B128 What Can Forensic Science Learn From the Tragedy in Walkerton, Ontario, Canada?

Kimberley Johnston, MSc, BA and Gareth Jones, MSc, BSc, Centre of Forensic Sciences, 2nd Floor, Centre of Forensic Sciences, 25 Grosvenor Street, Toronto, Ontario, Canada*

The goals of this presentation are to recognize the critical importance of appropriate training and education for forensic scientists, recognize the value of laboratory accreditation and quality assurance programs, recognize the dangers of "grandfathering in" of individuals in certification programs, and to understand the difference between method certification, individual certification, and accreditation.

In May 2000, in Walkerton, Ontario, Canada, 7 people died and more than 2,300 others became ill after drinking water from the town supply that was heavily contaminated with Escherichia coli O157:H7. The community was devastated and the losses to local businesses were enormous.

This public health catastrophe raised serious questions about the safety of drinking water across the Province of Ontario. As a result, the Government of Ontario called a Commission of Inquiry to determine what had caused the deadly contamination and to ascertain responsibility for this event, with a view to ensuring that such a tragedy never happens again.

The Inquiry was divided into two parts. Part 1 examined the circumstances that caused the outbreak. Part 2 focused on ensuring the safety of drinking water in Ontario. This presentation is based on the Report from Part 1 and on testimony provided during the Inquiry.

The Inquiry determined that there were a number of factors that led to the events of May 2000. This paper focuses on issues pertaining to training, certification, laboratory accreditation, and quality assurance. The primary goal is to answer the question: What can forensic science learn from the events in Walkerton?

Inadequate training issues were at the heart of the Walkerton tragedy. From the water system operators (who had twice been "grandfathered" as certified waterworks operators), to the Public Utilities commissioners (to whom the water system operators reported), to the Ontario Ministry of the Environment (which has regulatory oversight of municipal water systems in Ontario), and to the scientists of the private sector laboratory responsible for the actual testing of Walkerton's drinking water, there were repeated training failures.

E. coli O157:H7 and Campylobacter jejuni entered the Walkerton water system through a shallow source well during a period of heavy rainfall. The source well was very vulnerable to surface runoff and the primary source of the bacterial contamination was identified as manure from a farm near the well. The waterworks operators lacked the training and expertise to identify the vulnerability of the well to surface contamination. Consequently, they lacked an understanding of the necessity for continuous chlorine residual and turbidity monitoring. Monitoring chlorine residuals allows for assessment of the capacity for disinfection in treated water as it moves through the distribution system and provides a way to determine whether contamination is overwhelming the disinfectant capacity of the chlorine that has been added to the water. The Inquiry Report stated that the General Manager of the Public Utilities Commission (PUC) was skilled in the mechanical operation of the water system but lacked knowledge and appreciation of the health risks associated with failure to properly operate the system.

The waterworks operators, the PUC commissioners, the Ministry of Environment inspectors and the scientists testing the drinking water all suffered from a lack of knowledge regarding the dangers of fecal coliform contamination of drinking water in general and the deadliness of E. coli O157:H7 contamination in particular. This lack of knowledge left 7 dead and 2,300 seriously ill.

The Walkerton PUC commissioners were responsible for establishing and controlling the policies under which the PUC operated. The commissioners were concerned primarily with the financial side of PUC operations and had very little knowledge about water safety or the operation of the water system. This lack of knowledge is demonstrated by their failure to understand the significance of a 1998 report from the Ministry of the Environment that indicated serious problems with the operation of the Walkerton water system, including the repeated presence of E. coli in treated drinking water samples. As a result, the commissioners did nothing.

Evidence given at the Inquiry showed that Ministry of the Environment personnel in the office responsible for Walkerton were unaware of matters essential to carrying out their responsibilities in overseeing municipal waterworks. The District Supervisor and three inspectors who testified were all unaware of the potential lethality of E. coli. In addition, some of the Ministry of the Environment staff were unaware of or unclear about some provisions of the Ontario Drinking Water Objectives (the government guidelines they were responsible for enforcing).

During the 1990s there was a substantial reduction in the Ministry's staff and budget. This resulted in a severely reduced training budget and focused toward administrative and management training and away from technical training. Staff shortages created a climate of frequent job rotations with little or no supporting technical training.

In 1996 water testing of drinking water, a function previously carried out by government laboratories,

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was privatized. There was no regulation of the private laboratories: no criteria governing the quality of testing, no requirements for qualifications or experience of laboratory personnel, no requirement to have scientists on staff, and no provisions for licensing, inspection, or auditing of such laboratories.

Although the laboratory testing Walkerton's water in May 2000 was performing microbiological analyses, none of the scientific staff had academic backgrounds in or experience with microbiological assays. The lab's experience was in chemical analyses. Unfortunately, for the people of Walkerton, none of the laboratory staff knew the significance of the results obtained from the microbiological analyses. While the laboratory was certified and accredited to perform standard chemical analyses for drinking water, they were neither certified nor accredited to perform microbiological analyses.

What are the lessons for forensic science from the Walkerton tragedy? This case clearly demonstrates the critical importance of education and training programs, laboratory accreditation and quality assurance programs, and the dangers of "grandfathering" in individual certification programs. The work we do as forensic scientists affects the lives and/or freedom of many people. It is crucial that our profession takes all of the necessary steps to ensure the quality of the science and the scientists and recognizes the very direct connection to the lives of the people we serve.

Training, Accreditation, Quality Assurance

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