

## Commonly Used Water Quality Sensors Can Detect Intentional Drinking Water Contamination

***Free chlorine and total organic carbon sensors most successful for detecting contamination in tests using selected biological and chemical contaminants***

### Introduction

EPA has released [Distribution System Water Quality Monitoring: Sensor Technology Evaluation Methodology and Results – A Guide for Sensor Manufacturers and Water Utilities](#), which summarizes the results of tests with various online (i.e., real-time) water quality sensors to see if they could provide dual use for early warning of intentional contamination, as well as monitoring general water quality. Only sensors most commonly used by water utilities were tested.

Free chlorine and total organic carbon (TOC) sensors were the most successful in detecting a number of chemical and biological contaminants.

- Free chlorine levels noticeably dropped in the presence of various contaminants
- TOC sensors were successful in detecting carbon containing contaminants or carrier liquids

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### Background

Water distribution systems are routinely monitored to ensure that drinking water meets mandated standards and that treatment processes are performing as intended. Online sensors measure water quality in real-time and have the potential to serve as an early warning for an intentional contamination event.

EPA's research on sensors is in support of the Water Security (WS) initiative, which is developing contaminant warning systems. The WSi addresses the risk of intentional contamination in drinking water distribution systems. A comprehensive warning system is being successfully piloted by several water utilities in major cities throughout the United States.



Online Water Quality Monitoring Station

## Conclusions

### **Free chlorine and total organic carbon were the most responsive trigger parameters**

- Free chlorine and TOC were the most responsive parameters in chlorinated systems
- Total chlorine was not an effective trigger parameter in chloraminated systems over the four hour time-frame of the study
- TOC levels were effective in detecting organic compound contamination (e.g., solvents, pesticides, petrochemicals) in both chlorinated and chloraminated systems
- Additional water quality parameters' responses to the presence of contamination are summarized in the report

### **Online water quality sensors alarms were a reliable indicator of a contamination event**

- Online water quality sensors can generate reproducible data at various contaminant concentration levels
- Stable or predictable baseline water quality levels are needed to capture normal water quality variability for each location
- Background value variations need to be considered when locating online sensors and interpreting response data

### **Operational and maintenance costs for online water quality monitoring systems can be managed**

The report also summarizes lessons learned and estimated operation and maintenance costs for each sensor tested by EPA.

### **Best practice recommendations for online sensor contaminant warning systems are provided for the following topics.**

- Instrument Setup and Data Acquisition (Section 3)
- Testing Procedures and Safety Precautions (Section 4)
- Data Analysis (Section 5)
- Operation, Maintenance and Calibration of Online Instrumentation (Section 6)

For more information, visit the EPA Web site at [www.epa.gov/nhsrc](http://www.epa.gov/nhsrc).

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