USING ADVANCED ALGORITHMS FOR CONTINUAL MONITORING OF SOURCE WATER

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ABSTRACT

There are a number of potential problems with implementing a monitoring system for source water. There is the problem of diurnal (night and day) as well as seasonal shifts in water quality due to a variety of factors such as aquatic plant respiration and decaying vegetation from autumn leaf falls. Varying amounts of sediments, turbidity and dissolved solids due to precipitation events and spring run-off fluctuations may be problematic. Because of the transient and unexpected nature of the events we are trying to detect, the monitoring systems also need to be on-line and continuous because, if we knew when we needed to monitor we wouldn't need to monitor.

The basic concept here is to actively and continuously monitor a variety of basic water quality parameters and look for significant changes that may be indicative of a terrorist event. There are a variety of source water parameters that may find application for this sort of system. Various manufacturers in the environmental market have for many years combined a variety of this sort of instrumentation into self contained data collection bundles that can feed data back to a central location via wireless telemetry or hard wired packages. There are a number of parameters currently available for on-line monitoring. The relative low cost of these instrumentation packages allows monitoring at a variety of sites. The major drawback is the huge amount of data that must be analyzed and correlated to determine if a change is significant or the result of natural variation.

The use of advanced chemometrics techniques have been proven to be effective in recognizing and classifying events in the complex matrix of the drinking water distribution system. The use of these same algorithms with a different sensor set to monitor source water is described here. A trial program in coordination with the USGS is being conducted to determine if the use of these algorithms for this application is feasible. A series of monitoring stations on a major watershed will have their data run through the algorithms to see if events can be recognized and alarm threshold levels set. Samples will be collected and an analysis run to determine the cause of any recognized events. The data will be collected for a period of at least 12 months. This new tool opens a new vista for source water monitoring for both terror and pollution related events.

KEYWORDS

Source water, Monitoring, On-Line, Security, Chemometrics, Algorithm, Event Detection