

**Chapter 3    The Events in Walkerton in May 2000**

**Contents**

3.1    Overview ..... 56

3.2    The Walkerton Water System ..... 57

3.3    May 1 to May 14 ..... 58

3.4    Monday, May 15 ..... 60

3.5    Tuesday, May 16 ..... 62

3.6    Wednesday, May 17 ..... 63

3.7    Thursday, May 18 ..... 65

3.8    Friday, May 19 ..... 67

3.9    Saturday, May 20 ..... 73

3.10   Sunday, May 21 ..... 79

3.11   Monday, May 22 ..... 88

3.12   Tuesday, May 23 ..... 92

3.13   May 24 to May 31 ..... 97

## Chapter 3 The Events in Walkerton in May 2000

### 3.1 Overview

From May 8 to May 12, 2000, heavy rainfalls in Walkerton caused flooding. Because the operators of the Walkerton water system did not check the chlorine residual levels, they were unaware that contaminated water was entering the distribution system.

Samples from the water system were collected on May 15 and sent to the laboratory for microbiological analysis. The testing laboratory reported to Stan Koebel, the general manager of the Walkerton Public Utilities Commission (PUC), on May 17 that there were high levels of total coliforms and *Escherichia coli* (*E. coli*) in the water system. By May 18, the first symptoms of the outbreak emerged. Two children who had bloody diarrhea and abdominal pain were admitted to the hospital, and about 20 were absent from school.

In the succeeding days, the scope of the outbreak expanded. On May 19, the Bruce-Grey-Owen Sound Health Unit contacted the Walkerton PUC to ask about the quality of the water. It was reassured by the general manager that the water was fine. The same reassurances were received by the health unit on the following day. The general manager did not disclose the adverse water results received on May 17, nor did he reveal that a well had been operating for several days without chlorination. On May 21, the health unit issued a boil water advisory as a precautionary measure. On May 23, it received results from water samples it had collected indicating that *E. coli* was present in the Walkerton water supply.

When the Ministry of the Environment (MOE) initiated an investigation of the Walkerton water system on May 22 and May 23, the PUC operators altered the daily operating sheets to conceal the fact that the system had operated without chlorination.

In this chapter, I will describe the events of May 2000. In subsequent chapters, I will address the roles various parties played in those events and set out my conclusions where appropriate.<sup>1</sup>

---

<sup>1</sup> For the reader's assistance, I have included a description of the participants after Chapter 15 of this report.

### **3.2 The Walkerton Water System**

In May 2000, the Walkerton water system was supplied by three groundwater wells: Wells 5, 6, and 7.

Well 5 is located on Wallace Street, in the southwest area of Walkerton. Constructed in 1978, it is a shallow well, drilled to a depth of 15 m. Well 5 was capable of providing approximately 56% of the water needs of the town. The well water was disinfected by the use of sodium hypochlorite, a bleach solution.

Well 6 is situated approximately 3 km west of Walkerton, in the former Township of Brant, adjacent to Bruce County Road 2. Built in 1982, the well had a depth of 72.2 m and was considered a deep-drilled well. It was capable of providing 42–52% of Walkerton's water requirements. Disinfection was provided by chlorine gas.

Well 7, located a short distance west of Well 6, was constructed in 1987 and has a depth of 76.2 m. It is capable of providing 125–140% of the daily water used by the Town of Walkerton. As was the case for Well 6, disinfection was provided by chlorine gas.

The water distribution system in Walkerton included 41.5 km of watermains as well as two standpipes, which provided water storage and pressure equalization for the system. It is estimated that in the Walkerton system, between 33 and 35 locations were “dead ends.” There is a greater risk of bacterial contamination in dead ends, because water does not adequately circulate in them and may become stagnant. The water system had a reserve capacity of 20 hours.

The Walkerton PUC had a computerized control system for the wells and standpipe operation known as SCADA (Supervisory Control and Data Acquisition). It controlled the water operation 24 hours a day, 7 days a week, and stored data from the system.

In the next chapter, I conclude that the vast majority, if not all, of the contamination entered the Walkerton system through Well 5 and that the residents of the town first became exposed to the contamination on May 12 or shortly after.

### 3.3 May 1 to May 14

On May 5, Stan Koebel, the general manager of the Walkerton PUC, left Walkerton for a conference in Windsor that was sponsored in part by the Ontario Water Works Association. He did not return to Walkerton until May 14. His brother Frank Koebel, the foreman of the Walkerton PUC, was responsible for the waterworks operation while Stan Koebel was away.

Before leaving, Stan Koebel was aware that Well 7 was pumping unchlorinated water into the distribution system. Well 7, which had not operated since March 10, had been activated on May 2. On May 3, Mr. Koebel instructed his brother to remove the existing chlorinator at Well 7. Stan Koebel expected his brother to install the new chlorinator, which had been on the PUC premises since December 1998, while he was attending the conference in Windsor.

Frank Koebel did not install the chlorinator while Stan was away, and Well 7 operated without a chlorinator from May 3 to May 9. It was the only well operating during this period. This was clearly contrary to the Ontario Drinking Water Objectives (ODWO) and Bulletin 65-W-4, "Chlorination of Potable Water Supplies," commonly known as the Chlorination Bulletin. Although both Stan and Frank Koebel were aware that chlorination was required at all times, they believed that unchlorinated water from Well 7 was safe because it was from a deep well. PUC staff would frequently drink raw unchlorinated water at the well because it was "cold, clear, and clean" and had a better taste than chlorinated water.

On May 9, Well 7 was turned off and Wells 5 and 6 were activated. Well 5 operated continuously until May 15, with the exception of the period from 10:45 p.m. on May 12 until 2:15 p.m. on May 13, and it was the primary source of water for the town. Well 6 cycled on and off during this period.

It rained heavily in Walkerton from May 8 to May 12: 134 mm of rain fell during these five days. The heaviest rainfall occurred on May 12, when 70 mm fell. On the evening of May 12, flooding was observed at Well 5, and at about 10:45 p.m. that well stopped pumping water. No explanation has been offered as to why this happened. None of the witnesses said they turned the well off, and the SCADA system was set so that the well should have continued pumping. The well began to operate again on May 13 at 2:15 p.m. Someone could have turned off the well because of a concern that there was flooding, but there

is no evidence to support this suggestion; nor is there evidence as to how Well 5 was turned on again.

On May 13, Frank Koebel performed the routine daily check of the operating wells. The purpose of the daily checks was to enter data on pumping rate flows and chlorine usage, and, most importantly, to measure the chlorine residuals in the treated water. However, for more than 20 years, it had been the practice of PUC employees on most days not to measure the chlorine residual but rather to make a fictitious entry for the chlorine residual on the daily operating sheet. PUC employees routinely entered a chlorine residual of 0.5 mg/L or 0.75 mg/L, even though they were setting the chlorine dose being added to the water below these amounts.

According to the daily operating sheet for Well 5, Frank Koebel checked the well on May 13 at 4:10 p.m. and entered 0.75 mg/L as the chlorine residual. There are no entries for Well 6 on May 13. I am satisfied that Frank Koebel did not in fact check the chlorine residual at Well 5 on May 13. The PUC did not use enough chlorine to achieve a residual nearly that high, and clearly the 0.75 mg/L shown as the chlorine residual for May 13 is false. The entry that day followed the pattern of making fictitious entries over the years.

I am also satisfied that at the time Frank Koebel checked the well on May 13, contamination was most likely entering the distribution system through Well 5. Had he tested the chlorine residual on May 13, it is very likely that he would have learned that there was no residual, which should have alerted him to the problem of incoming contamination.<sup>2</sup> It is likely that contamination had already entered the distribution system by then, but nonetheless steps could have been taken at that time to reduce the scope of the problem.

On the next day, May 14, Frank Koebel again checked Well 5 and followed the same procedure, entering a fictitious chlorine residual of 0.75 mg/L on the daily operating sheet. Here too, I am satisfied that he did not check the residual at the well. Had he done so, he almost certainly would have detected that contamination was entering the system.

---

<sup>2</sup> A properly qualified operator would readily recognize that the absence of a chlorine residual indicated that the demand being exerted by contaminants in the raw water was exceeding the chlorine dosage being added to the water.

### 3.4 Monday, May 15

Stan Koebel arrived at the Walkerton PUC office at 6:00 a.m. He checked the SCADA system and learned that Well 7 was not operating. Mr. Koebel turned on the well, assuming that by then the new chlorinator had been installed.

At approximately 7:30 a.m., Allan Buckle, a PUC employee, informed Stan Koebel that the new chlorinator at Well 7 had not yet been installed. Nevertheless, Mr. Koebel allowed Well 7 to continue pumping unchlorinated water into the distribution system. From May 15 to May 19 at noon, at which time the installation of the new chlorinator was completed, the water that entered the distribution system from Well 7 was not chlorinated. At 1:15 p.m. on May 15, Well 5 was shut off, and from then until the following Saturday, May 20, Well 7 was the only source of supply. Well 6 did not pump water during this time.

On May 15, an entry of 0.75 mg/L chlorine residual at Well 5 was made on the daily operating sheet. Again, I am satisfied that no one measured the chlorine residual at Well 5 on that day. Had the chlorine residual been measured then, it is virtually certain that there would have been none and that PUC staff would have been alerted to the problem of incoming contamination.

It was the practice of PUC employees to collect samples for bacteriological tests every Monday from the operating wells and from the distribution system. On the morning of May 15, Mr. Buckle was instructed to collect samples at Well 7. PUC employees, including Mr. Buckle, would routinely label samples as having been taken at sites where they were not in fact collected. Mr. Buckle had four bottles labelled “Well 7 raw,” “Well 7 treated,” “125 Durham Street,” and “902 Yonge Street.” He testified that he filled the bottles labelled “Well 7 treated,” “Well 7 raw,” and “125 Durham Street” with raw water from Well 7. As I find in Chapter 4 of this report, I am satisfied that none of the samples from May 15 were in fact taken at the site of Well 7. Two of these samples, as well as the sample labelled “902 Yonge Street,” tested positive for *E. coli*. The evidence is overwhelming that the contamination entered the system through Well 5, not Well 7.<sup>3</sup> Stan Koebel testified that PUC staff, including Mr. Buckle, sometimes collected samples at the PUC workshop, which was close to and

---

<sup>3</sup> In Chapter 4 of this report, I point out that Well 6 was susceptible to surface contamination. However, there is no evidence to suggest that contamination actually entered through Well 6 during the critical period.

down the line from Well 5, rather than at the site on the label of the sample bottle. The fourth sample was collected at 902 Yonge Street by Stan Koebel.

Samples were also collected from the Highway 9 project on May 15. At that time, the installation of the new watermain on Highway 9 was almost complete. The construction project involved the replacement of 615 m of watermain in southwest Walkerton between Wallace Street and Circle Drive. The consulting engineer was B.M. Ross and Associates Ltd., and the contractor was Lavis Construction Ltd. Before connecting the new watermain to the Walkerton water system, it was necessary to test water samples from the main. Wayne Greb from Lavis Construction and Dennis Elliott from B.M. Ross asked Stan Koebel if water samples from the Highway 9 site could be sent to the same laboratory that would test samples collected that day from the Walkerton system. Mr. Koebel agreed, and three samples were collected from two hydrants at the Highway 9 project. Mr. Greb and Mr. Elliott asked Mr. Koebel to write the words “Please rush” on the laboratory submission form (also called the “chain of custody” form) because the contractor was anxious to complete the job. The date prescribed by the Ministry of Transportation for the completion of the construction work, May 12, had already passed, and financial penalties could be imposed on contractors who failed to complete the work by the prescribed date.

On May 15, Mr. Koebel sent the three “rush” samples from the Highway 9 project, four from the Walkerton system, and eight from the subdivisions of Chepstow and Geeson to A&L Canada Laboratories. The samples were accompanied by two separate submission forms. The first form listed the three samples from Highway 9 (#1 hydrant new main, #4 hydrant new main, and #4 hydrant new main), and presence-absence testing was requested.

The second form listed 20 sampling sites but had entries for only 4 from the Walkerton system and 8 from Chepstow and Geeson.

A&L was requested to perform presence-absence and membrane filtration testing on the sample labelled “Well 7 treated” from the Walkerton system as well as on two samples from Chepstow and Geeson. Presence-absence testing was to be conducted on all of the 12 samples submitted to the lab.

Stan Koebel knew that the list of samples on the second submission form contained inaccurate information. He knew that the sample described as “Well 7 treated” could not be treated water because the well was pumping

unchlorinated water and that the sample labelled “125 Durham Street” had been collected not at this site but at a different location. When Mr. Koebel was asked at the Inquiry for an explanation for this misinformation, he answered, “Simply convenience, or just couldn’t be bothered.” It was not unusual for PUC sampling bottles to be mislabelled in this fashion.

### **3.5 Tuesday, May 16**

Before discussing the events of May 16, it is useful to briefly describe the history of the Walkerton PUC’s relationship with A&L Canada Laboratories.

A&L was a private laboratory. Although it had performed chemical testing for the PUC, it had only begun to conduct microbiological tests for the PUC on May 1. Previously, these tests had been done by G.A.P. EnviroMicrobial Services Inc. In April, Stan Koebel received a letter from G.A.P. indicating that the laboratory would no longer conduct routine drinking water analysis such as presence-absence and membrane filtration tests. Mr. Koebel decided to retain A&L to perform the microbiological tests. When he contacted Robert Deakin, the laboratory manager at A&L, Mr. Koebel indicated that the PUC was changing laboratories because it had received a “wacky result” from the previous laboratory. As Mr. Koebel testified, this in fact was not the reason that G.A.P. was no longer analyzing water samples from the Walkerton PUC. When asked at the Inquiry to explain this statement to A&L, Mr. Koebel said, “I thought it was up to G.A.P. to make these announcements.”

On May 1, when Mr. Koebel first sent samples to A&L, he did not include all the samples listed on the chain of custody form, and he sent an insufficient volume of water to perform the requested tests. A&L contacted Mr. Koebel and explained that the presence-absence test required 100 mL of water, that the coliform and *E. coli* membrane filtration test required a further 100 mL of water, and that another 100 mL of water was necessary for the heterotrophic plate count. Despite this conversation, Mr. Koebel repeated the same procedure in the samples he sent to A&L on May 15, sending only enough water samples to perform presence-absence tests and a membrane filtration test on one sample – the one labelled “Well 7 treated.”

On May 16, A&L received the two chain of custody forms and the samples collected from the Walkerton water system, the Highway 9 project, and the two suburban divisions. A&L staff observed that eight samples listed

on the Walkerton form had not actually been sent by the PUC. Moreover, although Mr. Koebel had requested A&L to perform presence-absence and membrane filtration tests, the requisite water volumes again had not been shipped. Mr. Deakin asked his assistant supervisor, Cathy Doyle, to contact Mr. Koebel and explain the proper sampling volumes.

Ms. Doyle spoke to Stan Koebel before 10:00 a.m. on May 16. Mr. Koebel said that the PUC would provide the appropriate water volumes in the next set of samples to be tested by A&L. He then asked whether the results for the “rush” tests were available. Ms. Doyle responded that A&L had only recently received the samples for Walkerton and that they were being processed.

Mr. Deakin called Stan Koebel later that day to explain that A&L required a minimum of 24 hours to perform the microbiological tests. He stated that if a significant finding was discerned during the 24-hour testing period, A&L would contact Mr. Koebel. In that conversation, Mr. Deakin raised the subject of Well 5. The results of the presence-absence tests performed on the May 1 samples, which were reported on May 5, had indicated that both the raw and the treated samples from Well 5 tested positive for total coliforms. Mr. Deakin wanted to know whether the “wacky results” referred to earlier by Mr. Koebel were reflected in the May 5 lab results. Mr. Koebel did not give a clear answer to the question. When Mr. Deakin asked Mr. Koebel why samples from Well 5 had not been forwarded to A&L with the May 15 shipment, he simply replied that Well 5 was “off line,” which Mr. Deakin interpreted as meaning “not operational.” In fact, Well 5 was operating on the morning of May 15. It was turned off at 1:15 p.m.

It is worth noting that Well 5 was not sampled on May 8, the week following the positive results received on May 5. Thus, the last bacteriological samples for Well 5 before the Walkerton outbreak were taken on May 1.

### **3.6 Wednesday, May 17**

When Mr. Deakin arrived at A&L at approximately 8:30 a.m. on May 17, the laboratory technician had analyzed the samples from Walkerton. Mr. Deakin was informed that there were several positive results. He examined the samples and asked the technician to begin the report to the Walkerton PUC.

Mr. Deakin telephoned Stan Koebel in the early morning of May 17. He told Mr. Koebel that each of the three “rush” samples were positive for *E. coli* and total coliforms and that “the distribution samples didn’t look good either.” Mr. Deakin identified the samples that had adverse results. He stated that he was unable to specify the number of colony forming units (cfu) because most of the samples had only been subjected to the presence-absence test. However, Mr. Deakin did state that in the one sample from the Walkerton water system that had undergone the membrane filtration test, the plate was covered with both coliforms and *E. coli*. Although Mr. Koebel may have been focusing on the problem with the Highway 9 rush samples at this point, he certainly had information alerting him to the fact that there might be a problem in the distribution system. To be fair to him, on several previous occasions distribution samples had tested positive for *E. coli*; however, subsequent sample results had been negative.

On the morning of May 17, A&L faxed the results from the Highway 9 project to the PUC. These results indicated that the three hydrant samples were positive for total coliforms and *E. coli*. The report for the second set of samples from the Walkerton water system was faxed by A&L in the early afternoon of May 17. The sample labelled “Well 7 treated” was positive for *E. coli* and total coliforms. Membrane filtration testing was also conducted on this sample. The results showed massive contamination: coliform bacteria greater than 200 cfu/100 mL, *E. coli* greater than 200 cfu/100 mL, and a heterotrophic plate count of 600 cfu/1 mL. The presence-absence results from the samples labelled “125 Durham Street” and “902 Yonge Street” were also positive for total coliforms and *E. coli*. The sample labelled “Well 7 raw” had negative results. As I have said above, the bottles were mislabelled. I have concluded that none of the samples came from Well 7, so the anomaly of raw water being negative and treated water being positive need not be resolved.

The date on A&L’s fax machine was set incorrectly: it was set 11 hours and 13 minutes ahead of the actual time and showed p.m. instead of a.m. Although the date stamped on the lab reports to the Walkerton PUC are, respectively, “May 17 8:27 p.m.” and “May 18 1:50 a.m.,” I am satisfied that they were in fact sent 11 hours and 13 minutes earlier – that is, on May 17 at 9:14 a.m. and 2:37 p.m., respectively.

Neither the MOE nor the local Medical Officer of Health received notice of these adverse laboratory results. These results were sent only to Mr. Koebel at the PUC, because it was the policy of A&L to forward laboratory reports solely

to its clients unless directed otherwise. Mr. Deakin was unaware of section 4.1.3 of the ODWO, a guideline stating that the lab should notify the MOE district office of indications of unsafe drinking water. The May 17 results were indicators of unsafe drinking water. I discuss the issue of the failure of the government to enact a regulation mandating notification by a testing laboratory to the MOE and the local health unit in Chapter 10 of this report.

On May 17, Mr. Koebel informed Dennis Elliott, the site supervisor for B.M. Ross, that the samples from Highway 9 had failed. Rechlorination, the flushing of the new watermain, and the collection of additional samples were necessary.

### **3.7 Thursday, May 18**

New samples were collected from the Highway 9 project on May 18. The contractor, through its agent Philip Analytical Services, submitted three samples, this time to MDS Laboratory Services Inc. in London. Philip Analytical, an environmental laboratory that conducted chemical testing, regularly sent samples to MDS for microbiological analysis. The work order submitted to MDS requested that three samples – “BM1,” “BM2,” and “BM3” (identification numbers assigned by Philip Analytical) – undergo tests for total coliforms and *E. coli*. No information appeared on the work order to indicate that the samples were from a municipal drinking water system or from a hydrant. Testing on these samples was conducted by MDS on May 19.

Frank Koebel was aware on May 18 that adverse lab results from the Highway 9 construction project had been received from A&L. On that day, Frank Koebel had a discussion with Dennis Elliott of B. M. Ross and Wayne Greb of Lavis Construction regarding the connection of the new main on Highway 9 to the Saugeen Fuel and Filter building (previously the Canadian Tire building). One reason for the connection was fire protection. The owners of the building had also been pressuring the contractor to clean the area for the upcoming grand opening of Saugeen Fuel and Filter. Frank Koebel agreed to complete the connection on the condition that its water would not be consumed by people in the building and that the tap would be kept running to prevent backfeed into the system.

Meanwhile, on May 18, illnesses were emerging in the community.<sup>4</sup> Two children were admitted by Dr. Kristen Hallett, a pediatrician, to the Owen Sound hospital: a seven-year-old girl with bloody diarrhea, and a nine-year-old boy with abdominal pain and a fever who developed bloody diarrhea later that evening. Dr. Hallett spoke with the parents of the two patients to determine if there was a link between the children. Both children were from Walkerton and were pupils at Mother Teresa School. Dr. Hallett examined the stools of the two patients and noticed that they were similar. She suspected that the children had contracted *E. coli* O157:H7 and sent the stool samples from the two patients to the hospital laboratory for analysis.

Other members of the Walkerton community were also ill on May 18. At least 20 students at Mother Teresa School were absent, and although the evidence is not entirely clear, I am satisfied that by May 18, members of the public had begun contacting the staff at the Walkerton PUC to inquire about the safety of the water. They were told by a staff member, who had discussed the issue with Stan Koebel, that the water was fine.

It was also on May 18 that Stan Koebel instructed his brother Frank, foreman of the PUC, to install the new chlorinator at Well 7. It seems more than coincidental that the instruction to install the chlorinator was given on the same day that the public first contacted the Walkerton PUC regarding the safety of water due to illness in the community and on the day after Stan Koebel first learned that there might be contamination in the Walkerton water distribution system. I am satisfied that on May 18, Stan Koebel at least suspected there could be a problem with the water. He was very likely concerned that Well 7 had been operating without a chlorinator, a situation that he knew was contrary to government requirements.<sup>5</sup>

Mr. Koebel was also concerned about contamination in the new watermain on Highway 9. The valve connecting the new main to the distribution system had been opened on May 11, 12, 15, and 17 for the swabbing, flushing, and chlorination procedures on the construction project. He may have thought that

---

<sup>4</sup> Although some people had experienced symptoms before May 18, public indications of an outbreak emerged on that day.

<sup>5</sup> I use the word “requirements” to describe the provisions set out in the ODWO and the Chlorination Bulletin. As I discuss in Chapter 9 of this report, these documents were in fact guidelines, not regulations. However, the MOE had made it clear to Mr. Koebel on several occasions that the water at Walkerton was to be treated with chlorine and that a chlorine residual of 0.5 mg/L was to be maintained after 15 minutes contact time.

the new main was one of the possible sources of the contamination in the distribution system.

On the evening of May 18, the Walkerton PUC held a meeting. As was his usual practice, Stan Koebel presented the manager's report. In it, he stated that the PUC was awaiting sample results from the Highway 9 project, but he did not disclose to the PUC commissioners that adverse results from the Highway 9 project had been received, nor did he reveal the failed samples from the Walkerton water system. Moreover, Mr. Koebel indicated in his report that "we are currently rebuilding the chlorine equipment at our #7 pumphouse." He did not disclose, nor were the commissioners aware, that the new chlorinator had been stored at the pumphouse for over a year and a half and that Well 7 had been pumping unchlorinated water from May 3 to May 9 and again from May 15 to the time of the meeting. At this point, Mr. Koebel was obviously concerned about the adverse results and about a possible connection between those results and the fact that Well 7 had been operating without chlorination.

### **3.8 Friday, May 19**

The scope of the outbreak expanded rapidly. Eight people with a three-day history of diarrhea and stomach cramps were examined at the Walkerton hospital emergency department. Bloody diarrhea had prompted these individuals to visit the hospital. More than 25 students at Mother Teresa School were ill, and 8 students at the Walkerton Public School suffering from stomach pain, diarrhea, and nausea were sent home. On the same day, three residents at a retirement home, Maple Court Villa, developed diarrhea and vomiting, and a number of residents at Brucelea Haven, a long-term care facility, contracted diarrhea; two of the residents developed bloody diarrhea. A local physician, Dr. Donald Gill, examined 12 or 13 patients, all of whom were suffering from diarrhea.

At approximately 9:00 a.m., Dr. Hallett placed a telephone call to Dr. Murray McQuigge, the local Medical Officer of Health. This was the first contact with the Bruce-Grey-Owen Sound Health Unit regarding the emerging outbreak. Early that morning, Dr. Hallett had learned that in addition to the two children she had seen on Thursday, other people in the community were ill. She had conducted a food history investigation with the parents of her two patients and suspected that *E. coli* O157:H7 was the causative agent and that contaminated water was the source of the infections. Dr. Hallett spoke to Mary Sellars,

Dr. McQuigge's executive assistant, and advised her that two young patients had been admitted to the Owen Sound hospital. The pediatrician explained that the children had diarrhea and that stool samples had been sent to the laboratory for analysis. She also indicated that the illnesses were not confined to the two pediatric patients and that several other people in the community were experiencing the same symptoms. Ms. Sellars said that she would leave a note containing this information on Dr. McQuigge's desk. Dr. Hallett called the health unit again that day to ensure that the matter was addressed.

At approximately noon, David Patterson, assistant director of health protection at the health unit, listened to the voice-mail message from Ms. Sellars that described Dr. Hallett's call. Mr. Patterson instructed Beverly Middleton, a public health inspector in Owen Sound, to contact Dr. Hallett, and in a telephone call later that afternoon, Ms. Middleton learned that two children had been admitted to the Owen Sound hospital. Dr. Hallett told Ms. Middleton that people were concerned that something was "going on" in Walkerton. Ms. Middleton informed the doctor that she had no knowledge of any unusual events in Walkerton.

At approximately 2:00 p.m., Ms. Middleton received a call from JoAnn Todd, managing director at Maple Court Villa. It was the policy of the retirement home to contact the local Medical Officer of Health if three or more residents in a 24-hour period developed the same symptoms. Ms. Todd described the outbreak protocol of the home, the symptomatology of the three residents, and the date of the onset of symptoms. Ms. Middleton issued an outbreak number and asked Ms. Todd to initiate stool collections and a patient line-listing (a list of the names of patients who had been examined).

Ms. Middleton contacted administrative staff at Mother Teresa School, the school attended by the two pediatric patients at the Owen Sound hospital. She was informed that 25 students were ill with diarrhea, some of them with bloody diarrhea, and that 4 other students had been sent home from school that day with abdominal pain and nausea. The school receptionist reported that a parent of a student had stated that something was wrong with the Walkerton water. She indicated that she was not aware of problems with the town's water supply. Ms. Middleton then spoke with the Walkerton Public School, which had also observed increased absenteeism among its student population, and learned that eight children were ill and had been sent home. These children were also suffering stomach pain, diarrhea, nausea, and vomiting.

In a conversation with the Walkerton hospital emergency department, Ms. Middleton was informed that eight patients with a three-day history of diarrhea and stomach cramps had been examined but that there had been no hospital admissions. The physician-on-call, Dr. Donald Gill, had left the hospital, and Ms. Middleton telephoned him at his office to discuss the medical histories of these individuals.

James Schmidt, the public health inspector in the Walkerton office of the health unit, also received calls on May 19 concerning illness in the community. Ruth Schnurr, an administrator at Mother Teresa School, reported to the Walkerton office that 25 students were ill – abnormally high absenteeism for that time of the academic year. Some of these students lived in the town of Walkerton, others in the countryside; and the students were in various grades and different classrooms. Ms. Schnurr believed that water was the source of the illnesses. Mr. Schmidt also received a call from a member of the public regarding the number of sick students at Mother Teresa School. He did not pass the information received on May 19 to Beverly Middleton of the health unit's Owen Sound office.

Although there were suspicions in the community that water was the source of the outbreak, Mr. Patterson, Ms. Middleton, and Mr. Schmidt did not believe at this point that water was responsible for the illnesses. Their experience was that the common source of outbreaks that have symptoms of this nature is food, not water. However, because the quality of the water had been questioned by members of the community, the health unit's public health officials decided to investigate this issue.

Mr. Schmidt contacted the Walkerton PUC in the early afternoon. By that time, the chlorinator at Well 7 had been installed and the well was pumping chlorinated water into the distribution system. Stan Koebel, who was returning from a meeting in Southampton, spoke to Mr. Schmidt on his cellphone. The telephone record shows that this call was placed at 2:21 p.m. on May 19.

Mr. Schmidt told Mr. Koebel that a number of children at Mother Teresa School were ill with diarrhea and stomach cramps. When Mr. Schmidt asked Mr. Koebel if there were any problems with the water supply, Mr. Koebel replied that he "thought the water was okay." There are differences in the testimony of Mr. Schmidt and Mr. Koebel regarding the details of the conversation that took place between them. I do not think anything turns on the differences. However, where such differences occur, I prefer the evidence of

Mr. Schmidt. It is clear that Mr. Schmidt was asking about the safety of the water and that Mr. Koebel led him to believe that everything was “okay.”

I am satisfied that by this point in time, Mr. Koebel was aware of the adverse results from samples collected by the PUC on May 15 at Highway 9 and from the Walkerton water system. I do not accept the evidence of Mr. Koebel that he had not seen the adverse results from the Walkerton system when he spoke to Mr. Schmidt on May 19. There is overwhelming evidence to the contrary. Mr. Koebel had been told by Mr. Deakin about those results on May 17; the fax of the results had been on his desk since the afternoon of May 17. Later on the afternoon of May 19, he told his brother Frank Koebel that he was concerned about contamination in the distribution system, and on May 23 he told a town council meeting that he had received the lab report on May 19.

In his conversation with Mr. Schmidt, Mr. Koebel did not disclose any of the adverse results or the fact that Well 7 had been operating without a chlorinator that same week. Mr. Koebel may have expected A&L to notify the MOE’s district officer, who would at some point notify the health unit of the adverse test results, as had been the case in the past. However, it was clear to Mr. Koebel that at this point, Mr. Schmidt was unaware of the results in the May 17 reports from A&L. Even though he was advised by Mr. Schmidt that children at Mother Teresa School were ill with diarrhea and stomach cramps, Mr. Koebel reassured Mr. Schmidt that the water quality was fine.

At 4:00 p.m. on May 19, Mr. Patterson contacted Stan Koebel to discuss the calls received by the health unit from members of the public concerned about the quality of the water. Mr. Koebel again stated that he thought the water was fine. Mr. Patterson asked whether anything unusual had occurred in the water system. Mr. Koebel responded that there had been watermain construction in the south part of town near Mother Teresa School and that the mains were undergoing a flushing procedure. He also stated that a new chlorinator had been installed at the well on the previous day, May 18. This statement was not accurate: the chlorinator had not been installed until May 19 at noon. Again, Mr. Koebel did not reveal the adverse results from the Highway 9 project or the Walkerton system, nor did he disclose that Well 7 had been pumping unchlorinated water from May 3 to May 9 and from May 15 to May 19.

Mr. Patterson and other members of the health unit continued to investigate the cause of the outbreak. Their training and experience led them to believe that outbreaks with these symptoms were generally caused by food. The

information amassed by health officials on May 19 showed that children of elementary school age and residents of a retirement home and a nursing home had contracted bloody diarrhea. The illnesses appeared to be affecting the very young and the very old. Although this is typical for *E. coli* O157:H7, public health officials at the health unit were perplexed, because these two age groups do not generally eat the same food or attend the same functions. However, having received assurance from Mr. Koebel that the water was fine, public health officials continued to investigate possible food-borne sources. They believed that there had never been an *E. coli* O157:H7 outbreak in a treated water system like Walkerton's, and the municipal treated drinking water supply was therefore low on their index of suspicion.

Even before the health unit issued a boil water advisory, some individuals in Walkerton believed that their water might be the source of the illnesses and took measures in their homes and workplaces to prevent further infections. (It was not until Sunday, May 21, at approximately 1:30 p.m., that the health unit advised the Walkerton community not to drink the municipal water.) On May 19, Brucelea Haven decided to institute its own boil water procedures – the first time such procedures had been implemented at the nursing home. Robert McKay, an employee of the Walkerton PUC who was on sick leave, also began to boil water at his home on May 19. Similarly, Mr. and Mrs. Reich, the parents of the seven-year-old girl who had been admitted to the Owen Sound hospital on May 18, decided that their family as well as their employees should drink only bottled water. Members of their extended family made the same decision.

At 4:30 p.m., after his conversations with Mr. Schmidt and Mr. Patterson, Stan Koebel went to the PUC shop and met Frank Koebel and Allan Buckle. He asked Frank about the status of the chlorinator at Well 7 and was told that it had been installed that day. Stan Koebel told the others that the samples from Highway 9 had failed the laboratory tests. After Mr. Buckle left, Stan Koebel told Frank Koebel that he was concerned about bacteriological contamination in the distribution system. He said that the PUC office had received calls from Walkerton residents, that the health unit had asked if the water was safe for consumption, and that he had indicated that the water was “okay.”

After Stan Koebel's conversation with Mr. Patterson on the afternoon of May 19, he decided to flush and to increase the chlorine in the Walkerton water system. He had told Mr. Patterson he would take these “precautionary measures.” Significantly, this was the first time that Mr. Koebel had flushed

watermains after receiving an adverse test result. He decided to use Well 7, which a few hours earlier had had a new chlorinator installed. He testified that the fact that Well 7 had pumped unchlorinated water into the distribution system from May 15 until noon on May 19 did not influence his decision to flush the watermains. I do not accept this evidence. By this time, he knew that people in Walkerton were sick, he was aware of contamination in the system, and he had not told Mr. Schmidt or Mr. Patterson about the results of the adverse water samples or that Well 7 had been operating without a chlorinator when he was asked about the safety of the water.

I accept that on May 19, Mr. Koebel was concerned that people in Walkerton were becoming sick and that he was hoping to prevent further illness by increasing the chlorination in the water system. But he was also hoping that if he was successful in eradicating the contamination from the distribution system, the next set of microbiological samples sent to the laboratory would yield negative results from the distribution system. He was very concerned, I believe, that it should not come to light that Well 7 had operated for a significant length of time without a chlorinator. Indeed, as I point out below, on May 22, he took steps to alter the operating records for Well 7 to conceal this fact.

I do not think, however, that on May 19 or during the following weekend, Stan Koebel fully understood the seriousness of the health risk posed to the community by his failure to disclose the adverse results to the local health unit. This is exemplified by the fact that during the weekend, he continued to drink water from a fire hydrant and a garden hose, and on May 22 he filled his daughter's swimming pool with municipal water. It is also clear that Mr. Koebel was not aware of the existence of *E. coli* O157:H7, nor that this bacteria was potentially lethal.

At approximately 5:00 p.m. on May 19, Mr. Koebel began to intensively flush and increase the chlorine levels in the Walkerton water system. This activity continued until May 22. Mr. Koebel testified that he selected the hydrant at Mother Teresa School on May 19 because it was a location at which the system would draw "fresh chlorinated water" from Well 7. He tested the chlorine residual at the school at 5:45 p.m. and received a low reading of 0.01 mg/L. He continued to measure the chlorine residual at both Well 7 and Mother Teresa School throughout the evening, until 11:00 p.m. His recorded measurements appear in Table 1. It is not clear whether the residual measurements at Well 7 were taken after 15 minutes of contact time. Given the PUC sampling practices, this is highly unlikely.

**Table 1 Chlorine Residual Measurements, May 19, 2000**

Well 7		Mother Teresa School	
6:30 p.m.	0.50 mg/L	5:45 p.m.	0.01 mg/L
9:30 p.m.	0.63 mg/L	7:00 p.m.	0.02 mg/L
11:00 p.m.	0.90 mg/L	8:00 p.m.	0.06 mg/L
		9:30 p.m.	0.08 mg/L
		10:30 p.m.	0.10 mg/L

**3.9 Saturday, May 20**

On Saturday morning, the laboratory at the Owen Sound hospital determined that the stool sample from one of the two children whom Dr. Hallett had examined on May 18 was presumptive positive for *E. coli* O157:H7. The laboratory notified the Bruce-Grey-Owen Sound Health Unit of the presumptive result and indicated that the confirmatory result would be available the next day. The other child who had been admitted to the Owen Sound hospital on May 18 had normal fecal flora.

The outbreak continued to spread on May 20. The Walkerton hospital was extremely busy throughout the day. It received more than 120 calls from concerned residents, half of whom complained of bloody diarrhea, and 20 to 30 people were examined by staff in the Walkerton hospital's emergency department.

The health unit continued to investigate the cause of the outbreak. At 9:50 a.m., David Patterson was notified of the presumptive positive *E. coli* O157:H7 result from the patient at the Owen Sound hospital. He passed this information to Ms. Middleton, who contacted the Walkerton hospital, explaining to emergency department staff that a potential complication of *E. coli* O157:H7 is hemolytic uremic syndrome (HUS), which could have serious implications for the young and the elderly. She also advised the staff not to dispense anti-diarrheal medication, because it could exacerbate the condition of patients with *E. coli*. Ms. Middleton faxed information to the Walkerton hospital on *E. coli* O157:H7, HUS, and the management of diarrheal infections. She also contacted the hospitals in Hanover and Owen Sound: she was concerned that if a parent with a child suffering from bloody diarrhea arrived at a busy emergency department at the Walkerton hospital, the parent might travel to Hanover or Owen Sound to obtain medical attention.

At 11:00 a.m., Mr. Patterson asked James Schmidt to contact Stan Koebel and advise him of the ongoing illnesses. Mr. Schmidt was also asked to obtain the current chlorine residual levels in the water system and to ensure that the system would be monitored throughout the weekend. Mr. Patterson did not instruct Mr. Schmidt to review the Walkerton water file to obtain information on sample results in past weeks. It was not until several days later, on May 24, that the health unit examined the Walkerton file.

In his discussion with Stan Koebel, Mr. Schmidt learned that the system was being flushed and that the chlorine residual levels were 0.1 to 0.4 parts per million (ppm) in the distribution system and 0.73 ppm at the wellhead. Mr. Schmidt did not ask Mr. Koebel for water test results from the previous few weeks, nor did Mr. Koebel offer information about the adverse samples from the Walkerton system and the Highway 9 construction project that he had received earlier that week.

Mr. Schmidt informed Mr. Patterson by voice mail of the chlorine residual measurements. When Mr. Patterson received this information, he was relatively confident that the water supply was secure. He believed that if chlorine residual levels existed in the distribution system, there would be no bacteria in the water supply.

At about 1:30 p.m., Mr. Patterson decided to contact Dr. Murray McQuigge, the local Medical Officer of Health, at his cottage. He informed Dr. McQuigge that two children from Walkerton with bloody diarrhea were in the Owen Sound hospital and that one of them had a stool culture that was presumptive *E. coli* O157:H7. Mr. Patterson reported that several people in the Walkerton area had also developed bloody diarrhea. Ten stool cultures had been submitted to the laboratory for analysis, but the results were not yet available. Dr. McQuigge indicated that if more cases of *E. coli* O157:H7 were reported by the hospital laboratory, the patients should be interviewed to obtain additional information about their illnesses. He returned to Owen Sound in the early evening of May 20.

At 3:00 p.m., Mr. Patterson informed Stan Koebel that an individual had reported to the hospital that he had heard on CKNX FM 102, a local radio station, that the water in Walkerton should not be consumed. Mr. Patterson asked Mr. Koebel to contact the radio station to correct the impression that there were problems with the Walkerton water and to reassure concerned members of the public. Mr. Koebel was reluctant to comply with this request.

He told Mr. Patterson that the watermain were being flushed and that the chlorine residual levels ranged from 0.1 to 0.3 ppm. Mr. Patterson again asked Mr. Koebel whether there had been any unusual events in the water system. Mr. Koebel responded that there had been watermain construction and that the chlorinator had been replaced – activities that Mr. Patterson considered standard in a water system. Again, Mr. Koebel did not disclose the adverse results from the May 15 samples or the fact that Well 7 had been operating without a chlorinator.

Mr. Patterson instructed Mr. Schmidt to travel to Walkerton and to take chlorine residual readings with a swimming pool kit at different locations. At approximately 4:00 p.m., Mr. Schmidt informed Mr. Patterson that he had visited five sites at various locations in Walkerton and was unable to detect chlorine residual levels at any of these locations. However, the minimum level detectable by the pool test kit was 0.5 ppm, and the information received by the health unit from Mr. Koebel was that the chlorine residual levels in the distribution system at that time were below 0.5 ppm.

Throughout May 20, the community continued to be concerned that the water was unsafe. The Walkerton hospital received many calls with questions regarding the quality of the water. Donald Moore, the administrator of Brucelea Haven, contacted the health unit to ask whether the water was safe for consumption. Mr. Patterson told Mr. Moore that the PUC had assured the health unit that there was nothing wrong with the water and that it was safe to drink. The health unit continued to believe that because *E. coli* O157:H7 is usually a food-borne and not a water-borne disease, it was unlikely that the illnesses had been transmitted through a municipal treated water system.

Robert McKay, an employee of the Walkerton PUC, was also concerned that a problem existed with the water supply. He was on sick leave from the PUC because of an injury. In discussions with Frank Koebel on May 18 regarding his return to work, Mr. McKay had learned that water samples from the Highway 9 construction project had failed. He had first noticed flushing in the vicinity of Mother Teresa School on May 19, the day he learned that 20 to 25 students at the school were ill. On May 20, Mr. McKay again observed flushing at a hydrant near the school. At the Inquiry, he said that it was “basically wearing on me ... I presumed something was wrong” and “I just wanted someone to come and look into it.”

Mr. McKay contacted the MOE's Spills Action Centre (SAC) in the early afternoon of May 20. He decided not to disclose his identity, because he was worried that he would be reprimanded by Stan Koebel if it became known that he had raised concerns about the Walkerton water system. At the time of Mr. McKay's anonymous call, Christopher Johnston and Paul Webb were on duty at the SAC. Mr. Johnston was informed by Mr. McKay that samples from the Walkerton system had failed the lab tests. In attempting to obtain further details on the adverse results to determine whether the problem was a chemical parameter, turbidity, or total coliforms, Mr. Johnston asked the anonymous caller whether the samples contained total or fecal coliforms. Mr. McKay was unable to provide this information and simply stated that the samples had failed. He then gave Mr. Johnston a contact number for the Walkerton PUC and indicated that Mr. Johnston should speak with either Stan or Frank Koebel.

Following this conversation, Mr. Johnston left a message at the number provided by the anonymous caller. He also contacted the South Grey Bruce Police Services and spoke with the dispatcher. Mr. Johnston explained that he was seeking information about the water system and asked the dispatcher for a contact number for the manager of the Walkerton PUC. The dispatcher stated that she had had a conversation with either a pharmacist or a doctor who had indicated that the water was fine.

Mr. Johnston made contact with Stan Koebel at 1:19 p.m. on May 20. He informed Mr. Koebel of the anonymous call regarding the failed water samples. The following is an excerpt of their conversation:

*Christopher Johnston:* I just want to inquire and find out what's going on, that's all.

*Stan Koebel:* We had a fair bit of construction and there is some concern – I'm not sure, we're not finding anything ... but I am doing this [flushing and chlorinating] as a precaution ...

*Christopher Johnston:* So you haven't had any adverse samples then?

*Stan Koebel:* We've had the odd one, you know, we're in the process of changing companies, because the other company, it closed the doors, so

we are going through some pains right now  
to get it going.

It was Mr. Johnston's understanding that adverse sample results had been received during construction at the Walkerton PUC in past weeks. Mr. Koebel knew that the SAC wanted information on the adverse samples, yet he did not inform Mr. Johnston that A&L's Certificate of Analysis indicated that the water samples from the wells and distribution system in Walkerton had tested positive for total coliforms and for *E. coli*. Even on his own evidence, Mr. Koebel had looked at the fax results by this time.

Mr. Johnston prepared an Occurrence Reporting Information System (ORIS) report after his conversation with Mr. Koebel. The ORIS reports form a repository of information that enables MOE staff to easily access information collected on previous work shifts. The ORIS report stated that there had been "minimal adverse sampling" in the system while watermainns were being replaced and that the chlorine residual levels on May 19 had been 0.1 mg/L at 5:00 p.m. and 1.0 mg/L at 11:00 p.m.

At 9:30 p.m., Robert McKay made another telephone call to the SAC. He wanted to know what actions had been taken by the SAC as a result of his call earlier that day. Mr. McKay had developed diarrhea, and his daughter had experienced the same symptoms a few days before. He was worried that the water in Walkerton was contaminated and was "wondering if we were getting sick."

Mr. McKay told the SAC that he had been unwell that day, that 25 students from Mother Teresa School were reportedly ill, and that 2 or 3 individuals had been sent to the Owen Sound hospital because there was blood in their stools. The SAC official indicated that the manager of the Walkerton PUC had been contacted. He further stated that water was the responsibility of the province's Ministry of Health. Mr. McKay thought that the MOE regulated water quality and was dissatisfied with the actions of the SAC. He told the SAC official that he was boiling water at his residence, that many people were sick, and that this was not a normal situation. He also requested the telephone number of the Ministry of Health and was informed that the ministry's Barrie office was the one closest to Walkerton.

Mr. McKay telephoned the Ministry of Health's Barrie office at 9:38 p.m. and was told to contact the emergency number of the health unit in Simcoe County.

He called that number and was advised to contact the Bruce-Grey-Owen Sound Health Unit, because Walkerton was not in Simcoe County.

At approximately 10:00 p.m., Mr. McKay made another telephone call to the SAC to inform officials that he had had no success with the Barrie telephone number. As had been the case in his two previous calls to the SAC, Mr. McKay did not reveal his identity. The SAC official who responded to this call undertook to contact the local MOE office. Mr. McKay pointed out that Walkerton used an unlicensed operator, an issue he had discussed in previous months with MOE official Larry Struthers. He said that he thought that if he alerted the SAC to the fact that the Walkerton PUC violated rules, the SAC might dispatch an official to Walkerton more quickly.

Stan Koebel worked intensively to flush and increase the chlorination in the Walkerton water system. On May 20, he spent 12 hours, from 6:00 a.m. to 6:00 p.m., at various locations in the water system, including 130 Wallace Street, Ellen Avenue, the intersection of Highway 9 and Wallace Street (the location of the new main), and the Walkerton Fire Hall. Frank Koebel assisted him for part of the day. At 10:45 a.m., Stan Koebel decided to turn on Well 5, which had been out of service since May 15. The chlorine residual levels recorded by Stan Koebel on May 20 for Well 5, Well 7, and Mother Teresa School appear in Table 2.

It is unlikely that Mr. Koebel allowed 15 minutes of contact time before he measured the chlorine residuals at Wells 5 and 7. As I discuss in Chapter 4 of this report, the raw water at Well 5 was probably still contaminated. The chlorine residuals shown for Well 5 in Table 2 are not a reliable indicator of the residuals in the water that was entering the distribution system: those residuals were probably lower.

**Table 2     Chlorine Residual Measurements, May 20, 2000**

Mother Teresa School		Well 5	
6:30 a.m.	0.12 mg/L	11:00 a.m.	0.30 mg/L
12:25 p.m.	0.23 mg/L	5:30 p.m.	0.48 mg/L
3:40 p.m.	0.19 mg/L	6:00 p.m.	0.51 mg/L
Well 7			
6:00 a.m.	0.68 mg/L		
3:50 p.m.	0.70 mg/L		

It is noteworthy that the chlorine residual level at Mother Teresa School decreased from 0.23 mg/L at 12:25 p.m. to 0.19 mg/L at 3:40 p.m. This change is consistent with contaminated water from Well 5, which was turned on that morning, exerting a higher chlorine demand.

Results from MDS Laboratory Services Inc. on May 20 confirmed that there were high counts of *E. coli* and total coliforms on May 18 in samples submitted from the Highway 9 construction project. Three samples had been sent to MDS by Philip Analytical Services on behalf of its client B.M. Ross. Daniel Ormerod, an environmental analyst with MDS who had 12 years' laboratory experience in microbiology, conducted the analysis and read the plates. The results of the three samples in cfu/100 mL were as follows – sample 1: *E. coli* 9, total coliforms 26; sample 2: *E. coli* 14, total coliforms 43; sample 3: *E. coli* 10, total coliforms 78.

The results were reported on May 20 to both Philip Analytical and B.M. Ross. Because of the large amount of business transacted between MDS and Philip Analytical, MDS entered the results directly into Philip Analytical's computer via modem. MDS faxed the three sample results to B.M. Ross at approximately 3:00 p.m.

It was the practice of MDS to report municipal or drinking water samples that contained *E. coli* and total coliforms not only to its client but also to the local Medical Officer of Health and to the MOE's district office. However, Mr. Ormerod was unaware that these three samples were from a municipal water system. He had not seen the document from B.M. Ross to Philip Analytical on which "hydrant" was inscribed. Consequently, neither the local health unit nor the MOE received these results on the afternoon of May 20.

### **3.10 Sunday, May 21**

The outbreak of illness continued to expand on May 21, when more than 140 telephone calls were made to the Walkerton hospital by concerned members of the public. Many people suffering from diarrhea and abdominal pain were examined by the emergency department. Two more patients were admitted to the Owen Sound hospital.

When Gord Duggan, the news editor at local radio station CKNX, contacted Dr. Murray McQuigge on Sunday morning, he was informed that there were

several cases of diarrhea in the Walkerton area and that the Bruce-Grey-Owen Sound Health Unit was investigating the illnesses. Dr. McQuigge told the news editor that he was reasonably confident about the quality of the water and advised Mr. Duggan to contact the Walkerton PUC to obtain further information on the water supply.

The information provided to Mr. Duggan by Dr. McQuigge was the subject of radio newscasts on May 21 on both CKNX AM 920 and FM 102. The 11:00 a.m. report announced that a number of Walkerton residents were ill with diarrhea. It stated that the Walkerton hospital had received 100 calls from people suffering from diarrhea, that two children had been admitted to the Owen Sound hospital, and that one stool sample had contained *E. coli*. The newscast also reported that it was Dr. McQuigge's view that because the water in Walkerton was from a deep well, the system should be secure and not prone to contamination. The local Medical Officer of Health did not think the illnesses were related to the heavy rain and flooding in Walkerton in the previous week. The noon newscast on CKNX AM and FM repeated similar information with respect to illness in the community. It reported that local health unit officials were continuing their investigations throughout the weekend in an attempt to identify the source of the illnesses. It further stated:

McQuigge says the usual suspects are food or water and he says the incubation period for diarrhea puts the contamination well before last Friday's serious flooding. As for *E. coli*, McQuigge says that's also unlikely.

Shortly before noon, the laboratory at the Owen Sound hospital contacted the health unit to confirm the earlier presumptive *E. coli* O157:H7 result. This was the first confirmation of *E. coli* O157:H7 after Walkerton residents began to develop symptoms of diarrhea and abdominal pain. The lab also reported a presumptive result of *E. coli* O157:H7 for another patient. Upon receiving this notification, Mr. Patterson consulted with Dr. McQuigge and Clayton Wardell, the director of health protection, and recommended the issuance of a boil water advisory.

The boil water advisory, issued at approximately 1:30 p.m., stated:

The Bruce-Grey-Owen Sound Health Unit is advising residents in the Town of Walkerton to boil their drinking water or use bottle [*sic*] water until further notice. The water should be boiled for five

minutes prior to consumption. This recommendation is being made due to a significant increase in cases of diarrhea in this community over the past several days.

Although the Walkerton PUC is not aware of any problems with their water system, this advisory is being issued by the Bruce-Grey-Owen Sound Health Unit as a precaution until more information is known about the illness and the status of the water supply.

Anybody with bloody diarrhea should contact his or her doctor or local hospital.

It was decided by the health unit that the local AM and FM radio stations, CKNX and CFOS, would be contacted to announce the boil water advisory. In the past, the health unit had used radio announcements to transmit information on meningitis and rabies. It did not contact CBC Radio to disseminate information on the boil water advisory, nor did it use television on that day to inform residents that water should be boiled before consumption. Neither did it distribute handbills to the approximately 5,000 residents of Walkerton to alert them to the need for preventive measures.

Many individuals in the community did not become aware of the boil water advisory on that day. A report produced several months later by the Bruce-Grey-Owen Sound Health Unit, "The Investigative Report on the Walkerton Outbreak of Waterborne Gastroenteritis May–June 2000," indicated that only 44% of the respondents surveyed were aware on May 21 that a boil water advisory had been issued by the health unit, and that 34% of the respondents had heard the announcement on the radio.

The lack of notice was also confirmed by witnesses who testified at the Walkerton Inquiry. For example, Walkerton PUC employee Allan Buckle did not know that a boil water advisory had been issued for Walkerton until he returned to work on May 23, after the long weekend. As a result, until May 23 he did not boil water prior to consuming it. Similarly, Diana Adams, a Walkerton resident, was not aware of the boil water advisory until May 23. Ms. Adams did not generally listen to the CKNX or CFOS radio stations. During the May 2000 long weekend, she entertained family from Toronto, including her 79-year-old mother, at her Walkerton home. Her three children and other relatives drank Walkerton water throughout the weekend. On May 22, Ms. Adams' husband, the coach of their son's soccer team, attended a soccer

practice. He encouraged the team to drink water because it was a warm evening. His son drank two large bottles of Walkerton water. The Adamses' three children contracted *E. coli* O157:H7.

The 2:00 p.m. newscasts on the local FM and AM radio stations reported that the health unit had issued a boil water advisory for Walkerton residents and that approximately 100 people had called the hospital because they were experiencing diarrhea. The 3:00 p.m. newscasts reiterated that a boil water advisory was in effect, and advised residents either to use bottled water or to boil water for five minutes before consuming it. The newscasts reported that a large number of people were suffering from diarrhea and that the source of the illness had not yet been determined. Similar reports were made between 4:00 p.m. and 11:00 p.m.

Jack Gillespie, general manager of CKNX, explained to the Inquiry that the frequency of an announcement depends on the perception of the seriousness of the situation. He stated that if Dr. McQuigge had informed CKNX that the problem was urgent and that the announcement should be made in 15- or 30-minute intervals, the radio station would have done so.

Both Mr. Patterson and Dr. McQuigge testified that if the health unit were again confronted with a situation similar to that experienced on the May 2000 long weekend, they would not rely only on the local radio stations to transmit urgent information. In the words of Dr. McQuigge, "If we had to do it all over again, we'd have notified the TV stations too ... [W]e've learned out of this experience, we would have put it on TV stations." He also stated that in the future, handbills would also be delivered to the homes of local residents to communicate such information.

Shortly before the boil water advisory was issued, Dr. McQuigge contacted the mayor of Brockton, David Thomson. Dr. McQuigge testified that the mayor was told that people in Walkerton were ill and that a stool culture from a patient had contained *E. coli*. He explained that the disease was serious and that people could die, and he read the text of the boil water advisory to the mayor.

Dr. McQuigge asked Mayor Thomson if he was aware of any potential food-borne sources of the illnesses. The mayor responded that on May 13, a band had played in the Walkerton arena and that pizza, pop, and candy floss had been sold. Dr. McQuigge did not think that these foods were responsible for the infections. In a discussion regarding whether the water could be the source

of the illnesses in the community, Dr. McQuigge indicated that he had contacted the Walkerton PUC and had been assured that the water was safe.

At the Inquiry, Mayor Thomson recalled that he had had two calls from Dr. McQuigge. He testified that after his calls with Dr. McQuigge on May 21, he did not believe that a threat to public health existed in Walkerton. In his evidence, Mayor Thomson did not recall that Dr. McQuigge had mentioned *E. coli* or the symptoms of people who were sick. It seems likely that Dr. McQuigge would have mentioned these matters, but in any event, the mayor was aware people were sick and that Dr. McQuigge had issued a boil water advisory because of his concern about the water and the health of the community. Dr. McQuigge did not, however, ask the mayor to do anything in response to the boil water advisory, and the mayor did not do anything. He did not contact anyone – the PUC chair, town council, hospitals, or police or fire departments – nor did he invoke the municipality’s recently developed emergency plan, the purpose of which was to provide measures to protect the health of inhabitants.

When James Kieffer, chair of the Walkerton PUC, learned on May 21 that a boil water advisory was in effect for the Town of Walkerton, he did not believe that the consumption of municipal water constituted a serious risk to the residents of Walkerton. Mr. Kieffer contacted Stan Koebel on May 21 and was informed that Mr. Koebel was flushing the water system and that the chlorine levels had been increased. Mr. Kieffer and his family continued to drink unboiled water until May 23.

In the early afternoon of May 21, Dr. McQuigge placed a call to the SAC to inform officials that there was an *E. coli* outbreak in Walkerton. Paul Webb, an SAC official, made reference to an anonymous caller who had reported that adverse results had been received by the Walkerton PUC. He also stated that there was watermain construction in Walkerton and that the chlorine residual level in the system was 0.1 mg/L. Both the health unit and the SAC discussed the reassurances from the PUC regarding the quality of the water. Dr. McQuigge said, “We’re really into something ... [W]e’ve got over 120 cases of something and we think it’s *E. coli*, bloody diarrhea.”

At approximately 2:00 p.m., Mr. Patterson contacted Stan Koebel to discuss the boil water advisory. Mr. Koebel was clearly anxious: he told Mr. Patterson that he wished the health unit had given him advance notice of the boil water advisory. Mr. Koebel reported that the chlorine residual levels in the system

were 0.34 mg/L and 0.43 mg/L and that there had been flushing for 16 hours at Mother Teresa School. When Mr. Koebel asked for advice, Mr. Patterson responded that although this was not his area of expertise, he thought the chlorine levels in the system should be increased.

That afternoon, the SAC received a further call from the health unit and was informed that there were 2 confirmed cases of *E. coli* O157:H7 and 50 cases of bloody diarrhea. The SAC also called Mr. Koebel to discuss the *E. coli* cases and the boil water advisory. Again, Mr. Koebel did not disclose the May 17 A&L report indicating the presence of *E. coli* in the water distribution system. At the hearings, Mr. Koebel was asked whether he deliberately avoided disclosing adverse results from samples collected on May 15. His response was, "I guess that's basically the truth." I am sure that Mr. Koebel hoped that the lab results from samples to be collected on May 23 would indicate that total coliforms and *E. coli* were no longer present in the Walkerton system.

Assisted by his brother Frank, Stan Koebel flushed the Walkerton system for approximately three and a half hours on May 21. He flushed for a shorter period of time and at fewer locations than he had the previous day, because "with the amount of chlorination we were getting into the system, [I] thought it would help to have the chlorine ... settle in and kill off the bacteria." Well 5 did not operate for most of the day: it had been shut down at 1:15 a.m. on May 21. Flushing began at the site of Mother Teresa School on May 21. The chlorine residual measurements recorded by Mr. Koebel for May 21 are shown in Table 3.

After the boil water advisory was issued, the health unit established a strategic team to address the outbreak in Walkerton. The team met twice a day. A strategic team meeting was convened at 2:30 p.m. to develop a coordinated approach to the Walkerton outbreak. It was attended by Dr. McQuigge, Clayton Wardell, David Patterson, Beverly Middleton, and Mary Sellars. A review of events to date was presented, and the information provided by Stan Koebel to the health unit was discussed. The discussion concerned watermain construction at the PUC, the installation of the new chlorinator, the flushing of the system, and the chlorine residual levels of 0.34 mg/L and 0.43 mg/L. Ms. Middleton was asked to notify Maple Court Villa and Brucelea Haven, as well as the hospitals in Walkerton, Bruce-Grey, Mount Forest, and Wingham, that a boil water advisory had been issued by the health unit, that *E. coli* O157:H7 was the suspected illness, and that a case number had been assigned for all laboratory tests connected with the outbreak. The MOE, the Bluewater

**Table 3 Chlorine Residual Measurements, May 21, 2000**

<b>Mother Teresa School</b>	
12:05 p.m.	0.32 mg/L
12:30 p.m.	0.34 mg/L
3:30 p.m.	0.30 mg/L
<b>902 Yonge Street</b>	
10:45 a.m.	0.34 mg/L
4:15 p.m.	0.39 mg/L
7:15 p.m.	0.48 mg/L
9:15 p.m.	0.69 mg/L
<b>7 Brown's Avenue</b>	
3:40 p.m.	0.46 mg/L
<b>Well 7</b>	
12:45 p.m.	0.78 mg/L
1:15 p.m.	0.89 mg/L
2:40 p.m.	0.92 mg/L
3:00 p.m.	1.34 mg/L
<b>130 Wallace Street</b>	
12:20 p.m.	0.10 mg/L
3:20 p.m.	0.20 mg/L
<b>Fire Hall</b>	
12:55 p.m.	0.47 mg/L
<b>4 Park Street</b>	
12:00 p.m.	0.26 mg/L
4:00 p.m.	0.38 mg/L

School Board, and the Bruce-Grey District Catholic School Board were also to be notified of the boil water advisory by health unit staff.

Although the hospitals and school boards were apprised of the Walkerton outbreak and the boil water advisory on May 21, neither Maple Court Villa nor Brucelea Haven was contacted by the health unit. Ms. Middleton testified that this was an oversight on her part. As a result, not until May 23 were these institutions informed by the health unit that water should be boiled before consumption. Dr. McQuigge stated that this omission could have placed the elderly at an increased risk of contracting *E. coli* O157:H7. Fortunately, both Brucelea Haven and Maple Court Villa had, on their own initiative, taken steps to ensure that these facilities' residents did not drink water from the Walkerton system. The health unit had also not notified the Walkerton Jail, which had 30 inmates and 39 staff members, of the boil water advisory on May 21. On May 22, several staff were ill and inmates began to develop flu-like symptoms. The nurse who examined the inmates learned of the boil water advisory later that day and informed the Walkerton Jail.

The Walkerton hospital was informed of the boil water advisory at 3:30 p.m. on May 21. Before that, hospital staff had not been aware that water was under

investigation by the health unit as a possible cause of the outbreak. In the 48-hour period between May 19 and May 21, although hospital staff had communicated with the health unit at least five times, the health unit had never informed the hospital that water was a possible source of transmission of the illnesses. In fact, Ms. Middleton had told hospital staff on at least two occasions that it was not necessary to boil the water. She believed that if water was responsible for the illnesses, the contamination would likely have occurred on the weekend of May 12 and that the bacteria were no longer in the water supply by May 19.

When the Walkerton hospital was notified of the boil water advisory on May 21, its building services department was instructed to shut off the water supply to the drinking fountains, post signs on the ice machines, and obtain an alternative source of water. The hospital's food services department purchased water from a local store for the evening and made arrangements with a supplier to deliver ice and water the following morning. Staff in food services were instructed to discard food that had been prepared with water, including juice, Jell-O, and vegetables that had been rinsed in tap water. The patient units of the hospital were advised to empty water jugs and not to use ice. Nurses discussed measures to be adopted with patients, such as using bottled water for drinking and brushing teeth, using waterless handwashing solution, and giving no baths, except to newborns, who were to be immersed in water that had been boiled and then cooled.

Over the next few days, the Walkerton hospital implemented a number of additional measures: bleach was used to wash dishes; there was a shift from a water-based to a chemical-based disinfection system for hospital equipment; the laundry department added a chemical to the rinse cycle; changes were made to products used by cleaning staff at the hospital; and an infection control nurse was made available for consultation.

The MOE also received notification of the boil water advisory from the health unit on May 21. When Philip Bye, the MOE's district supervisor in Owen Sound, arrived at his home on Sunday at 5:30 p.m., there was a message on his answering machine from the health unit's Clayton Wardell. The MOE official learned that there were 2 cases of confirmed *E. coli* O157:H7 and 50 cases of bloody diarrhea in Walkerton and that water was suspected to be the source of transmission in the illnesses. Mr. Bye was unaware that the presence of *E. coli* O157:H7 in the water system could result in deaths.

In a discussion with Mr. Wardell that evening, Mr. Bye reported that he was not aware of any significant events in connection with the Walkerton water system. Mr. Bye did not recall the 1998 MOE inspection report of the Walkerton system, nor was he aware of the April 2000 adverse results.<sup>6</sup>

Mr. Bye did not contact John Earl, the emergency response official on duty at the Owen Sound office, on May 21. At the time, he thought that the MOE did not need to become involved, because a boil water advisory had been issued, the health unit was investigating the source of the illnesses in the community, and the Walkerton PUC had increased chlorine levels and was flushing the water system.

By the early evening of May 21, the health unit had notified the Minister of Health and the Chief Medical Officer of Health of Ontario of the Walkerton outbreak and the boil water advisory. It discussed with Dr. Monica Naus of the Ministry of Health the need for assistance from hospitals in London and Toronto to treat Walkerton residents who were ill. It also investigated the availability of dialysis machines for pediatric cases of hemolytic uremic syndrome (HUS) and decided that ill children under the age of five should undergo a blood test every second day to determine whether they had renal failure. Dr. McQuigge asked the Ministry of Health to arrange to obtain the assistance of an epidemiologist from the federal government.

The number of Walkerton residents affected by the infection continued to rise throughout the day; by May 21, the Walkerton hospital had received a total of 270 calls from concerned individuals regarding symptoms of diarrhea and serious abdominal pain. A child was airlifted from Walkerton to London for medical attention. The health unit decided to assign more staff to investigate the outbreak.

David Patterson instructed James Schmidt to collect 20 water samples at various locations in Walkerton, including food premises, hospitals, and the health unit office. The health unit had made arrangements with the Ministry of Health laboratory in London to analyze these samples for bacteriological contamination. On the evening of May 21, Mr. Patterson obtained the water samples from Mr. Schmidt and left for London by car at midnight to deliver the samples. Mr. Patterson instructed Mr. Schmidt to repeat the sampling the

---

<sup>6</sup> The inspection report and the April adverse results are discussed in Chapters 4 and 9 of this report.

next day and to transport the second set of samples to the laboratory in London by 3:00 p.m.

### 3.11 Monday, May 22

The Walkerton outbreak continued to escalate. By Monday morning, 90 to 100 cases of *E. coli* had been reported to the health unit. The Walkerton hospital and other area hospitals continued to examine and receive calls from many patients who had symptoms of diarrhea, abdominal pain, and nausea. Brockton's mayor, David Thomson, was ill with diarrhea, stomach cramps, and nausea. Although he lived outside of town, he had consumed a few glasses of municipal water at an awards presentation in Walkerton on May 19. He assumed that he had contracted the flu and did not associate his symptoms with the outbreak in the community.

Neither Mayor Thomson nor the chair of the Walkerton PUC, James Kieffer, initiated any action on May 22 with respect to the boil water advisory or the suspected problems with the municipal drinking supply. The mayor thought that the health unit was investigating the situation and that Dr. McQuigge would contact him if the Walkerton water was the source of the illnesses.

When the MOE's Philip Bye was told on the morning of May 22 that Walkerton had approximately 100 cases of *E. coli* and that the health unit was reasonably certain that the water supply was the source of transmission of the illnesses, he did not immediately initiate an MOE investigation. It was only when Dr. McQuigge contacted Mr. Bye later that day to stress the urgency of the situation and the need for the MOE's involvement that Mr. Bye dispatched environmental officer John Earl to the Walkerton PUC. Mr. Earl was instructed to contact Mr. Patterson before meeting Stan Koebel and to obtain any information sought by the health unit.

Mr. Patterson provided Mr. Earl with detailed information on the outbreak: the "alarming" number of cases that had been reported to the local hospitals, the laboratory confirmation of *E. coli* O157:H7, and the imposition of the boil water advisory the previous day. He explained that the health unit had investigated group picnics, barbecues, and community events but could not explain the sudden and alarming rise in gastrointestinal disease in Walkerton. Mr. Patterson stated that the water system was highly suspect and that water samples had been sent by the health unit for testing at the Ministry of Health

laboratory in London. He then asked Mr. Earl to obtain from the Walkerton PUC copies of the microbiological test results for the past two weeks, the chlorine residual levels at the wells and in the distribution system, the water flow records in this two-week period, and a map of the water distribution system. Mr. Patterson also asked for documentation on the recent construction and on disinfection procedures for the new watermain as well as for information on unusual events that had occurred in recent weeks. Finally, he asked Mr. Earl to investigate any breaches in the system.

Before leaving for the Walkerton PUC on the afternoon of May 22, Mr. Earl contacted the SAC to obtain information about the anonymous caller. He was provided with a copy of the occurrence report completed by Mr. Johnston in response to the May 20 call, which stated:

Caller reports adverse water samples were found in the Walkerton distribution system on 2000/05/18. Caller reports new watermain is going into service and PUC is flushing mains.

Because the anonymous caller seemed to have detailed information on the operation of the Walkerton water system, Mr. Earl thought that the contamination of the water system might be the result of intentional acts. He decided to ask Stan Koebel if there had been problems with discontented PUC staff.

When Mr. Earl arrived at the Walkerton PUC at 4:00 p.m. on May 22, Wells 5 and 7 were operating. Mr. Koebel explained that only in peak periods – those in which water demand was high – would Wells 5, 6, and 7 operate simultaneously. He also told Mr. Earl that a new chlorinator had recently been installed at Well 7.

Mr. Earl asked Mr. Koebel whether there had been any unusual events in the past two weeks. Mr. Koebel responded that Well 6 had been “knocked out” by an electrical storm, but that no unusual events had occurred in the past 14 days. Mr. Koebel did not mention the much more significant information that Well 7 had operated without a chlorinator from May 3 to May 9 and from May 15 to May 19 and that water samples collected on May 15 had contained *E. coli* and total coliforms.

The heavy rainfall and flooding of the previous weekend were discussed in the context of the potential contamination of the system by surface water. Mr. Koebel believed that surface water could have entered the system through

the overflow pipe at Well 7. He explained that over the past few days he had flushed the watermains at various locations and had increased the chlorine residuals at the pumping wells.

Mr. Earl asked Mr. Koebel whether there were any problems with staff at the Walkerton PUC. Mr. Koebel replied that PUC employees were anxious that the Municipality of Brockton would assume control of the operation of the Walkerton water system but that he did not think that an employee had sabotaged or intentionally contaminated the system. Staff qualifications were also discussed. Mr. Earl was told that Stan and Frank Koebel were the primary operators of the water system and that they were certified; however, an unlicensed PUC employee occasionally monitored the Walkerton system.

At Mr. Earl's request, Stan Koebel provided a number of documents, including the following:

- a copy of Stan Koebel's notes describing his activities at the Walkerton PUC from May 19 to May 22 (this confirmed that the PUC manager had been chlorinating and flushing the system throughout the weekend);
- the A&L Canada Laboratories report of May 5, which indicated that total 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," with the "Well 7 treated" sample showing greater than 200 cfu/100 mL of total coliforms and of *E. coli*, as well as a heterotrophic plate count (HPC) of 600 cfu/1 mL;
- maps that identified the streets and watermains in Walkerton (on one of the maps, Mr. Koebel indicated the location and diameter of the watermains replaced in 2000);
- daily pumping data for April 2000, which indicated that Well 7 did not operate during this month; and
- daily operating sheets for Wells 5 and 6 for May 2000.

Mr. Earl asked Mr. Koebel to obtain documentation relating to the construction of the mains and the disinfection procedures from the firms involved in

the watermain construction. He collected raw and treated samples from Well 7, as well as samples from the PUC office on 4 Park Street. Mr. Koebel told Mr. Earl that the daily operating sheet for Well 7 was not available and that it could be picked up the following day. I am satisfied that Mr. Koebel intended to revise that sheet so as to conceal the fact that Well 7 had operated without chlorination.

Mr. Earl arrived at the MOE office in Owen Sound at 6:00 p.m. and reviewed the Walkerton PUC documents. He learned from the May 17 A&L report that the water supply had had high *E. coli* counts. Mr. Patterson had specifically asked Mr. Earl earlier that day to obtain, from the PUC, adverse water sample results for the past two weeks. Although Mr. Earl knew that the health unit had conducted water sampling at different sites in Walkerton and was awaiting results from the Ministry of Health laboratory in London, he did not inform either the health unit or his supervisor, Mr. Bye, of these results on May 22. He testified that he did not consider the situation to be urgent, because a boil water advisory had been issued for the Town of Walkerton.

Throughout May 22, Stan Koebel continued to flush and increase the chlorination levels of the water system. At 11:00 a.m., he activated Well 5, which had been out of service the previous day. The chlorine residual was 0.64 mg/L. At Well 7, the following readings were recorded by Stan Koebel: 1.10 mg/L at 8:10 a.m. and 1.24 mg/L at 9:10 a.m.

The PUC manager also flushed at Mother Teresa School, 130 Wallace Street, the Fire Hall, and 34 William Street. The chlorine residuals at various locations, as reported by Stan Koebel, are reproduced in Table 4.

At 6:30 p.m., the health unit's outbreak team met to plot an epidemiological curve. At the health unit's request, the Walkerton, Hanover, and Owen Sound hospitals had forwarded patient line-listings – the names of patients who had been examined at these hospitals – to the health unit. Throughout May 22, public health staff contacted these patients to obtain their residential addresses as well as information about onset dates of symptoms, the patients' consumption of Walkerton water, and the dates that stool samples had been collected from the patients.

As the outbreak team began to plot the epidemiological curve, it became apparent that most individuals in Walkerton had become ill at about the same time. The peak of the onset of symptoms occurred on May 17, indicating that

**Table 4 Chlorine Residual Measurements, May 22, 2000**

<b>Mother Teresa School</b>		<b>130 Wallace Street</b>	
7:30 a.m.	0.20 mg/L	7:45 a.m.	0.77 mg/L
11:05 a.m.	0.38 mg/L	<b>34 William Street</b>	
<b>902 Yonge Street</b>		10:45 a.m.	0.38 mg/L
7:00 a.m.	0.58 mg/L	3:00 p.m.	0.26 mg/L
11:45 a.m.	0.70 mg/L	<b>6 Campbell Street</b>	
<b>Fire Hall</b>		9:40 a.m.	0.75 mg/L
9:20 a.m.	0.89 mg/L	<b>4 Park Street</b>	
<b>7 Brown's Avenue</b>		4:00 p.m.	0.68 mg/L
11:30 a.m.	0.66 mg/L		

the illnesses appeared to be attributable to a common event. The health unit officials believed that the likely dates of transmission of *E. coli* O157:H7 were May 12, 13, and 14.

A large map of Walkerton was placed on the wall of the health unit’s office, and the patients’ addresses were highlighted on it. When the process was complete, the map was, in the words of Mr. Patterson, “covered with yellow highlighting.” The infection was widespread – the patients lived throughout the area served by the Walkerton water distribution system.

On the evening of May 22, the health unit concluded that the municipal water supply was causing the *E. coli* O157:H7 outbreak in Walkerton. Although the health unit had not been informed of the May 17 adverse microbiological report from A&L, both the epidemiological curve and the highlighted map indicated that water was the common element linking the residents.

**3.12 Tuesday, May 23**

John Earl returned to the Walkerton PUC on the morning of May 23 to obtain the outstanding documents from Stan Koebel and to collect more samples from the pumphouses. He was given the annual water records from 1997 to April 2000. Mr. Earl was also provided with the daily operating sheet for Well 7, which had been altered by Frank Koebel on May 22 or 23 on Stan

Koebel's instructions. Stan Koebel had asked his brother to "clean up" the May 2000 daily operating sheet for the MOE because "it was a mess" and "the arithmetic was bad." Frank Koebel completed a new daily operating sheet for Well 7 and destroyed the original one. The intent of creating the new sheet was to conceal the fact that Well 7 had operated in May without a chlorinator.

The daily operating sheet as amended by Frank Koebel indicated that Well 7 did not operate between May 3 and May 9. Those were in fact some of the dates in May on which Well 7 pumped unchlorinated water into the distribution system. Frank Koebel also entered chlorine residual levels in the daily operating sheet for May 11, 12, and 13 – days on which there was no chlorinator at Well 7 and on which that well did not operate. For those dates, he inscribed numbers under the column "chlorine used in previous 24 hours."

Similarly, a chlorine residual level of 0.3 mg/L was entered for May 18, as well as a level of 0.5 mg/L for May 19 at 10:15 a.m. (The chlorinator at Well 7 had not been installed until noon on May 19.) At the Inquiry, Frank Koebel stated, "I'll have to take responsibility" for the fictitious numbers. He testified that he had composed these numbers on the daily operating sheet for Well 7 "so it would look better to the MOE."

After Mr. Earl was provided with these documents, he collected samples from each of the wells and from the distribution system and took photographs of Well 7.

In his review of the daily operating sheets from May 2000, Mr. Earl observed that Wells 5, 6, and 7 did not appear to operate between May 3 and May 9. He thought this was unusual. He also found "questionable" the chlorine residual measurements for Well 5, which were all 0.75 mg/L. Mr. Earl communicated his observations to his superior, Philip Bye. He also told Mr. Bye that the A&L report dated May 17 had indicated that *E. coli* and total coliforms were present in samples labelled "Well 7" and that this well had operated without disinfectant for several days in May. This information was not conveyed to the health unit by either Mr. Earl or Mr. Bye on May 23.

On the morning of May 23, the health unit received results from the Ministry of Health laboratory in London regarding the first set of samples collected at various sites in Walkerton. Two samples contained *E. coli* and total coliforms: the sample from a store on Yonge Street west of Highway 9 had a level greater than 80 total coliforms and 69 *E. coli*, and the sample from the Bruce County administrative building had 2 coliforms and 2 *E. coli*. These two locations

were served by “dead ends” in the Walkerton distribution system. Although the testing process was not completed for the second set of samples submitted by the health unit, coliforms were already visible in some of the samples.

Mr. Patterson immediately contacted Mr. Bye to inform him of these results. He also conveyed the findings of the outbreak team regarding the epidemiological curve and the Walkerton map indicating that residents from all sections of the town had contracted the infection. Again, the MOE did not inform the health unit of the failed results from samples collected at the PUC on May 15.

At approximately 9:45 a.m., Mr. Patterson called Stan Koebel to notify him of the adverse results received by the health unit and asked him for the date of the last set of microbiological tests from the Walkerton PUC. When Mr. Koebel replied that samples had been collected on May 15, there was silence, and he then told Mr. Patterson for the first time that those samples had failed. He also told Mr. Patterson that the chlorinator had operated intermittently. Mr. Koebel was distraught. He testified that he realized then that his attempts at flushing and chlorinating the system from May 19 to May 22 had not been successful in eradicating the contamination. When he asked Mr. Patterson for advice, Mr. Patterson told him to be open and honest and to inform the PUC commissioners of what had transpired.

Mr. Patterson immediately informed Dr. McQuigge and the chair of the board of health, Bill Twaddle, about the adverse results from the May 15 samples. Dr. McQuigge called Brockton mayor David Thomson to request a meeting between the health unit and the Brockton municipal council. Mr. Bye was also asked to attend the meeting. Initially, the meeting was to be held at Newman's Restaurant in Walkerton, but it was rearranged to be held in the Brockton council chambers because this venue was considered to be more appropriate. Although there are discrepancies in the evidence about the arrangements for this meeting, I think nothing turns on the differences.

At approximately 11:30 a.m., Dr. McQuigge held a joint press conference at the Walkerton hospital with the hospital staff to communicate to the public the seriousness of the situation and to advise the public of precautions to be taken. He reported that since May 18, a total of 160 patients had been examined at the Walkerton, Owen Sound, and Hanover hospitals and that 400 calls had been received from concerned members of the public. Eleven people had been admitted to hospital, and three patients were in serious condition. Dr. McQuigge discussed the positive *E. coli* results from samples analyzed by

the Ministry of Health laboratory and stated that exposure to the infection likely occurred on May 12, 13, or 14. He explained that the risk of renal failure was 7% and that the death rate was expected to be between 1% and 3%. Intravenous support and dialysis were the sole forms of treatment. Dr. McQuigge cautioned that antibiotics and diarrhea medications should not be administered to ill persons, because they increased the risk of hemolytic uremic syndrome (HUS).

The meeting at Brockton council chambers, which began at 2:15 p.m., was attended by officials from the health unit, the MOE, the PUC, and the Municipality of Brockton. Dr. McQuigge reviewed the chronology of events from May 19. He stated that water linked the illnesses and that an event between May 12 and May 15 was responsible for the outbreak. *E. coli* O157:H7 had been confirmed in nine patients, and a 2-year-old child was on life support. Dr. McQuigge said that the situation was serious. In fact, a 66-year-old woman had died on May 22 and the 2-year-old child he mentioned died on May 23.

Mr. Bye announced at the meeting that the MOE was initiating an investigation of the Walkerton water system. He suggested four ways in which the water could have become contaminated: watermain replacement, backwash through the floodgate at Well 7, the failure of the chlorinator, and the contamination of sumps or cisterns due to flooding. Mr. Bye recommended increasing the chlorine levels in the water system, urged the Municipality of Brockton to take immediate action, and suggested that an independent agency assume control of the water system and that the municipality contact its engineering firm. The PUC would be required to report to the MOE on measures initiated to address the problems. Mr. Bye stated that he was prepared to meet with municipal officials and the engineering firm the next morning.

Stan Koebel was then asked by Dr. McQuigge whether he wished to contribute to the meeting. The PUC manager began to discuss the new watermain, and it became evident that he had no intention of disclosing the events that had compromised the quality of Walkerton's drinking water. He did not discuss the adverse results received from A&L the previous week, nor did he reveal that Well 7 had operated without a chlorinator. Dr. McQuigge became agitated. He interrupted Mr. Koebel and said, "Stan, come clean." He asked Mr. Koebel probing questions. Mr. Koebel admitted that samples collected at the PUC on May 15 had failed the microbiological tests. He said that intensive

flushing and chlorination of the water system began on May 19, but he did not disclose that Well 7 had operated without chlorination.

Dr. McQuigge told participants at the meeting that the *E. coli* outbreak in Walkerton was unprecedented in Canada. Members of the municipal council asked Dr. McQuigge a number of questions about the timing and the issuance of the boil water advisory. When he was asked whether the public could have been notified of the outbreak at an earlier date, Dr. McQuigge stated that the health unit had been aware of only two cases of bloody diarrhea on May 19. On May 20, some individuals who resided outside Walkerton were ill, which created confusion as to whether the outbreak was confined to the town. However, by May 21, the volume of calls received by the Walkerton hospital, as well as the positive stool cultures, confirmed that the problem was in Walkerton. It was also learned that an ill patient in Hanover had consumed water in Walkerton. Dr. McQuigge stated that the health unit continued to investigate the source of transmission of the infection and, despite assurances from the PUC, believed that the common link was the water. As a precautionary measure, the health unit issued a boil water advisory on May 21 at 1:30 p.m.

In response to a question regarding the dissemination of information on the boil water advisory, Dr. McQuigge said that he had contacted Mayor Thomson and the local radio stations on May 21. In his view, the holiday weekend had had no impact on the time at which the public was notified of the boil water advisory. He told officials at the meeting that it was not until May 23 that the health unit had conclusive evidence that the municipal water was responsible for the illnesses in the community.

At about 3:30 p.m., as members of the health unit began to leave the meeting, words were exchanged privately between Dr. McQuigge and Mayor Thomson. Their versions of what was said differ, and much was made of this during their evidence at the Inquiry. It was Dr. McQuigge's evidence that he said, "Dave, now's the time to tell the public what you know." The mayor, on the other hand, testified that Dr. McQuigge said, "Don't you blow the whistle on me or Brockton will ... " I am satisfied that Dr. McQuigge's version is the more probable. It does not make sense to me that he would have said what the mayor recalls. I am satisfied that the mayor was simply mistaken in this regard.

After Dr. McQuigge and his staff left the meeting, Mayor Thomson, Richard Radford, and other officials from the Municipality of Brockton remained to discuss the events. It was decided that contact would be made with Steve Burns

of the engineering firm B.M. Ross and Associates Ltd., and a municipal council meeting was scheduled for later that afternoon.

The council meeting held in the late afternoon of May 23 was attended by both Mr. Burns and Stan Koebel. Mr. Koebel told council members that historically there had been bacteriological problems at Wells 5 and 7. He also stated that the chlorinator at Well 7 had not functioned properly. Still he did not say that Well 7 had operated in May without a chlorinator. He explained that samples collected by the PUC on May 15 had failed but said that he had not read the laboratory report until May 18 or May 19. Mr. Koebel stated that beginning on May 19, the date on which he received a call from the health unit, he had increased the chlorine residuals and that he had flushed the system throughout the May long weekend (May 20–22).

At the meeting, Mr. Burns indicated that his firm would develop an action plan for the MOE, the components of which he had discussed with Mr. Bye. The purposes of the action plan were to determine the cause of the contamination, to remedy the problem, and to ensure the proper operation of the water system. Mr. Burns said that he would continue to chlorinate and flush the system and that he had shut down Well 5 because it was a shallow well.

Before the meeting was adjourned, those at the council meeting discussed the prospect of declaring a state of emergency under the Ontario *Emergency Plans Act*. Mayor Thomson and council members took the position that Mr. Burns had the skills necessary to rectify the problems in the water system and, after receiving legal advice, concluded that there was no point in declaring an emergency pursuant to the statute.

### **3.13 May 24 to May 31**

In the last week of May, the Walkerton hospital continued to receive many calls from individuals who were vomiting and suffering from diarrhea. Staff hours in both the laboratory and the emergency department of the hospital doubled, and the number of patients examined remained high. According to statistics compiled by the hospital, the greatest number of emergency room registrations per day in April 2000 was 55. This number is to be contrasted with the number of patients who visited the Walkerton hospital's emergency department from May 24 to May 31, as shown in Table 5.

**Table 5      Patient Visits, Walkerton Hospital Emergency Department,  
May 24–31, 2000**

Date	Number of Patients
May 24	113
May 25	117
May 26	106
May 27	111
May 28	87
May 29	116
May 30	64
May 31	106

By May 24, some patients had developed mixed infections of *Campylobacter* and *E. coli* O157:H7. The symptoms for *Campylobacter* are similar to those for *E. coli* – diarrhea and abdominal pain. By May 24, four people, including a two-year-old child and a resident at Brucelea Haven, had died. Several patients were transported by air or ground ambulance from Walkerton to London for medical attention.

Physicians at the Walkerton hospital sought additional medical and support staff to meet the needs of the community. Elective surgery was cancelled. The maternity ward of the hospital was closed, and patients were transported to hospitals in Owen Sound, Hanover, and Kincardine. A pediatrician from Toronto’s Hospital for Sick Children travelled to Walkerton and remained at the site of the Walkerton hospital until June 14. Julie Stratton, an epidemiologist from Health Canada, arrived in Walkerton on May 24 to assist the Bruce-Grey-Owen Sound Health Unit. She was later joined by Dr. Jeff Wilson of Health Canada’s Laboratory Centre for Disease Control and Dr. Andrea Ellis of Health Canada’s Centre for Infectious Disease Prevention and Control.

The health unit at this time was concerned that its credibility was being challenged. Some individuals in the community were criticizing it for not having issued a boil water advisory until May 21, and at a meeting of the outbreak team on May 24, David Patterson stated, “There have been complaints from the public with finger-pointing and lots of anger.”

Dr. McQuigge decided that he would make public statements through the media to maintain the credibility of the health unit. At the Inquiry, he testified:

At that time, the health unit's credibility was being called into question ... and we very much needed the public to believe that we were a credible agency, because we were giving a great amount of advice that we really needed the public to follow and that they really needed to follow in order not to get any sicker.

Dr. McQuigge was concerned that Mayor Thomson had not disclosed to the public that the Walkerton PUC had received adverse results during the week of May 15 and that the chlorinator had not been functioning properly for some time. He wished to explain to the public that the health unit had waited two days to issue a boil water advisory because it had not been notified of these adverse results or that a chlorinator had not functioned properly for a period of time.

On May 25, Dr. McQuigge read a prepared statement on CTV's *Canada AM* and CBC Radio's *Metro Morning* program in Toronto. On *Canada AM*, he stated that the health unit had contacted the Walkerton PUC on May 19 and May 20 and had been told on those occasions that the water was safe and secure. The health unit had not been informed of the results of samples collected on May 15 indicating the presence of *E. coli* and total coliforms in the water distribution system. Nor had it been aware on these dates that the chlorinator at Well 7 had not been functioning properly. Despite assurances from the PUC, the health unit had decided to advise the people of Walkerton on May 21 not to drink the water. As a result of these non-disclosures, it had focused its investigation on potential food sources for the illnesses pervading the community. Not until May 23 had it become aware of this undisclosed information from the PUC.

Dr. McQuigge was interrupted by *Canada AM* host Wei Chen as he read the public statement, and in response he stated that deaths could have been prevented if the Walkerton PUC had notified the health unit when it received the laboratory results on May 17. A similar statement was made by Dr. McQuigge on *Metro Morning*, hosted by Andy Barrie:

[T]his is a statement I would much prefer not to have made. Yesterday, there were questions of the Chief Medical Officer of Health of

Ontario and myself about whether we acted with all possible speed to warn the citizens of Walkerton that their water might be contaminated. I would like to discuss this and tell you what we know now ...

Last night the Chief Medical Officer of Health in Ontario and myself decided that we could no longer wait for the results of the Ministry of the Environment's investigation. We felt that the people and public of Walkerton should know that what has happened and is happening is not a mystery. This could have been prevented ...

People have died and people may die yet. I am saddened by that because I think this could have been prevented.

At the Inquiry, much was made of the fact that Dr. McQuigge's comments were inaccurate and reflected badly on people other than Stan Koebel, including possibly the mayor. Dr. McQuigge testified that in his opinion, the deaths in Walkerton would probably not in fact have been prevented even if the sample results from the PUC had been reported to the health unit on May 17 or May 18 and a boil water advisory had been issued at that time; he stated that the number of people infected with *E. coli* O157:H7 might have been reduced if the health unit had issued a boil water advisory on May 17 or May 18 rather than May 21.<sup>7</sup> It is unfortunate that Dr. McQuigge's comments to the media on May 25 were not entirely accurate, but I accept that he needed to make a statement for the reason he articulated and that his misstatements were entirely innocent and understandable, given the pressure he was under and the circumstances leading up to his statement.

At this time, remedial actions were initiated at the Walkerton PUC. Mr. Burns presented the action plan at a meeting on May 24 that was attended by officials from the Municipality of Brockton and the MOE. Tony Emonds, a drinking water specialist at the MOE office in Toronto, commented that the action plan was reasonable and appropriate. Mr. Burns and MOE officials toured the Walkerton water system. Mr. Emonds observed that the system's first consumer was in close proximity to Well 5. When the potentially offending overflow pipe at Well 7 was examined, Mr. Emonds noticed "sewage or similar

---

<sup>7</sup> I note that the epidemiological evidence discussed in Chapter 4 of this report indicates that a boil water advisory on May 18 could possibly have prevented one death. As stated in Chapter 10 of this report, I think it is too speculative to discuss the possibility of a boil water advisory on May 17.

waste water type sludge ... visible in grass feet from the discharge point.” The MOE officials collected water samples from various sites at the PUC.

On May 25, A&L faxed to the Walkerton PUC the results of the water samples that had been collected on May 23. A&L reported high counts of *E. coli* and total coliforms in the “raw” water sample from Well 5: 200 total coliforms (cfu/100 mL), 33 *E. coli* (cfu/100 mL), and a heterotrophic plate count of 9 (cfu/1 mL). The samples from Well 7 “raw” contained 15 heterotrophic units (cfu/1 mL), and those from 4 Park Street contained 3 heterotrophic units (cfu/1 mL). The samples from 130 Wallace Street, Well 7 treated, 125 Durham Street, and 902 Yonge Street were all negative by the presence-absence test.

Upon receiving these results, Stan Koebel contacted Robert Deakin at A&L and asked Mr. Deakin if he could recall their conversation of May 18. Mr. Deakin thought that this comment was “very strange,” because the date of his conversation with Mr. Koebel had been May 17 – the day the two faxes with the adverse “rush” hydrant sample results and the distribution sample results were sent to the Walkerton PUC.

On May 25, the Municipality of Brockton decided to retain the Ontario Clean Water Agency to operate the Walkerton system. Ultimately, this was achieved through a resolution of the PUC, because it retained legal control over the waterworks. On that day, the MOE issued a Field Order to the Municipality of Brockton pursuant to the *Ontario Water Resources Act*. It required an action plan to be submitted to the MOE that included a statement of Brockton’s response to the contamination of the water supply, the preparation of a report on the possible causes of the contamination, and the appointment of a qualified operating authority to oversee the operation to ensure the safety of the drinking water. In compliance with the Field Order, Mr. Burns filed an action plan with the MOE on May 26.

On the evening of May 26, Garry Palmateer, president of G.A.P. EnviroMicrobial Services Inc., was interviewed by Brian Stewart on CBC Television’s *National Magazine*. The G.A.P. laboratory had tested the water in Walkerton from 1996 to April 2000. Mr. Palmateer stated that on five occasions between January and the end of April 2000, coliforms were detected in the distribution system or at the wells of the Walkerton PUC. The five adverse results had been reported to the MOE’s district office in Owen Sound, but only one of these was an indicator of unsafe water that required notification to

the health unit. Through an oversight on that occasion, the MOE did not notify the health unit.

Dr. McQuigge, who watched the television interview, was surprised to learn this information; the MOE had not informed the health unit of these adverse results. Although Dr. McQuigge had met with Mr. Bye on several occasions in the previous few days, the April samples had not been mentioned.

On May 27, a meeting took place between the health unit and the MOE, whose officials conceded that in violation of the Ontario Drinking Water Objectives, the MOE had failed to notify the health unit of the adverse results it had received from the Walkerton PUC on April 10. The MOE was required to notify the health unit if there were coliforms in consecutive samples from the same point in the distribution system or from multiple samples on a single submission. At the meeting, the MOE stated that since May 1, 2000, it had not received notification of water results from the Walkerton system. Both the MOE and the health unit had been unaware that G.A.P. no longer conducted microbiological testing for Walkerton.

In the last days of May and in succeeding months, the Walkerton hospital continued to treat many individuals in the community who had contracted *E. coli* O157:H7 and *Campylobacter*. In May 2000, a total of 1,829 individuals sought medical attention at the Walkerton hospital's emergency department – 66% above the normal rate. In addition, from May 17 to the end of May, approximately 850 calls were made to the hospital by people who were vomiting, had abdominal pain, and were suffering diarrhea. In June 2000, the number of patients registered at the Walkerton hospital emergency department was 39% above the normal rate. According to the estimates of the health unit and Health Canada, 2,321 individuals became ill as a result of the outbreak. At least 65 people were hospitalized, 27 people developed hemolytic uremic syndrome (HUS), and 7 people, ranging from 2 to 84 years of age, died as a result of the Walkerton outbreak.

In the following months, the MOE continued its investigation, and the Ontario Clean Water Agency flushed, chlorinated, and instituted other measures in an attempt to restore safe drinking water to the residents of Walkerton. The Bruce-Grey-Owen Sound Health Unit outbreak team continued to meet. The boil water advisory was lifted on December 5, 2000.