



STAFF REPORT ACTION REQUIRED

Research Project: Partnership with AUG Signals Inc. for Drinking Water Monitoring Pilot Project

Date:	January 31, 2007
To:	Public Works and Infrastructure Committee
From:	General Manager of Toronto Water
Wards:	All
Reference Number:	P:\2007\Cluster B\TW\pw07004

SUMMARY

This report seeks approval for Toronto Water to enter into a partnership agreement with AUG Signals Inc. for the purpose of undertaking a research project. The research project intends to develop an early warning monitoring system for the detection of threats or contaminants to water supply systems. Toronto Water has the opportunity to be involved in the development of an intelligent system not currently available to water service providers and, potentially, to be reimbursed for in-kind services. The project has the potential for future revenue if the new technology is commercialized.

RECOMMENDATIONS

The General Manager of Toronto Water recommends that:

1. the General Manager, Toronto Water be authorized to negotiate, enter into and execute an agreement with AUG Signals Inc., in a form satisfactory to the City Solicitor, to provide in-kind technical, research and analytical services;
2. authority be granted for the City to receive funds, if applicable, commensurate with the in-kind services to be provided by Toronto Water staff;
3. upon final execution of the agreement, the 2007, 2008 and 2009 Operating Budget revenue be increased by an annual amount to be determined, up to a cumulative maximum amount of \$100,000 over the three-year period, to recognize the additional source of revenue, if applicable, as determined during the agreement negotiations; and

4. the appropriate City officials be authorized and directed to take the necessary action to give effect thereto.

FINANCIAL IMPACT

No additional costs will be incurred if the recommendations of this report are approved.

The work to be undertaken is an incremental item, which will be absorbed by existing staff resources. There is an opportunity for Toronto Water to receive funding in the overall approximate amount of \$100,000 for a portion of staff time dedicated to undertake the three-year project.

The Deputy City Manager and Chief Financial Officer have reviewed this report and agree with the financial impact information.

ISSUE BACKGROUND

Ongoing regulatory compliance water sampling is performed at water treatment facilities and throughout the distribution system. This is followed by laboratory analysis, the findings of which are known hours or days after the initial sampling. In the unlikely event of contamination of the supply system, identification of any contamination would be dependent on user complaints or through regular grab samples taken by Toronto Water at rotating locations throughout the supply system. The turnaround time for sampling and testing can be several days for detection depending on the type of contaminant.

This project represents an opportunity for the City to provide in-kind technical, research and analytical services to facilitate the investigation and development of a new technology that will potentially enhance the City's monitoring of water quality and reduce the time required to respond to any potential contamination event or outbreak.

COMMENTS

Need for Research:

It is critical for municipalities to respond to a drinking water contamination event as quickly as possible. Currently, the impact of many threats or contaminants can only be identified by examining patterns of illnesses that occur after the threat reaches the population.

There is a large amount of available information that is not being used to monitor drinking water for contaminants. Historical sampling data, water customer complaints and public health data such as health care provider visits, absenteeism, and over-the-counter drug purchases are not all being linked together with water quality on a real-time

basis. If correlated together, this data could provide early indications of a water contamination event and reduce response time by water authorities and external responders (health care providers, emergency response, etc.) to any outbreak.

Since this project represents research into the development of intelligent systems (i.e. programmed computer control) and is being led by AUG Signals Inc., it is eligible for Industry-led funding by Precarn Inc., an independent not-for-profit company that supports the pre-commercial development of leading-edge technologies.

Project Objectives:

The City has received a request to work with industry, university and other government partners in leading edge research. The project will be led by AUG Signals Inc., together with a number of Canadian universities, Public Health staff, and the City of Toronto as the ‘host’ community. As a host, the City would be providing an operating water distribution system necessary to allow the development of new monitoring and protection capabilities for drinking water.

The objective of the “Intelligent Systems for Drinking Water Monitoring Pilot Project” is to perform research into the capabilities of using on-line drinking water monitoring sensors and correlating other data through development of an intelligent system. The proposed research has the potential to improve the accuracy and efficiency of current water quality assurance practices. Furthermore, real-time sensor technology could dramatically reduce the time it takes to detect a potential threat in drinking water.

The focus of this project is the advancement and development of intelligent systems technologies, a critical component of a larger water monitoring system. The aim is to address the technical problem of detecting natural, accidental or intentional chemical, biological or radiological contamination in drinking water with far greater accuracy and in a shorter time frame, than through current conventional methods. This initiative could dramatically improve the monitoring and protection of municipal drinking water supplies.

Technology Development and Benefits:

The advancement of intelligent systems and other technologies will play a key role in improving drinking water monitoring. To facilitate rapid responses and decision making, water service providers will have an online and real-time visual display of the analysis results. The long-term vision for the project is to develop an “Early Warning Monitoring System” for drinking water. Water quality and security warnings could be quickly shared with public health staff, emergency responders and the public when necessary.

The proposed solution is an Intelligent Situation Assessment Unit (ISAU) that will form the central component of an Early Warning Water Monitoring System for Drinking Water. An intelligent system for water monitoring offers the following major benefits:

1. **Real-time, continuous monitoring:** Advanced water sensors, coupled with intelligent situation assessment will enable detection of threats within minutes or hours of contamination, drastically reducing detection time.

2. **Correlation of multiple information sources:** An intelligent system can base a decision on multiple sources of information that may not even be considered by human decision makers.
3. **Detailed detection results:** Sensors and the intelligent system will identify what threat is present, the extent of the threat and information on the source of contamination. This information can be compiled into recommendations for the end user on a course of action.
4. **Data mining of historical archived water quality data:** Intelligent systems can perform data mining on months or years of archived historical data to identify trends and contribute to making accurate and timely detections of contamination.
5. **Decision support tools for rapid response:** Specialized tools will provide water services personnel with information on response activities based on the nature, severity, extent and source of the problem. This will enable responders to make the best decisions for each given situation, containing the threat as quickly as possible.
6. **Efficient communication of information to end users:** A graphical user interface will collect and display large amounts of incoming data in an organized manner to provide end users with a visual overall status of the system.

Toronto Water's Role and Future Actions:

Under the terms of the proposed partnership with AUG Signals, Toronto Water staff will provide end user requirements during the project. Toronto Water's expertise in water quality standards, sampling procedure and water sample analysis will contribute greatly to the ISAU's development. Staff will also contribute to areas including scenario generation, contaminant analysis, background analysis, and user interface requirements.

The project is expected to be of a three-year duration involving staff from various sections of Toronto Water. Staff will provide in-kind labour or time, and be key participants in many aspects of the research including selection of appropriate sensors and their locations, identification of contaminants to be monitored, and graphical display needs for the end user. To facilitate this involvement and return of labour costs through the Precarn funding, Toronto Water would enter into an agreement that confirms our commitment to providing the required effort or time as represented in the overall budget estimate as identified above.

If the research project is successful, Toronto Water could become the primary end user for the developed technology. The City will have been involved in a technology development initiative that can become a commercialized, patented technology, which represents potential future revenue. Prior to engaging in such a business venture, Toronto Water would report to Council on the outcome of the research and the terms of commercialization and seek authorization to receive revenue of this nature.

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SIGNATURE

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