

Walkerton - The events of 2000

BY MICHELE BRISTOW

In May 2000, Walkerton's drinking water system became contaminated with deadly bacteria, primarily Escherichia coli 0157: H7 (E. coli). Seven people died, and more than 2,300 became ill. The community was devastated. Widespread feelings of frustration, anger and insecurity abounded. The tragedy triggered nationwide insecurities about the safety of Canada's drinking water. So what actually happened in Walkerton? What were the causes? Following is part one of a summary of the events as reported in local and international news reports, industry articles and the findings of the Ontario Government's Commission of Inquiry

In May 2000, the Walkerton water system was supplied by three groundwater sources; known as Well 5, Well 6 and Well 7. The water pumped from each well was treated with chlorine before entering the distribution system.

It has been concluded that the overwhelming majority of the contaminants, if not all of them, entered the water system through Well 5. This was a shallow well: its casing extended just five metres below the surface. All of its water was drawn from a very shallow area between five and eight metres below the surface. More significantly, the water was drawn from an area of highly fractured bedrock. Due to the nature of the fracturing, the geology of the surrounding bedrock, and the shallowness of the soil overburden above the bedrock, it was possible for surface bacteria to quickly enter into a fractured rock channel and proceed directly to Well 5.

The event began with the heavy rainfall in Walkerton from May 8 to May 12, 2000 (134mm of rain fell during five days) the heaviest rainfall occurring on Friday 12 May, when 70mm fell. This extraordinary rainfall it was later determined, assisted in the 'transport of contaminants' to Well 5.

The primary if not the only source of the contaminants was manure that had

been spread on a farm near Well 5 during late April 2000. DNA typing of the animals and the manure on the farm revealed that *E. coli* 0 157: H7 and *Campylobacter* strains on the farm matched strains that were prevalent in the human outbreak in Walkerton.

Walkerton like many water treatment systems around Canada, are required to treat well water with sufficient chlorine to inactivate contaminants in the raw water, and to sustain a chlorine residual of 0.5 mg/L of water after 15 minutes of contact time.

In May 2000, the operators of the Walkerton system chlorinated the water at Well 5 but routinely used less than the required amount of chlorine at that Well and at the others operated by the Walkerton Public Utilities Commission (PUC).

SYSTEM FAILURES

Two serious failures on the part of the Walkerton PUC operators directly contributed to the outbreak. The first was an operational problem: the failure to take daily chlorine residual measurements in the Walkerton water system.

The Commission found that had they done so and manually tested the water at Well 5 on May 13 or on the days following, the necessary steps could have been taken to protect the community, significantly reducing the likelihood of the outbreak. The second failure relates to the manner in which the PUC operators (in particular brothers, Frank and Stan Koebel)

responded to the outbreak when it became apparent that something was wrong.

On 13 May, PUC foreman, Frank Koebel, performed the routine daily check of the operating wells. The purpose of the daily checks was to record 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

"I am satisfied that these samples were not taken at the locations indicated, but rather were most likely taken at the Walkerton PUC workshop, which is near to and downline from Well 5. It is not unusual for PUC employees to mislabel the bottles so that they did not reflect the actual locations at which water samples were taken."

-Hon. Dennis R. O'Connor

Ontario Ministry of the Attorney General

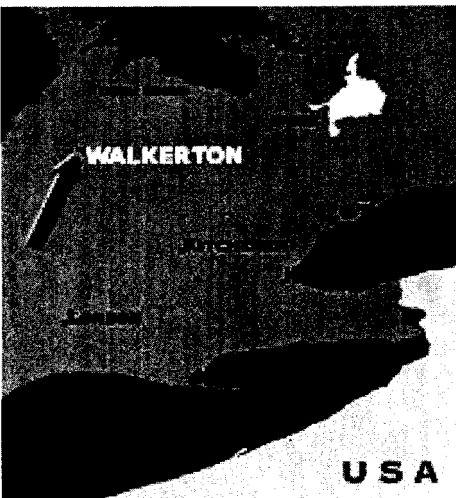
of PUC employees not to measure the chlorine residuals on most days, misstate the locations at which the samples for microbiological testing were taken, operate wells without chlorination, making false entries in daily sheets. It was later found that PUC foreman Stan Koebel was one of them.

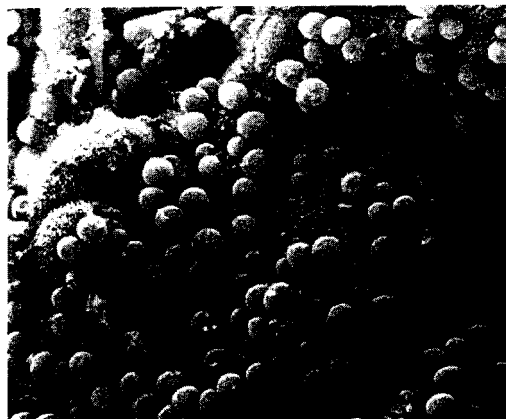
On May 13, Frank Koebel did not measure the chlorine residual at Well 5. It is very

likely that at this time, *E. coli* and *Campylobacter* bacteria were overwhelming the chlorine being added at the well and were entering into the distribution system. Had the correct tests been carried out, he would almost certainly have learned that there was no residual.

On 14 May Frank Koebel again checked Well 5 and followed the Walkerton PUC's usual procedure and did not measure the chlorine residual. The same omission occurred on 15 May, although it is not clear which PUC employee checked Well 5 on that day. Well 5 was turned off at 1:15pm on that same day.

Stan Koebel, general manager for the Walkerton PUC (who held a Class 3 Water



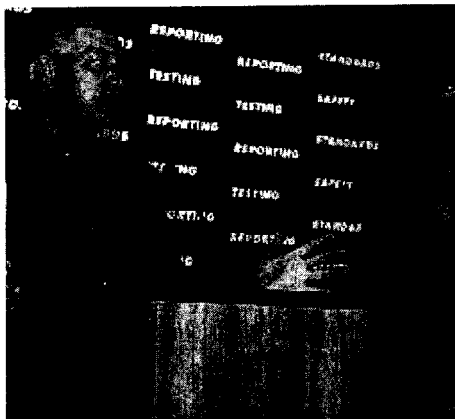


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Operators Licence), on the morning of 15 May, returned to work after a week on leave and turned on Well 7. Shortly after doing so, he learned that a new chlorinator for Well 7 had not been installed and the system was pumping unchlorinated water directly into the distribution system. Despite his years of experience, he did not turn off the Well; rather, he allowed the Well to operate without chlorination until noon on 19 May, when the new chlorinator was installed.

Over the coming days, Stan Koebel would fail to inform authorities (even when asked point blank) of the test results and the lack of a chlorinator on Well 7. Evidence would show that under the supervision of Stan Koebel, the Walkerton PUC often engaged in a host of improper operating practices. But it was the May 15 test results and his failure to report the results to the health unit; given that he knew of the illnesses in the community, that many found hard to understand.

On the morning of May 15, another PUC employee, Allan Buckle, took three water samples for microbiological testing. The bottles were labelled "Well 7 raw" and "Well 7 untreated" and "125 Durham Street". The samples were forwarded to a laboratory for testing. On May 17 the laboratory phoned Stan Koebel to inform him that all three samples were positive for *E. coli* and total coliforms. It would later be determined that the samples were taken at the Walkerton PUC workshop, which is near to and downstream of Well 5. The laboratory said that three of the samples had undergone an "elaborate membrane filtration test, and the resulting plate was "covered" with total coliforms and *E. coli*. However, the laboratory failed to forward its results to the MOE's area office. As a result the health unit was not notified of the results until six days later, on May 23.



THE OUTBREAK

The first indicators of illness emerged on 18 May 2000 when 20 children reported in sick from the local Catholic school. Two of the children were admitted to the Owen Sound Hospital with bloody diarrhoea, vomiting and cramping. The next day there was an enteric outbreak among residents of a retirement home. People began to contact the Walkerton hospital, nearby hospitals, and local physicians to complain of symptoms of enteric illness, including bloody diarrhoea, stomach pain and nausea.

Over the next several days, the illness spread quickly in the community.

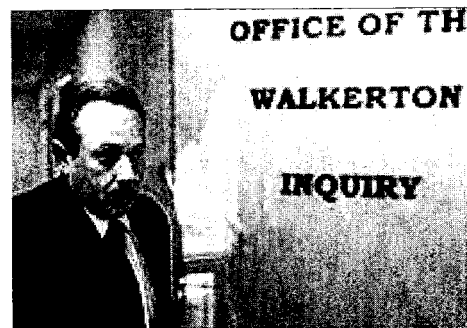
The Walkerton hospital was inundated with telephone calls and with patients visiting the emergency department. Dr Kristen Hallet, a pediatrician at Owen Sound Hospital, suspecting that the illnesses of the two children admitted the previous day were caused by *E. coli*, contacted the local health unit.

The health unit began its investigation by speaking to the schools, hospitals, retirement homes, and the PUC's general manager, Stan Koebel. The health unit asked him if there was a problem with the water. To which he replied that he thought it was "okay". This despite the fact that he had the results from the May 15 samples.

Mr Koebel would be asked twice more about the water quality and twice he would repeat his assurances that the water was safe.

As early as May 18 and 19, some in the community believed that the something was wrong with the water and took steps to prevent further infection. Some residents began to boil their water while others only drank bottled water.

It was not until Owen Sound Hospital confirmed on May 21 the specific pathogen *E. coli* O157: H7 was involved that they issued a boil water notice. The notice was broadcast on the local AM station and FM



(Left) Ontario Premier Mike Harris and Enviro Minister Dan Newman.
(Above) Walkerton Utilities manager Stan Koebel.
(Right) Frank Koebel.



radio stations, but not on the local Walkerton station, on television or in print. This lack of communication by local authorities meant not all residents of the town were aware of the boil water notice.

The rapid increase in the number of people affected continued throughout the day of May 21, and by the end of the day Walkerton Hospital had received more than 270 calls concerning symptoms of diarrhoea and serious abdominal pain. The first person died on 22 May 2000, a second on May 23 and two more on May 24. During this time 27 people developed Haemolytic Uremic Syndrome, also known as HUS. In the United States, HUS is the leading cause of acute kidney failure in children. It is thought that approximately 90 percent of children who develop Haemolytic Uremic Syndrome after an infection with *E. coli* O157:H7 survive but may face a lifetime of complications from the disease.

Five schools closed and residents began to pick up bottled water donated by charities, businesses and other communities. The social impact on the community came to light as reporters from around North America descended on the area. Everyone knew someone who had died or was seriously ill. In all seven people died and more than 2,300 became ill.

In the next issue: Dealing with the real issues: Who was to blame, really? The commission looked at federal and state budget cuts, municipal lack of training, lack of systems, the privatisation of laboratories and the cost of maintaining a quality water supply.