## Safe waters

Keeping chlorine out of the rivers and oceans has been an age-old problem in the wastewater industry, but Richard Baril, product marketing manager at Emerson Process Management, Rosemount Analytical, in Irvine, Calif., points to security as one of today's major issues. Baril said he'd been working with the government and the EPA and several other groups for a year and a half and has really been focused on the drinking water side—the infrastructure protection. A presidential directive a few years ago assigned the Department of Homeland Security and the Environmental Protection Agency (EPA) to identify certain critical infrastructures they need to protect: power, drinking water, and wastewater. "The guidelines show how someone in the utility could design online contaminate moderating systems," Baril said. Some are continuous. In this publication, there are several manufacturers and different ways of measuring things.

But the common way to moderate the systems right now is through oxidation reduction potential (ORP), chlorine residuals, dissolved oxygen, and turbidity, Baril said. The goal for manufacturers in the future? An American Society of Civil Engineers (ASCE) project is in progress to clarify specifications for instruments in municipalities.

Although the Public Health, Security and Bioterrorism Preparedness and Response Act of June 2002 amended the Safe Drinking Water Act to require all public water suppliers serving populations greater than 3,300 to complete vulnerability assessments and establish emergency response plans, Baril said right now, "there are no specifications for security and protecting yourself for water quality monitoring." In an article on homeland security for drinking water supplies, ENSR International, a global provider of environmental and energy development services, said a vulnerability assessment required manufacturers to "identify potential threats, assess the critical assets of the system, evaluate the likelihood and consequences of an attack, and develop a prioritized set of system upgrades to increase security.

*—Ellen Fussell*

methods, oxidation may not be complete. This limits their application as the correlation will change with the degree of oxidation. Those analyzers require sampling lines and high maintenance.

### UV absorption

Nitrate has a very strong absorption at 214 nm in the UV range. Most dissolved organics have a strong absorption at 254 nm. This property has been around for quite some time in systems designed to measure on sampling lines. You could have the measuring cell mounted inside the analyzer or outside. This type of unit requires a high-maintenance due to the sampling line when applied to wastewater. Limitations in the technology include potential interferences—high and changing concentration of nitrite or organic compounds absorbing UV light in the vicinity of the measuring wavelength. The presence of suspended solids in the water will create a scattering of light. You need to compensate for an accurate reading. Instruments will be blind to organics, such as methanol, with no or little absorption at 254 nm.

A solution is an organic sensor for in-line installation in open channels and tanks. If in-line installation is not possible, you can have a trough chamber mounted at the measuring end of the sensor. In those cases, typically for some applications in drinking water, you'll need a sampling line.

The light source is a flash light with high emission in the UV spectrum. The beam is directed through the measuring area and then split to reach the two detectors. Use solid state detectors to measure the absorption at two wavelengths. The reference wavelength establishes the base signal. The particles' scattering of light in the measuring gap, the aging of the source, and the absorption of UV light by other components such as organic material, determine the base signal. Then subtract this base signal from the actual absorption measurement. The intensity is directly proportional to the nitrate or dissolved organics concentration.

In nitrate application, the limits of this technology are nitrites and organic content. Nitrites have an absorption band very close to 214 nm. The unit is unable to differentiate between nitrate and nitrite. When the nitrite concentration is low and stable, you can calibrate the instrument to the nitrate calibration. In all other applications, the signal will be proportional to NOx. For applications with high COD, the applicability of the sensor will depend on the conditions. If the absorption at 254 nm is higher than the absorption at 214 nm, you won't be able to use the sensor. An excellent application situation is when the COD is below 300 mg/l. You can apply it at higher COD if the COD concentration is stable (variations less than 50 mg/l).

There are also some limitations in dissolved organics applications. You won't be able to see the organics that do not absorb the wavelengths. When using it as an equivalent for BOD or TOC, you'll need to establish a site/application specific correlation. That correlation works well when a single component is present in the water. When multiple components are present, the correlation will remain valid as long as the composition remains stable. Automatic cleaning is available. Air that a locally installed compressor supplies keeps the measuring area clean. As long as the detectors receive enough light to be in their linear range, the measurement will be accurate.

**Behind the Byline**

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## Safe drinking water's top 10

**Prepare** (or update) an emergency response plan. Make sure all employees help to create it and receive training on the plan.

**Post** updated emergency 24-hour numbers at your facilities in highly visible areas (pumphouse door, vehicles, office) and give them to key personnel and local response officials.

**Get to know** your local police, and ask them to add your facilities to their routine rounds, and practice emergency response with public health officials.

**Fence and lock** your drinking water facilities and vulnerable areas (wellhead, hydrants, manholes, pumphouse, and storage tanks).

**Lock all** entry gates and doors and set alarms to indicate illegal entry. Do not leave keys in equipment or vehicles at any time.

**Install good lighting** around your pumphouse, treatment facility, and parking lot.

**Identify** existing and alternate water supplies, and maximize use of back flow prevention devices and interconnections.

**Use** your Source Water Assessment information to work with any businesses and homeowners that are listed as potential sources of contamination and lesson their threat to your sources.

**Lock** monitoring wells to prevent vandals or terrorists from pouring contaminants directly into ground water near your source. Prevent pouring or siphoning contaminants through vent pipes by moving them inside the pumphouse or treatment plants, or if that isn't possible, fencing or screening them.

**In case of an emergency,** first call 911, then follow your emergency response plan.

SOURCE: EPA New England Office