



Sylvain Boudrias  
President Darspec  
Eng., MBA

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Preventive maintenance and health and safety initiatives are often ignored or left out in budget planning. Yet, prevention programs help to identify the elements that require significant recurring maintenance, especially when it comes to preserving public health.

### **The story of drinking water contamination\***

\*This story is based on real-life facts.

Claude did not believe that he would ever need medical attention to treat poisoning related to drinking water at his condominium. Unfortunately, he did have to be hospitalized, along with his wife and their 2- and 5-year-old children. He believed that this kind of incident only happened in factories and industries. He had also experienced an incident comparable at the food processing plant where he holds the position of quality manager. Fortunately, the problem had been discovered early enough and no one had been poisoned. Yet the two contamination events, while not directly related, occurred under very similar circumstances. It is indeed remarkable to note



that it takes a series of seemingly harmless events to cause a contamination with negative, even dangerous, effects for the population. But what happened?

### **Pressure fluctuation in buildings, a daily reality**

Claude lives on the twentieth floor of a building housing nearly seventy condominiums: a common reality in today's urban centers. He bought this apartment to provide proximity to services and security for his young family. The building was built about fifteen years ago and administrators have to juggle an annual maintenance budget as well as capital to replace worn or end-of-life components. Administrators are not experts in building mechanics and they trust the recommendations of the professionals they appoint. This ignorance of directors makes their task difficult when it comes to setting priorities and making the right decisions.

Over the years, potable water booster pumps, required to maintain adequate pressure in the building's distribution network, have accumulated wear and tear and eventually necessitated an important upgrade. For some time, these pumps had difficulty maintaining a constant pressure in the pipes. In addition, they caused large pressure fluctuations as well as occasional siphoning on the upper floors.

### **The increasingly noticeable presence of chemicals in buildings**

A large mechanical room is located on the 21st floor, and chemicals are used in the air conditioning and heating systems to prevent corrosion and silt creation as well as to control bacteria. All systems on the floors are connected to a potable water supply to compensate for a loss due to leakage or evaporation. Although a backflow prevention device is installed on the water supply on the 21st floor to prevent the discharge of chemicals into the distribution network, it has not been inspected annually for a long time and no one knows that it is defective.

### **A missing device in the building**

The RBQ safety code, which applies to building owners in Quebec, is precise and requires the installation of a backflow prevention device at the water inlet of the building. This device prevents a contaminant, which could circulate in the building, ends up in the municipal water system. Unfortunately for Claude and his neighbors, the law was not respected and no device was installed.



## **The winning conditions for full contamination**

A few hours before Claude returned home, there was a significant depressurization of the water system in the street adjacent to the building where he lives. This depressurization then produced a siphoning of the supply line of the building where he resides. At the same time, a brief power outage shut down the pumps. Due to this loss of pressure and the fact that the pumps could not perform their work properly, the building's drinking water flowed back into the pipe, carrying with it the contaminant used in the mechanical room on the 21st floor.

All conditions were present to cause significant contamination: a loss of pressure creating siphoning, the absence of functional backflow prevention devices, and the presence of a contaminant introduced into the water distribution system by faulty pumps. The concentration of the contaminant in the water distribution pipes was sufficient to inconvenience Claude and his family. In addition, the contaminant ended up in the municipal aqueduct, which required an urgent intervention of the municipality's water department.

## **Consequences of significant contamination**

The consequences of contamination of the drinking water distribution network are numerous. The most important is certainly the danger to the health of citizens. Then, as soon as there is a threat to the health of citizens, the municipality must carry out preventive evacuations around the building at fault. This could be followed by financial losses for businesses forced to close their doors, not to mention the risk of legal action by the victims.

The municipality must not only make efforts to evacuate residents, but also to clean up contaminated water pipes. This sudden and intensive cleaning can cause further problems in the distribution network by dislodging particles deposited in the pipes. Citizens' trust is then put to the test when they observe a worrying change in the color of the water as a result of these interventions.

## **The cost of "DON'T DO"**

With the multitude of obligations to be respected, it is difficult today for a manager to manage the risk related to certain preventive actions for the maintenance of a building. Sometimes, a tight budget forces him to neglect certain components of the building mechanics, including the protection of drinking water. However, to make the right decisions, the manager must compare the tangible costs of "doing" with the intangible costs of "not doing".

