

# Protecting Human Health Through Innovative Water Testing



Waterborne bacteria and viruses pose great risks to human health. The best defence is a proactive approach to water quality testing—and Canada's Early Warning Inc. is making this easier than ever before. The company has developed a biohazard water analyzer that can automatically detect dangerous pathogens in the water without requiring a technician to send samples back to a lab for analysis—making it faster to detect and prevent the transmission of potentially life-threatening disease.



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## Early Warning Inc.

### Out-of-this-World Science, Real-World Applications

The technology behind the Biohazard Water Analyzer was initially developed by NASA to help detect biological entities on Mars missions. Realizing that a small, energy-efficient biosensor had incredible potential a little closer to home, Early Warning exclusively licensed the technology from NASA and continued its collaboration under a five-year Space Act Agreement. The company then modified the sensor to include an innovative onboard biomolecule concentrator that enables processing of much larger water samples than traditional testing methods for greater accuracy in capturing the pathogens.



### Helping Cleantech Companies Grow

As a result of SDTC's involvement, Early Warning's Canadian team has grown from two initial employees to 13 people: six engineers, five biologists and two students. The company also employs an additional 15 people based in the United States, conducting work that can't be sourced in Canada.



*"The sensor is incredibly sensitive. Instead of just detecting indicator organisms in the water such as coliforms that may or may not indicate the presence of pathogens, the Analyzer identifies infectious strains of E. coli O157:H7, Salmonella and Cryptosporidium that could sicken or even kill vulnerable people if consumed."*

**Neil Gordon**

President & CEO, Early Warning Inc.

## Early Detection: The Key to Prevention

According to the World Health Organization, pathogenic viruses and bacteria make billions of people ill and cause the deaths of more than 18 million every year. Many of these pathogens are transmitted through untreated or contaminated water. Canadians have experienced first-hand the devastating effects: over the last decade people have fallen ill and, in the case of Walkerton, died from tainted water that was not detected until it was far too late for corrective action.

The key to reducing waterborne illness is frequent and comprehensive water testing. Early Warning Inc. has developed a fully-automated nanotechnology-based biosensor that will enable municipalities, food companies and large institutions to quickly and easily test for up to 25 specific pathogens—including E. coli and salmonella—without the use of a laboratory, dedicated technicians or expensive equipment. This system has the potential to stop the transmission of waterborne illness before an outbreak occurs.

### Making Tests Faster and More Affordable

Testing water for pathogens in laboratories is a very time-consuming process. Samples first need to be collected from the water source then transported back to a lab, where testing protocols and analysis can take up to a week. Early Warning's solution greatly improves this model by delivering near real-time results, a wider test scope and no major infrastructure costs.

Using a single instrument or a more effective network of wireless sensors that automatically sample and test water on location, Early Warning's Biohazard Water Analyzer allows for 'on-the-fly' detection and reporting of potentially lethal pathogens. The entire process takes under three hours—a significant improvement over lab-based testing.

Early Warning is also making it more affordable to implement water-testing procedures. Testing with the Analyzer costs much less than traditional testing methods—which can cost up to \$700 when remote samples need to be collected and actual pathogens are detected instead of indicator materials.

### Protecting Small and Remote Communities

Early Warning's system is designed for those who need it most, including smaller municipalities—especially those that have had a recent outbreak and need a reliable solution to avoid a repeat incident—and remote areas where residents lack local water testing facilities. Other initial applications of the system could include automated testing for water used in food and beverage plants, testing of recreational water at public beaches, real-time assessment of wastewater facilities, point of use testing especially when water is consumed by sick people, the elderly or tourists.

### Nanotechnology with Worldwide Potential

The industrial bio-testing market is estimated to be worth \$4.5 billion per year worldwide. Early Warning has an opportunity to quickly penetrate this market, as there are currently no other automated field tests for microbial parameters to which the Biohazard Water Analyzer can be compared. Looking beyond water testing, the total market for all types of biosensors is over \$22 billion per year. Much of this market will come from the biomedical, homeland security, industrial, environmental and food industries, all of which could use Early Warning's technology to detect harmful bacteria and viruses.



## Creating Canada's Green Infrastructure

Sustainable Development Technology Canada finances and supports the development and demonstration of clean technologies—solutions that address issues of climate change and air, soil and water quality to deliver economic, environmental and health benefits to Canadians.

An arm's-length, not-for-profit corporation created and funded by the Government of Canada, SDTC bridges a critical gap in the innovation chain, helping entrepreneurs move their products and solutions out of the laboratory and into the marketplace.

SDTC funds innovative new technologies, and fast-tracks their development by helping cleantech entrepreneurs connect with partners and customers, formalize business plans and qualify for private sector financing.

Find out more by visiting us at [www.sdtc.ca](http://www.sdtc.ca)

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