Real-time Environmental Monitoring

ZAPS TECHNOLOGIES
www.zapstechnologies.com

ZAPS Technologies, of Corvallis, OR manufactures the world's first integrated solid state equipment capable of concurrently measuring complex compounds for use in real-time environmental monitoring. The proprietary Hybrid Multispectral Analysis (HMA) methodology implemented by ZAPS Technologies was developed through support in part by Oregon State University, Oregon Nanoscience and Microtechnologies Institute, the US Environmental Protection Agency, and the Office of Naval Research.

Employing HMA, continuous parameters from the LiquID™ Station can be used alone or in combination as monitors of environmental conditions or to help develop strategies for dealing with adverse effects. The list of LiquID parameters includes (but is not limited to):

Chlorophyll-a	Color (@ 440 standard)	Refined Hydrocarbons	TOC
Chlorophyll-b	*E. coli*	Size	TSS
Chlorophyll Phycobilin	Nitrate+Nitrite	Temperature (sample)	Biologically-Available Iron

Measuring and understanding the profile of source water is a basic requirement for protecting the safety and security of our natural water resources for many purposes including protecting fisheries and wildlife, recreation, agricultural and water treatment. The LiquID is a self-contained, hands-free, on-line system designed to work 24/7/365 to automatically produce hundreds of readings per day, continuously monitoring for natural and man-made organic compounds, benign or otherwise. The LiquID station is a reagentfree, 100% optical, continuous monitoring instrument capable of simultanously measuring multiple parameters including major indicators of algal activity such as Chlorophyll-a, Chlorophyll-b and Phycobilin. Capable of unattended, automated operation for extended periods, the LiquID is ideally suited to serve as a dependable and ever-vigilant sentinel of source water quality. Strengths of the LiquID Station:

- Detects a broad range of significant water quality events using Hydrid Multispectral Analysis (HMA).
- Hybrid technology capable of tracking organic and inorganic contaminants using a combination of sensitive techniques.
- Automated alarm system makes it possible to stop bad water before it enters the water distribution system.
- High-resolution process approach (data every 2 minutes) enables events to be characterized for strength, longevity, decay or growth characteristics; versus limited sampling.
- A completely integrated system: every LiquID Station responds in accordance with every other in a network providing reliable early warning to stakeholders without false positives, from source to tap.

"**A river is more than an amenity, it is a treasure.**"
- Justice Oliver Wendel Holmes

The LiquID is a self-contained, hands-free system designed to work 24/7/365 that automatically samples water over 3 million times a day, continuously looking for natural and man-made organic compounds, benign or otherwise.

Concrete, meaningful improvement to water security without additional regulation or infrastructure.

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Real-time E. coli environmental monitoring;

INCREASE PEACE-OF-MIND.

The *E. coli* technique developed by ZAPS Technologies automates the detection of this indicator pathogen in our waterways thereby documenting fecal contamination events in real-time. This development is a significant step forward in on-line monitoring and provides an efficient means to advance our understanding of the total impact of such contamination on the quality of public water ways. Such information can now be implemented to provide better control systems and improved public health and safety.

THEN

Based on approach developed in 1903, requires user to collect test sample, store properly, distribute test sample & test medium into pocket cells of tray, wait 18-48 hours, then count how many E. coli colonies have grown. This technique is approved for current regulatory readings, but the lack of repeatability and slow turnaround makes it less than ideal for monitoring.

NOW

Hybrid Multispectral Analysis (HMA) performed in-situ instantly identifies proteins unique to *E. coli*. On-board data systems broadcast test results every 2 minutes for immediate manual or automatic response. On-line current and limitless historical data aids investigation. No reagents, operators, or data delays. Testing is performed without user intervention in the field.

The figure to the right represents **5 months** of laboratory tests from a waterway in the pacific northwest compared against readings taken by a LiquID station. As can be seen, the LiquID readings closely track the results received from the lab. However, 25 grab samples were taken over this period while the **LiquID reported about 98,000 data points** over the same period, capturing several events missed by the conventional lab sampling approach.

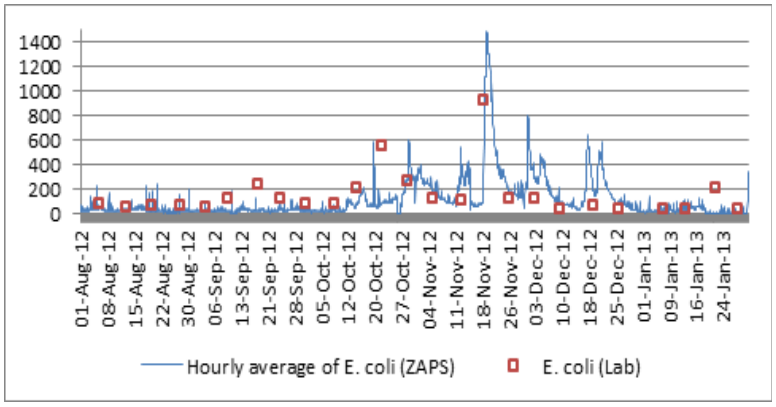

Figure: Comparison of ZAPS LiquID data with conventional lab testing.

Access to real time data provides a true reflection of the status of our waterways, and by doing so it also increases oversight; reduces risk and increases public safety.

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