices, including failing to use adequate doses of chlorine, failing to monitor chlorine residuals daily, making false entries about residuals in daily operating records, and misstating the locations at which microbiological samples were taken. The operators knew that these practices were unacceptable and contrary to MOE guidelines and directives.
- The MOE's inspections program should have detected the Walkerton PUC's improper treatment and monitoring practices and ensured that those practices were corrected.
- The PUC commissioners were not aware of the improper treatment and monitoring practices of the PUC operators. However, those who were commissioners in 1998 failed to properly respond to an MOE inspection report that set out significant concerns about water quality and that identified several operating deficiencies at the PUC.
- On Friday, May 19, 2000, and on the days following, the PUC's general manager concealed from the Bruce-Grey-Owen Sound Health Unit and others the adverse test results from water samples taken on May 15. Had he disclosed either of these facts, the health unit would have issued a boil water advisory on May 19, and 300 to 400 illnesses would have been avoided.
- In responding to the outbreak, the health unit acted diligently and should not be faulted for failing to issue the boil water advisory before Sunday, May 21. However, some residents of Walkerton did not become aware of the boil water advisory on May 21. The advisory should have been more broadly disseminated.
- The provincial government's budget reductions led to the discontinuation of government laboratory testing services for municipalities in 1996. In implementing this decision, the government should have enacted a regulation mandating that testing laboratories immediately and directly notify both the MOE and the Medical Officer of Health about adverse results. Had the government done this, the boil water advisory would have been issued by May 19 at the latest, thereby preventing hundreds of illnesses.
- The provincial government's budget reductions made it less likely that the MOE would have identified both the need for continuous monitors at Well 5 and the improper operating practices of the Walkerton PUC.
- This report contains some recommendations directed toward ensuring the safety of drinking water in Ontario. However, the majority of my recommendations in that respect will be in the Part 2 report of this Inquiry.

### **1.3.2 The Bacteria**

The vast majority of the deaths and illnesses in Walkerton were caused by two bacteria, *E. coli* O157:H7 and *Campylobacter jejuni*.<sup>3</sup> *E. coli* O157:H7 is a subgroup of *E. coli*. Cattle are a common source of *E. coli* O157:H7 and *Campylobacter*. The bacteria can thrive in the gut and intestines of cattle, are commonly found in cattle manure, and can survive in the environment for extended periods. These bacteria may be transmitted to humans in a number of different ways, one of which is through drinking water.

### 1.3.3 The Events of May 2000

I have also concluded that the residents became exposed to the contamination on or shortly after May 12. It rained heavily in Walkerton from May 8 to May 12: 134 mm of rain fell during these five days. On May 13, Frank Koebel did not measure the chlorine residual at Well 5. It is very likely that at this time, *E. coli* O157:H7 and *Campylobacter* bacteria were overwhelming the chlorine being added at the well and were entering into the distribution system. Had Mr. Koebel measured the chlorine residual, he would almost certainly have learned that there was no residual – a result that should have alerted him to the problem so that he could take the proper steps to protect the system and the community. On the morning of May 15, another PUC employee, Allan Buckle, took three water samples for microbiological testing. The samples were forwarded to A&L Canada Laboratories for testing. The samples were received by A&L on Tuesday, May 16. It takes a minimum of 24 hours to perform microbiological tests. On Wednesday, May 17, A&L telephoned Stan Koebel and advised him that the three samples from the construction site, which came from water pumped from the Walkerton distribution system, were positive for *E. coli* and total coliforms. A&L did not forward these results to the MOE's area office in Owen Sound. As a result, the local health unit<sup>7</sup> was not notified of the results until six days later, on May 23.

The first public indications of widespread illness occurred on Thursday, May 18. The health unit began an investigation. When the health unit reached Mr. Koebel by telephone in the early afternoon of Friday, May 19, he was asked whether there was any problem with the water. Mr. Koebel replied that he thought the water was “okay.” By then, he knew of the adverse results from the May 15 samples. The health unit did not issue a boil water advisory until two days later, on Sunday, May 21. The first person died on May 22, a second on May 23, and two on May 24.

### 1.3.4 The Physical Causes

The applicable government document, the Chlorination Bulletin, MOE, “Chlorination of Potable Water Supplies,” Bulletin 65-W-4 (March 1987), required a water system like Walkerton's to treat well water with sufficient chlorine to inactivate any contaminants in the raw water, and to sustain a chlorine residual of 0.5 mg/L of water after 15 minutes of contact time. One important purpose of the chlorine residual is to retain a capacity for disinfection in treated water as it moves throughout the distribution system. Another is to provide a way to determine whether contamination is overwhelming the disinfectant capacity of the chlorine that has been added to the water. If the required chlorine residual of 0.5 mg/L had been maintained at Well 5 in May 2000, when the contaminants entered the system, substantially more than 99% of bacteria such as *E. coli* and *Campylobacter* would have been killed. For practical purposes, this would have prevented the outbreak.

In May 2000, the operators of the Walkerton system chlorinated the water at Well 5 but routinely used less than the required amount of chlorine at that well and at the others operated by the Walkerton PUC. The bacteria and other organic matter that entered the system on or shortly after May 12 overwhelmed the chlorine that was being added. The amount of contamination at the time was very likely so great that the demand it put on the chlorine would have overwhelmed even the amount of chlorine needed to maintain a residual of 0.5 mg/L under normal conditions. Although daily monitoring would not have prevented the outbreak, it is very probable that it would have significantly reduced the outbreak's scope. Instead, the contamination entered the system undetected.

Even more importantly, the outbreak would have been prevented by the use of continuous chlorine residual and turbidity monitors at Well 5. Walkerton did not have continuous chlorine residual and turbidity monitors at any of its wells in May 2000. Well 5 was supplied by a

groundwater source that was under the direct influence of surface water. For such sources, the 1994 Ontario Drinking Water Objectives (ODWO) require the continuous monitoring of chlorine residuals and turbidity.<sup>15</sup> Had properly designed continuous monitors been in place at Well 5, the monitors would have automatically sounded an alarm so that the appropriate corrective action could have been taken to prevent contamination from entering the distribution system.

### **1.3.5 The Role of the Walkerton Public Utilities Commission Operators**

The evidence showed that under the supervision of Mr. Koebel, the Walkerton PUC engaged in a host of improper operating practices, including misstating the locations at which samples for microbiological testing were taken, operating wells without chlorination, making false entries in daily operating sheets, failing to measure chlorine residuals daily, failing to adequately chlorinate the water, and submitting false annual reports to the MOE. Mr. Koebel knew that these practices were improper and contrary to MOE guidelines and directives. There is no excuse for any of these practices.

Stan and Frank Koebel lacked the training and expertise either to identify the vulnerability of Well 5 to surface contamination or to understand the resulting need for continuous chlorine residual and turbidity monitors. The MOE took no steps to inform them of the requirements for continuous monitoring or to require training that would have addressed that issue. It was the MOE, in its role as regulator and overseer of municipal water systems, that should have required the installation of continuous monitors., p 18.

### **1.3.9 The Role of the Ministry of the Environment**

The Ministry of the Environment (MOE) was and continues to be the provincial government ministry with primary responsibility for regulating – and for enforcing legislation, regulations, and policies that apply to – the construction and operation of municipal water systems. In this regard, the MOE sets the standards according to which municipal 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 municipal water facilities. The overall goal is to ensure that water systems are built and operated in a way that produces safe water and does not threaten public health.

The failure to use continuous monitors at Well 5 resulted from shortcomings of the MOE in fulfilling its regulatory and oversight role...It is simply wrong to say, as the government argued at the Inquiry, that Stan Koebel or the Walkerton PUC were solely responsible for the outbreak or that they were the only ones who could have prevented it. P. 23

The second problem with the operation of the Walkerton's water system was the improper chlorination and monitoring practices of the PUC...the MOE should have detected those practices and ensured that they were corrected. Had the MOE done so, the scope of the outbreak would probably have been significantly reduced.

I have concluded that a number of MOE programs or policies involved in the regulation and oversight of the Walkerton water system were deficient – some more so than others. The MOE's "deficiencies" all fall into the category of omissions or failures to take appropriate action, rather than positive acts... The most significant deficiencies associated with the MOE relate to the approvals program, the inspections program, the preference for voluntary rather than mandatory abatement, and the water operator certification and training program.

### **1.3.9.1 The Approvals Program**

Well 5 was constructed in 1978, and the Certificate of Approval for the well was issued in 1979. The ODWO was amended in 1994 to provide that water supply systems using groundwater that is under the direct influence of surface water should continuously monitor “disinfectant residuals (equivalent to free chlorine)” – a type of chlorine residual – and turbidity. Even at that point there was no program or policy to examine the water sources supplying wells referred to in existing Certificates of Approvals to determine whether a condition should be added requiring continuous monitoring. 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. It is very probable 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 have significantly reduced the scope of the outbreak.

### **1.3.9.2 The Inspections Program**

The MOE inspected the Walkerton water system in 1991, 1995, and 1998. At the time of the three inspections, problems existed relating to water safety. Inspectors identified some of them, but unfortunately two of the most significant problems – the vulnerability of Well 5 to surface contamination, and the improper chlorination and monitoring practices of the PUC – went undetected... In my view, the inspections program was deficient in that the inspectors were not directed to look at relevant information about the security of water sources. The evidence of these practices was there to be seen in the operating records maintained by the PUC. A proper examination of the daily operating sheets would have disclosed the problem. However, the inspections program was deficient in that the inspectors were not instructed to carry out a thorough review of operating records. *E. coli* was being detected in the treated water with increasing frequency and three successive inspections had measured chlorine residuals in treated water at less than the required 0.5 mg/L. All of this should have led the MOE to conduct a follow-up inspection after 1998, preferably an unannounced inspection. ... I am satisfied that 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 unacceptable chlorination and monitoring practices.

### **1.3.9.3 Voluntary and Mandatory Abatement**

In the years preceding May 2000, the MOE became aware on several occasions that the Walkerton PUC was not conforming with the ministry’s minimum microbiological sampling program and that it was not maintaining a minimum total chlorine residual of 0.5 mg/L. Despite repeated assurances that it would conform with the MOE’s requirements, the PUC failed to do so. These ongoing failures indicated a poorly operated water facility. The MOE took no action to legally enforce the treatment and monitoring requirements that were being ignored. Instead, it relied on a voluntary approach to abatement. This was consistent with the culture in the MOE at the time., p. 27.

### **1.3.9.5 Other Deficiencies**

These inadequacies arose in the MOE’s management of information, the training of its personnel, and the use of guidelines rather than legally binding regulations to set out the requirements for chlorination and monitoring. P. 29.

...In the exercise of its regulatory and oversight responsibilities for municipal water systems, the MOE developed and regularly applied two sets of guidelines or policies: the ODWO and the Chlorination Bulletin. I am satisfied that matters as important to water safety and public health as those set out in these guidelines should instead have been covered by regulations – which, unlike

guidelines, are legally binding. Two possible effects on Walkerton arose from the use of guidelines rather than regulations. Stan and Frank Koebel, despite their belief that the untreated water at Walkerton was safe, would no doubt have been less comfortable ignoring a legally binding regulation than ignoring a guideline.

Moreover, the use of guidelines may have affected the MOE's failure to invoke mandatory abatement measures and to conduct 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 a guideline, it is more likely that the MOE would have taken stronger measures to ensure compliance – such as the use of further inspections, the issuance of a Director's Order, or enforcement proceedings. I note, however, that prior to the events in Walkerton there was no initiative, either from within or outside the MOE, to include these guidelines' requirements for treatment and monitoring in legally enforceable regulations.

### **1.3.10 The Failure to Enact a Notification Regulation**

At the time of the Walkerton outbreak, the government did not have a legally enforceable requirement<sup>21</sup> for the prompt and direct reporting of adverse results from drinking water tests to the MOE and to local Medical Officers of Health. This contributed to the extent of the outbreak in Walkerton in May 2000.

For years, the government had recognized that the proper reporting of adverse test results is important to public health. The ODWO directs testing laboratories to report any indicators of unsafe water quality to the local MOE office, which in turn is directed to notify<sup>22</sup> the local Medical Officer of Health. The Medical Officer of Health then decides whether to issue a boil water advisory.

When government laboratories conducted all of the routine drinking water tests for municipal water systems throughout the province, it was acceptable to keep the notification protocol in the form of a guideline under the ODWO rather than in a legally enforceable form – that is, a law or regulation. However, the entry of private laboratories into this sensitive public health area in 1993, and the wholesale exit of all government laboratories from routine testing of municipal water samples in 1996, made it unacceptable to let the notification protocol remain in the form of a legally unenforceable guideline.

This was particularly so since at the time, private environmental laboratories were not regulated by the government. No criteria had been established to govern the quality of testing, no requirements existed re the qualifications, experience of laboratory personnel, and no provisions were made for the licensing, inspection, or auditing of such laboratories by the government.

Starting in 1993, a small number of municipalities began to use private laboratories for microbiological testing. In 1996, however, as part of the government's program of budget reductions, the government stopped conducting any routine drinking water tests for municipalities – that is, it fully privatized laboratory testing.<sup>23</sup>

After privatization in 1996, the government did not implement a program to monitor the effect of privatization on the notification procedures followed whenever adverse results were found. When the MOE became aware that some private sector laboratories were not notifying the ministry about adverse results as specified in the ODWO, its response was piecemeal and unsatisfactory.

In 1997, the Minister of Health took the unusual step of writing to the Minister of the Environment to request that legislation be amended, or assurances be given, to ensure that the

proper authorities would be notified of adverse results. The Minister of the Environment declined to propose legislation, indicating that the ODWO dealt with this issue. He invited the Minister of Health to address the matter through the Drinking Water Coordination Committee, which included staff from both of their ministries. Nothing else happened until after the tragedy in Walkerton. Only then did the government enact a regulation requiring laboratories to directly notify the MOE and the local Medical Officer of Health about adverse test results.

23 I use the term “privatization” throughout this section. This term is used extensively in the evidence, in many documents, and in the submissions of the parties. In the context of this Inquiry, the term refers to the government’s 1996 discontinuation of all routine microbiological testing for municipal water systems – a move that resulted in the large majority of municipal systems turning to private sector laboratories for routine water testing. Municipalities are not required to use private laboratories: a few larger municipalities operate their own. Practically speaking, however, the large majority have no option other than to use private laboratories.

I am satisfied that the regulatory culture created by the government through the Red Tape Commission review process discouraged any proposals to make the notification protocol for adverse drinking water results legally binding on the operators of municipal water systems and private laboratories. On several occasions, concerns were expressed by officials in the Ministry of Health, as well as in the MOE, regarding failures to report adverse water results to local Medical Officers of Health in accordance with the ODWO protocol. Despite these concerns, the government did not enact a regulation to make notification mandatory until after the Walkerton tragedy. The evidence showed that the concept of a notification regulation would likely have been “a non-starter,” given the government’s focus on minimizing regulation., P. 33

...The government should have enacted a regulation in 1996 to mandate direct reporting by testing laboratories of adverse test results to the MOE and to local Medical Officers of Health. Instead, it enacted such a regulation only after the Walkerton tragedy. If, in May 2000, the notification protocol had been contained in a legally enforceable regulation applicable to private sector laboratories, I am satisfied that A&L would have informed itself of the protocol and complied with it. The failure of A&L to notify the MOE and the local Medical Officer of Health about the adverse results from the May 15 samples was the result of the government’s failure to enact a notification regulation.

### **1.3.11 Budget Reductions**

The budget reductions had two types of impact on Walkerton. The first stemmed from the decision to cut costs by privatizing laboratory testing of water samples in 1996 and, in particular, the way in which that decision was implemented... The second impact on Walkerton of the budget reductions relates to the MOE approvals and inspections programs. The budget reductions that began in 1996 made it less likely that the MOE would pursue proactive measures that would have identified the need for continuous monitors at Well 5 or would have detected the Walkerton PUC’s improper chlorination and monitoring practices – steps that would, respectively, have prevented the outbreak or reduced its scope.

The MOE’s budget had already been reduced between 1992 and 1995. After the new government was elected in 1995, however, the MOE’s budget underwent substantial further reductions. By 1998–99, the ministry’s budget had been reduced by more than \$200 million – resulting, among other effects, in its staff complement being cut by more than 750 employees (a reduction of over 30%). The reductions were initiated by the central agencies of the government,<sup>25</sup> rather than from within the MOE, and they were not based on an assessment of what was required to carry out the MOE’s statutory responsibilities.

Before the decision was made to significantly reduce the MOE's budget in 1996, senior government officials, ministers, and the Cabinet received numerous warnings that the impacts could result in increased risks to the environment and human health. These risks included those resulting from reducing the number of proactive inspections – risks that turned out to be relevant to the events in Walkerton. The decision to proceed with the budget reductions was taken without either an assessment of the risks or the preparation of a risk management plan. There is evidence that those at the most senior levels of government who were responsible for the decision considered the risks to be manageable. But there is no evidence that the specific risks, including the risks arising from the fact that the notification protocol was a guideline rather than a regulation, were properly assessed or addressed. In February 1996, the Cabinet approved the budget reductions in the face of the warnings of increased risk to the environment and human health, p. 35.

## **Chapter 4 The Physical Causes of the Contamination...p. 119**

### **4.3.4 Geology and Hydrogeology**

Both geology and hydrogeology are crucial factors in understanding why the contamination in May 2000 was able to enter Well 5. Geology refers to the study of rocks and the solid parts of the earth, and hydrogeology involves the study of the occurrence, movement, and quality of water beneath the earth's surface. The geology of the area around Well 5 involved a bedrock highly susceptible to fracturing. Well 5 drew its water from a shallow, highly fractured rock zone. The overburden – the area between the top of the bedrock and the surface – was very shallow. The significance of these geological factors is that a point source breach in the overburden could be connected to a fractured channel linked to the aquifer. This could lead to minimal natural filtration and a swift transport of living bacteria directly into the aquifer.

All underground aquifers are replenished by surface water. In a secure groundwater source, however, surface water infiltrates through the overburden (generally a variety of soils, sand, silt, or clay) and again through bedrock. Such natural filtration will often take years. Since bacteria such as *E. coli* O157:H7 will live in water for weeks or months, and in soil for six months or longer, they are expected to be physically removed from the water flow and to die during this natural filtration process. In a secure groundwater source, there is no *direct* influence of surface water bacterial contamination on the groundwater source. However, certain factors may influence the effectiveness of the filtration process, such as a relatively direct connection between surface water and the aquifer. Where there is a direct connection between a well or aquifer and surface water, living bacteria may directly enter the groundwater source well.

In 1994, the ODWO were amended to include the concept of “groundwater under the direct influence of surface water.” This amendment was modeled on the U.S. Environmental Protection Agency's Surface Water Treatment Rule. One of the purposes of the 1994 amendment was to require continuous chlorine monitors for groundwater sources that were found to be under the direct influence of surface water.

The MOE did not, however, publish any technical bulletins or guidelines listing factors that would indicate when a groundwater source was considered to be under the direct influence of surface water. For the purposes of my analysis, I have reviewed four sources of information that may indicate direct surface water influence on a groundwater source:

- **Biological Indicators** – The key biological indicators are fecal bacteria, including *E. coli*, in raw water. Given the relatively short lifespan of these organisms, the presence of fecal bacteria in a groundwater source indicates the presence of a source of fecal contamination, a short travel time

from the surface, and a lack of adequate natural filtration by subsurface materials surrounding a well intake screen. Other biological indicators of surface water influence include algae, aerobic sporeformers, *Giardia*, p.124 *Cryptosporidium*, and human enteric viruses. The latter three pathogens would also indicate a fecal contamination source, but they are not normally monitored.

- **Physical and Chemical Indicators** – A fluctuation of turbidity is not expected in a secure groundwater source. Generally, turbidity should be relatively low (i.e., less than 1 NTU) and should not fluctuate considerably. Fluctuations in chemical parameters such as organic nitrogen or nitrates, total organic carbon and pH, or the physical parameter of electrical conductivity, may also indicate surface water influence. None of these chemical or physical parameters is uniquely indicative of fecal contamination.

- **Hydrological and Hydrogeological Indicators** – Any interaction between surface water features (e.g., springs, ponds) and wells may indicate that surface water is directly entering the aquifer from which the well draws water. Fracturing of the bedrock, thinness of overburden, point source breaches, and improperly abandoned wells may contribute to the entry of surface water.

- **Well Construction Indicators** – Holes in the well casing, improperly maintained backflow valves, and other aspects of well construction may provide a direct route for surface water entry.

Using these four indicators, I am satisfied that Well 5 was a groundwater source under the direct influence of surface water, p. 124 In 1994, the ODWO were amended to provide extra monitoring for wells supplied by groundwater sources under the direct influence of surface water operating without filtration. Section 4.2.1.1 of the ODWO provided for continuous chlorine residual monitoring and turbidity monitoring by taking four grab samples a day or by continuous monitoring. For simplicity, I refer to this as continuous turbidity monitoring.<sup>13</sup> After the amendment, the MOE did not institute a program to reclassify existing wells.

I am satisfied that had the MOE instituted a program of reclassification after 1994, the information in its files was sufficient to show that Well 5 was under the direct influence of surface water. At a minimum, there was sufficient information to trigger an investigation that would have certainly revealed that situation. After 1994, the evidence that Well 5 came within this classification increased as the years passed. *E. coli* continued to show up in bacterial samples taken from the well. Between November 1995 and February 1998, there were five separate occurrences of adverse results, including *E. coli*. Still no steps were taken to reclassify Well 5, and, as a result, the MOE did not require the Walkerton PUC to install a continuous chlorine residual and turbidity monitors. Had Well 5 been so classified, and had the requisite monitoring equipment been installed, the contamination entering the well in May 2000 would have been identified, and appropriate alarms could have shut down the pump. Continuous monitors would have prevented the outbreak.

QUESTION: How many other groundwater wells need this monitoring?

#### **4.4 The Source of Contamination**

##### **4.4.1 The Area Surrounding Well 5**

I am satisfied that the primary, if not the only, source was the manure application in April 2000 on the Biesenthal farm near Well 5. In 1999–2000, Dr. Biesenthal maintained a Breeding herd of about 40 Limousin cows and heifers. The cows calve mainly in the barn from December to April. Animals from other operations are brought onto the farm in late April or early May and are sold

off in the fall, together with calves from the previous winter. A maximum of 95 head of cattle may be on the farm during the spring and summer.

On the Biesenthal farm, the manure is “solid manure.” The animals are provided with straw bedding; this is typical of many beef and dairy operations. The cattle’s feces and urine are mixed with the straw to form a solid manure with about 19% dry matter. In Ontario, the proportion of dry matter in solid beef-cattle manure ranges from 18% to 63%. Manure accumulated from November through April was stored on an open concrete pad in the paddock area. There was no runoff system to collect feces or urine. The farmer used a tractor scraper to transfer manure from the barn and the yard onto the concrete pad. The concrete pad was able to hold approximately 200 days’ manure production.

A significant rainfall occurred on April 20–21, 2000. On April 22, approximately 24 hours later, 70 tons of manure stored on the concrete pad were removed and spread on the east front field of Lot 20. Although few of the organisms would move below the cultivation depth, and in the weeks after the application many would have died, a significant source of fecal coliforms was applied and incorporated into the soil near Well 5 on April 22. At its closest point, manure was applied 81 m from Well 5.

It is important to note that Dr. Biesenthal’s manure handling, storage, and spreading practices were consistent with what are considered “best management practices” by the Ontario Ministry of Agriculture, Food and Rural Affairs. Therefore, although it is virtually certain that the contamination that caused the outbreak originated on his farm, Dr. Biesenthal cannot be faulted., P.126 ( and see p. 16 below)

#### **4.4.3 The Lifespan of *E. coli* O157:H7 in Soil**

Studies done on the survival of *E. coli* O157:H7 in various soil types indicate survival times of at least 10 to 25 weeks. Further, cooler soil temperatures tend to promote longer survival times. Dr. Goss testified that *E. coli* will survive longer when they are infiltrated into the soil because they are not subject to drying or ultraviolet light, as they are when at or near the surface. The manure applied on April 22 was incorporated into the soil within 24 hours of spreading. As a result, by May 12, most of the bacteria in this incorporated manure were still likely to be viable, except those exposed at the soil surface. Rain prior to May 12 would be expected to infiltrate the soil, thereby encouraging the movement of bacteria close to the soil surface into the deeper layers, where their viability is enhanced. In these circumstances, *E. coli* in the front east field could survive for up to 6 months.

#### **4.14.7 Biosolids and Septage**

The Inquiry also heard evidence as to whether the land application of biosolids or septage in the Walkerton area could have caused or contributed to the contamination. Biosolids and septage are regulated under the *Environmental Protection Act*,<sup>32</sup> the Waste Management Regulation,<sup>33</sup> and the 1996 Guidelines for the Utilization of Biosolids and Other Wastes on Agricultural Land. Under the Waste Management Regulation, biosolids, or “processed organic waste,” means waste that is predominantly organic in composition and that has been treated by aerobic or anaerobic digestion or other means of stabilization. It includes sewage residue from sewage works that are subject to the provisions of the *Ontario Water Resources Act*.<sup>34</sup> Hauled sewage, also known as septage, includes waste removed from a cesspool, a septage tank system, a privy vault or privy pit, a chemical toilet, a portable toilet, or a sewage holding tank. Biosolids may be applied to land only in places where an MOE district office has approved such an application by way of an Organic Soil Conditioning Site Certificate of Approval. Septage also requires a Certificate of Approval for a hauled sewage disposal site. These sites are subject to inspection by the MOE.

32 *Environmental Protection Act*, R.S.O. 1990, c. E-19. 33 *Waste Management Regulation*, R.R.O. 1990, Reg. 347. 34 *Ontario Water Resources Act*, R.S.O. 1990, c. O-40.

I am satisfied that there was no septage application in the area. Further with regard to the application of biosolids, both the dates (in September and October 1999) and the location (on the other side of the Saugeen River divide, 3 km from Well 5) rule out the fall 1999 land application of biosolids as the source of the contamination in May 2000, P. 178

## **Chapter 5 The Role of the Public Utilities**

### **5.4 The Relationship Between the Walkerton Public Utilities**

#### **Commission and the Ministry of the Environment**

The MOE's Owen Sound office was the provincial regulator responsible for overseeing the Walkerton facility. I will review the manner in which the MOE exercised this oversight role in a later chapter. In this section, I discuss the relationship from the perspective of the Walkerton PUC. The message received by Stan Koebel from the MOE, no doubt unintended by the ministry, was that although the requirements for treating, monitoring, and testing the water were important, they were not important enough to cause the MOE to take any steps to ensure that they were followed. P. 198

The MOE was aware in the years leading up to May 2000 that the Walkerton PUC was not conforming with several ministry requirements.<sup>8</sup> Despite repeated assurances, the PUC failed to fulfill its undertakings to the MOE. It was clear to the MOE environmental officers during the three inspections in the 1990s that the PUC was not complying with the minimum bacteriological sampling program and that it was not maintaining minimum total chlorine residuals of 0.5 mg/L. Nevertheless, the MOE took no action to make legally enforceable the requirements that were consistently being ignored by the PUC. Neither a Director's Order nor a Field Order under the *Ontario Water Resources Act* was issued. Instead, the MOE chose a voluntary approach to abatement. While in no way excusing Stan Koebel's disregard for MOE requirements, the ministry's failure to take stronger measures in the face of his repeated failures likely sent the unintended message that these requirements – all in the form of guidelines and recommendations, rather than legally enforceable regulations – were not important enough for the MOE to ensure that they were followed. P. 204

## **Chapter 9 The Role of the Ministry of the Environment**

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.

...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, P. 271

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 appropriate conditions, P. 296

#### **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. 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, p. 319

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 that after the budget reductions, the resulting refocusing of program priorities made it less likely that a follow-up inspection would occur.

#### **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 noncompliance requiring corrective action, it has the choice of proceeding by way of either voluntary or mandatory abatement. “Non-compliance” is a term used to describe the failure to adhere to a legal obligation. “Nonconformance” 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, 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... 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.

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, p. 327

**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., P. 350

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.

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. P. 356.

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, P. 357.

#### **Chapter 10 The Failure to Enact a Notification Regulation**

The entry of private laboratories into this sensitive public health area in 1993, and the wholesale exit of all government laboratories from routine microbiological testing for municipalities in 1996, made it unacceptable to let the notification protocol remain in the form of a legally unenforceable guideline, p. 367 Both the fact that private laboratories doing microbiological testing of municipal water samples were unregulated and the fact that the ODWO was only a guideline, not a regulation, help explain why A&L was not aware of the notification protocol.

Significantly, some other private laboratories that were aware of the ODWO notification protocol consciously decided not to follow it. Instead, they sent test results to their clients only, on the grounds that only a legally enforceable requirement – and not a government guideline like the ODWO – could override concerns about client confidentiality, p. 369

In the area of microbiological testing of drinking water for municipalities, there was no government requirement for the certification or accreditation of private laboratories until August 2000, when the government introduced Ontario Regulation 459/00.

#### **10.4.2 The Decision to Privatize**

A new government was elected in Ontario in June 1995. The MOE initiative to privatize drinking water testing that had begun shortly before the election was consistent with the policies of the new government. The decision to privatize became part of the budget reductions implemented through the MOE business plan dated January 22, 1996, approved by Cabinet February 28, 1996.

As mentioned, the original MOE proposal for privatization, in June 1995, was based on a time line of two to three years. After the newly elected government assumed office, this period was reduced to six months, then to four months, then to two months. Municipalities were informed, in a letter dated May 15, 1996, that the MOE's laboratories would stop providing routine drinking water tests on July 13, 1996, p376

#### **10.4.3 The Failure to Identify and Manage Risks**

The Cabinet decision to privatize drinking water testing was based on the 1996 MOE business plan. This plan warned of increased risks to the environment and public health, but did not specifically identify risks relating to the notification procedures that private laboratories would follow when adverse results were found. The Premier of Ontario and the then Minister and Minister of the Environment testified that they understood the risks to be "manageable." There was, however, no assessment of the risks associated with the privatization of municipal water testing, nor was there a consideration of the need for a regulation requiring testing laboratories to notify the local MOE office or local Medical Officer of Health about adverse results Dr. Richard Schabas, the Chief Medical Officer of Health for Ontario at the time of the privatization, testified that he was not consulted about the discontinuation of routine testing by government laboratories. Neither was he asked to provide input as to whether the testing should be privatized.

Dr. Schabas expressed concern that municipalities were given only two months' notice of the privatization. He felt that this was insufficient notice to ensure proper implementation. Dr. Schabas was also surprised to learn that it was not mandatory to use an accredited laboratory.

It seems clear that before the decision to privatize was made in 1996, the government was aware of concerns about the notification procedures being followed by private laboratories when adverse results were found. As a practical matter, the discontinuation of provincial government laboratory testing made the use of private laboratories essential unless a municipality was large enough to operate its own laboratory. Given that there were already problems with notification before privatization, the wholesale privatization of testing in 1996 enormously increased the risk that Medical Officers of Health would not be notified of adverse results. This risk should have been managed before government testing was stopped. However, after the decision to privatize was made, the need to address the risk increased dramatically. p.380

#### **10.7 The Health Minister's Request of the Environment Minister**

Dr. Le Ber drafted a memorandum for Dr. Schabas's signature, dated July 22, 1997, expressing the concern that there was no legally binding requirement for the reporting of adverse results to Medical Officers of Health. The memorandum described this situation as "a serious oversight." As a result of this memorandum, Minister of Health Jim Wilson sent a letter, dated August 20, 1997, to Minister of the Environment Norman Sterling. The letter requested an amendment to the *Ontario Water Resources Act*, or assurances from the MOE, that adverse drinking water test results from municipal water systems would be immediately brought to the attention of the local

Medical Officer of Health. He invited the Minister of Health to refer the matter to the Drinking Water Coordination Committee (DWCC), which was responsible for amending the ODWO. He did not initiate any amendment to the *Ontario Water Resources Act* or take any steps to make the notification procedure set out in the ODWO legally binding...Minister Sterling said that the whole issue was not high on the list of the MOE's priorities ..Thus, more than two years before the tragedy in Walkerton, the government had at a very high level recognized a problem with its own guidelines, but had done nothing. p. 391

### **Chapter 11 The Ministry of the Environment Budget Reductions**

I conclude that the budget reductions had two types of effects on the tragedy. First, with respect to the decision to privatize the laboratory testing of drinking water samples, and especially the way in which that decision was implemented, the budget reductions are connected directly to the events of May 2000. Second, in the case of the MOE's approvals and inspections programs, the budget reductions are indirectly linked to the events in May 2000 in that they made it less likely that the MOE would pursue proactive measures that would have prevented or limited the tragedy. p. 406

... the MOE approvals program did not systematically review existing Certificates of Approval, like the one issued for Well 5, to determine if operating conditions for treatment and monitoring should be added, especially after the 1994 amendments to the Ontario Drinking Water Objectives. After the budget reductions, the staff in the approvals Branch was reduced, albeit not as substantially as staff in other areas of the MOE. Nonetheless, the introduction of a systematic program to reach back and review all Certificates of Approval to determine if conditions should be attached would have taken time and resources. I have concluded that the MOE should have implemented a program of this nature. The budget reductions made it less likely that the MOE would do so.

I have also found that the MOE should have conducted a follow-up to its 1998 inspection to ensure that the Walkerton PUC complied with MOE requirements for chlorination and monitoring. With the proper follow-up, these proactive measures would likely have resulted in the PUC's adoption of chlorination and monitoring practices that would in turn very likely have substantially reduced the scope of the outbreak in May 2000.

Thus, one effect of the budget reductions was that MOE put less priority on its role in overseeing municipal water systems. The Inquiry heard evidence that starting in 1995, the number of inspections conducted by the MOE decreased dramatically, as did the number of site visits and other contacts between the MOE and municipal water systems. P 408

#### **11.4 The Cabinet Decision and the Lack of a Risk Assessment**

The MOE's business plan, with its discussion of associated risks, was approved by the Cabinet on February 28, 1996. As I have mentioned, those risks were significant. The business plan warned of a reduced capacity in the MOE to detect or control violations of environmental standards because of slower response times, less information available for responding to inquiries, and reduced technical expertise. Despite having knowledge that there could be risks, no member of Cabinet or other public servant directed that a risk assessment and management plan be conducted to determine the extent of those risks, whether the risks should be assumed, and if assumed, whether they could be managed. Although evidence was given at the Inquiry by senior civil servants, the Minister of the Environment, and the Premier that the risks were considered and that conclusions were reached that the risks were considered manageable, no analysis appears to have been made of the specific nature, scope, or extent of the risks or of how they could be managed.

The MOE's 1996 business plan was not released to the public after it was approved by the Cabinet. However, on May 1, 1996, the MOE published a modified business plan that did not include assessments of the adverse impacts or concerns about increased risks to the environment and human health resulting from the budget reductions. In fact, the business plan that was released to the public promised reforms "without lowering the current high level of environmental protection in Ontario., p. 412.

## **Chapter 12 Other Government Policies, Practices, and Procedures**

### **...12.8.4 Best Management Practices**

The Best Management Practices booklets provide practical and affordable voluntary approaches to conserving soil and water resources. OMAFRA was one of a number of public and private sector organizations that prepared the Best Management Practices technical documents. Although the Best Management Practices approach is supported by OMAFRA as technical policy, it is not official policy (i.e., signed off by the minister, approved by Cabinet, or posted on the *Environmental Bill of Rights* registry). Neither OMAFRA nor the MOE enforced the Best Management Practices.

However, Dr. David Biesenthal – who owned the farm near Well 5 from which contaminants entered the Walkerton water system – was essentially in compliance with the Best Management Practices documents. In fact, the Best Management Practices do not address the distance between manure application and municipal wells. They only provide that the distance between manure application and watercourses or domestic wells should be at least 15 metres. At its closest, the manure at the Biesenthal farm was applied at least 85 metres' distance from Well 5. In that sense, Dr. Biesenthal's practices surpassed the Best Management Practices.

As reviewed in Chapter 13 of this report, animal waste disposed of in accordance with normal farm practices is exempt from certain provisions of the *Environmental Protection Act*. The 1998 *Farming and Food Production Protection Act* defines normal farm practice to be "a practice that ... is conducted in a manner consistent with proper and acceptable customs and standards as established and followed by similar agricultural operations under similar circumstances." That Act also prohibits municipal bylaws from restricting a normal farm practice carried on as part of an agricultural operation. The risk created by this legislation is that a municipal bylaw passed to establish a wellhead protection zone can be ineffective against the practice of spreading manure if the practice is deemed a normal practice by the Normal Farm Practices Protection Board., p. 432

### **12.9 The Groundwater Management Strategy**

Evidence at the Inquiry showed that the Province of Ontario lacks a groundwater management strategy – despite repeated calls for such a strategy from independent parties such as the Environmental Commissioner and the Provincial Auditor. A groundwater management strategy should provide a full understanding of the water being removed from and added to the groundwater system. It should also provide an understanding of the effects of contaminants.

Dr. Ken Howard, Professor of Hydrogeology, U of T testified: Most parts of the world which use groundwater extensively manage the water; in Ontario unfortunately we don't manage water, the degree of management extends simply to issuing permits to take water and to me issuing permits to take water is a little bit like me writing cheques on my bank account when I don't know how much money is coming in every month and how much is going out to pay ... the other bills ... [T]here's a big difference between issuing permits to take water and managing a resource and to manage a resource you really need to know how the system is working. There's absolutely no reason at all why we can't get to that stage, but I think we are a little bit behind the game.

Dr. Howard explained that Permits to Take Water are issued without any prior adequate measurement of either the depletion of the resource that would result from permit use or the amount of water in the aquifer. Other evidence established that Ontario does not have a province-wide groundwater management strategy as described by Dr. Howard. It was suggested by another witness that budget cutbacks prevented the development of a groundwater strategy, p. 434

The Environmental Commissioner of Ontario has brought this and other groundwater protection concerns to the attention of the Ontario government in five consecutive annual reports released since 1996... The government was also criticized for reducing provincial funding to conservation authorities across Ontario by 70% and restricting their mandate to flood control...In the Environmental Commissioner's 1996 annual report, the commissioner again urged the government to prioritize the development of a sustainable strategy for restoring, protecting, and conserving Ontario's groundwater. The report recommended 11 elements for a comprehensive groundwater strategy.

#### **12.11.8 Conclusion**

The Provincial Policy Statements regarding water quality are not binding, and the MOE has little input into municipal land use planning. A provincial groundwater strategy, including information such as mapped aquifers, mapped water tables, and a well water database, would significantly enhance municipalities' ability to develop official plans that reflect provincial interests in water quality and quantity. The Ministry of Municipal Affairs and Housing does not have any policies or guidelines specifically relating to the siting of wells, aquifer protection, or the protection of recharge areas, and the MOE's role in this area has been greatly reduced. I will address all of these issues in depth in the Part 2 report of this Inquiry, p. 441.

### **Chapter 13 The Legislative, Regulatory, and Policy Framework**

#### 13.3 The Ontario Legislative and Policy Framework in May 2000

##### 13.3.1 The *Ministry of the Environment Act*

##### 13.3.2 The *Ontario Water Resources Act* and Regulation 435/93

##### 13.3.2.1 The Management of Ontario's Water Supply

##### 13.3.2.2 The Protection of Ontario's Water Supply

##### 13.3.2.3 The Waterworks and Sewage Works Regulation

##### 13.3.3 The *Environmental Protection Act*

##### 13.3.4 The *Environmental Bill of Rights*

##### 13.3.5 The *Health Protection and Promotion Act*

##### 13.3.6 The *Public Utilities Act*

#### 13.4 The Ontario Policy Framework in May 2000

##### 13.4.1 The *Ontario Drinking Water Objectives*, 1994

##### 13.4.1.1 Unsafe Drinking Water

##### 13.4.1.2 Deteriorating Drinking Water Quality

##### 13.4.1.3 Exceedance of Maximum Allowable Concentrations .

##### 13.4.1.4 Monitoring

##### 13.4.1.5 Legal Status

##### 13.4.2 The Chlorination Bulletin

##### 13.4.3 The Drinking Water Protection Regulation

#### 13.5 The Regulatory Review Process

##### 13.5.2 The Ministry of the Environment's Regulatory Review

##### 13.5.3 The Red Tape Commission Regulatory Review

##### 13.5.4 Impact Tests for Regulatory Review