The school of thought says that civilization took a major step forward with the advent of water treatment and sewage treatment. Although earlier civilizations had rudimentary water and wastewater systems, it was the population increase in America and Western Europe at the time of the Industrial Revolution that forced cities to adopt a different approach to their water supply and to sewage dumped in the streets. The resulting decrease in diseases and loss of life stabilized the population base and allowed the Industrial Revolution to expand. Water and wastewater treatment are now part of the basic fabric of our society. Their importance cannot be underestimated.

In 2007, the British Medical Journal asked its approximately 90,000 readers what they considered to be the biggest breakthrough in the advancement of public health in the previous 150 years. The readership, predominantly made up of doctors, picked sanitation ahead of penicillin and vaccines. Based on infant mortality rates in large cities before and after sanitation, it is clear that without clean water and the proper conveyance and treatment of sewage, our cities could not exist.

However, once we recognize how crucial water and wastewater facilities are to our survival, we have to consider the issue of vulnerability of these facilities. It is indisputable that a disruption to the supply or contamination of our potable water would have severe health impacts on the public, but what about a disruption in a city’s ability to process its sewage? Some are of the opinion that preventing a wastewater treatment plant from being able to accept sewage would be just as devastating, if not more so, in the long run.

Contaminated water being distributed from a water treatment plant would certainly have more immediate effects on human health. People would get sick immediately and fatalities may occur. However, barring significant logistical challenges, clean water could be sourced, a boil-water order could be issued, other branches in larger distribution systems could be tapped into, or clean water could be delivered via tankers.

Compromising a wastewater treatment plant’s ability to accept sewage may not have significant effects downstream of the plant, but, upstream, communities would be seriously affected by the ensuing sewage back-ups and basement flooding. The effects would be almost as wide reaching as a compromised water supply. The health impacts may not occur immediately, but they would occur and could be quite serious.

"Compromising a wastewater treatment plant’s ability to accept sewage may not have significant effects downstream of the plant, but, upstream, communities would be seriously affected by the ensuing sewage back-ups and basement flooding."

In that regard, security at wastewater treatment facilities is being taken very seriously and can be as sophisticated as that in place at water treatment facilities. Of course, this was not always the case and the purpose of security measures at wastewater treatment facilities has changed over the years. In the early 1900’s, when the first wastewater treatment plants in Canada were built, the intent of plant security was largely to prevent the public (especially children) from entering the plant and being subject to the potential dangers associated with plant processes (tanks, lagoons, etc.). Also, the equipment and processes were very simple. The plant was manually operated, without automation. The possibility of theft or vandalism was not a major concern at that time. A simple, chain-link fence around the perimeter, with a padlocked gate, was sufficient to keep the public out and safe.

In time, wastewater treatment plants started servicing larger communities and processing larger volumes of sewage. Facilities consisted of a main sewage treatment plant, plus satellite sites, such as sewage pumping stations. In addition to the chain-link fence, the main plants started using locks on the entry gates and, perhaps, locking ancillary buildings within the facility. Alarm response was generally undertaken through the plant’s operations staff.

The satellite locations usually had a chain-link fence and a padlocked gate. Even sites that were not staffed 24/7, had an operator on call at all times. Alarm response was as simple as a beacon outside the building, followed (hopefully) by a phone call from an observant neighbour, who might have seen the beacon. No separate security organization was used. All security issues were managed by the plant operators. Programmable Logic Controllers (PLCs) were not generally used. Mimic boards were the standard at that time.

In the late 1980s and into the 1990s, after the introduction of PLCs, door
developed a plan for the safeguarding of security systems we have in place and, became much more serious about the systems at these facilities. Mainly, we have gradually increased our security measures for water/wastewater systems as our perceived the same level of threat to plants. In Canada, we had not implemented measures for water and wastewater plants, and wastewater facilities). Canadians had not immediately followed suit. While the US response was immediate in 2001, the 9/11 attacks on the World Trade Centre occurred, and, the way we transfer security information off-site has also changed, with several options that were not previously available, including radio, fibre optic wide area networks, and telephone-based wide area networks.

How do you choose which one to use? The choice depends on what infrastructure you have available and your budget. Fibre and telephone are generally cheaper to install whereas radio has a higher installation cost, but it is cheaper to maintain.

Some regions/municipalities have opted for fibre optics, where available. Other regions/municipalities employ radio systems because the areas serviced are remote. Some areas have two systems: one main one and a back-up, which uses different technologies (telephone as the main and radio as the back-up).

Our approach to security, over the years, at water and wastewater plants has changed with technologies and social climate. The biggest change in recent years has been in response to our attitude towards perceived threats. Canadians are continuing to elevate security measures at our wastewater treatment facilities to meet these threats. A standardized security-planning template may help to identify suitable approaches for various facilities and threats.

contacts became more popular. A signal would automatically be sent from the door contact to the PLC, which would then automatically notify the operator in charge that a possible unauthorized entry had occurred. Plants no longer had to rely on a phone call from that observant neighbour.

As plant processes and control systems started becoming more sophisticated and use of computers and PLC’s became more wide-spread, the threat of theft and vandalism became a greater concern.

The 1990s saw more door entry security gates and their associated, remotely-installed controllers being used. Keypads were the interface that allowed operators to manually unlock a door by entering a numeric code on the keypad to disarm the security system, much like some current home security systems. The controller would be installed in a location, remote from the keypad, and only accessible to authorized personnel. The controller would broadcast the security status and alarms to the PLC, with their increasingly sophisticated wide area networks, and/or to a security company, a reality that was becoming more prevalent.

Still, not all facilities employed keypad-controller systems. Some were still using the traditional fencing and security gate.

In 2001, the 9/11 attacks on the World Trade Centre occurred, and, while the US response was immediate (Homeland Security greatly increased the security systems at both water and wastewater facilities), Canadians did not immediately follow suit. In subsequent years, the Water Environment Federation (WEF) participated in the development of a manual on voluntary security measures for water and wastewater plants. In Canada, we had not perceived the same level of threat to our water/wastewater systems as our neighbours to the south. However, we have gradually increased our security systems at these facilities. Mainly, we became much more serious about the security systems we have in place and, in particular, our response to a threat.

Most regions and municipalities developed a plan for the safeguarding of assets, with particular attention