

E.coli

Monitoring with the LiquID™ Station

Measuring E.coli

Escherichia coli, commonly abbreviated *E. coli* is a Gram-negative, facultative anaerobic, rod-shaped bacterium that is commonly found in the lower intestine of warm-blooded organisms (endotherms) Most *E. coli* strains are harmless, but some serotypes can cause serious food poisoning in humans, and are occasionally responsible for product recalls due to food contamination

The versatility and sensitivity of the (Hybrid Multispectral Analysis) HMA methodology developed by ZAPS Technologies can be used to make measurements that would otherwise require complicated, time-consuming and error prone methods. There is no better example than the *E. coli* determination of *E. coli* by HMA which uses a combination of fluorescence, scattering and absorption. First LiquID quantifies tryptophan, the basic protein of *E. coli* cells, using its characteristic fluorescence at 380nm. But this backbone measurement is augmented with complementary UV absorption and scattering resulting from cell colonization adjusted for turbidity and interference using complementary measurements in other parts of the spectrum. Determinations made in this way are heavily weighted toward living, colonizing cells of *E. coli* bacteria, but are not strain specific.

The HMA method for *E. coli*, implemented through the LiquID station, consists of over 1000 individual optical readings during each measurement cycle which are combined into a single value every 2 minutes using a proprietary algorithm. The large number of optical readings behind each *E. coli* determination adds statistical rigor and greater precision and accuracy to every reported value.

Calibration of the *E. coli* result to units of MPN/100mls is the result of direct comparison to hundreds of laboratory results determined by dozens of water and waste treatment plants using standard Quanti-Tray® or microscopic methods applied to samples taken from the drain of the LiquID machine. Comparative results vary as a result of interferences in the standard methods and local convention for what is reported. In summary, *E. coli* levels are determined 720 times per day

About LiquID™

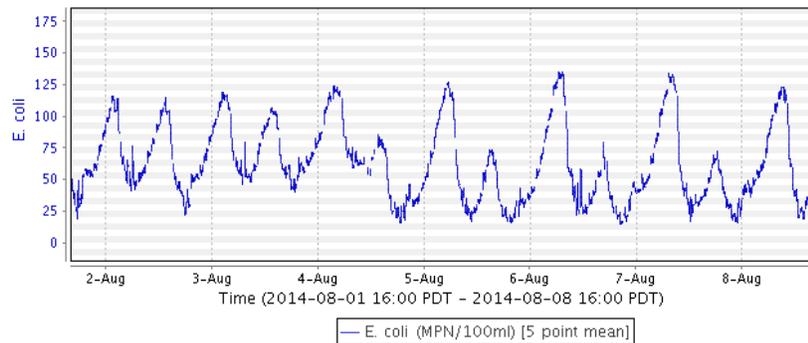
The LiquID Station from ZAPS Technologies (pictured below) is an innovative, optical instrument for continuous water quality monitoring. The automated online instrument analyzes a continuous flow-through stream from a pressurized water sample line using multi-spectral light and software algorithms, and uses no reagents nor produces any waste other than the original sample (which is returned or wasted as appropriate). With this method LiquID is capable of monitoring a wide range of water quality parameters in a number of different industry applications, including those relevant to municipal water and wastewater treatment, water reuse systems and industrial process control.



using the HMA approach compared to once per day using standard incubation methods: with comparable accuracy and without many of the pitfalls of sampling and growing anaerobic microbes in the laboratory. Furthermore, the results are available immediately from the LiquID station, without the 18-24 hour delay of laboratory test methods.

Effective in Different Matrixes

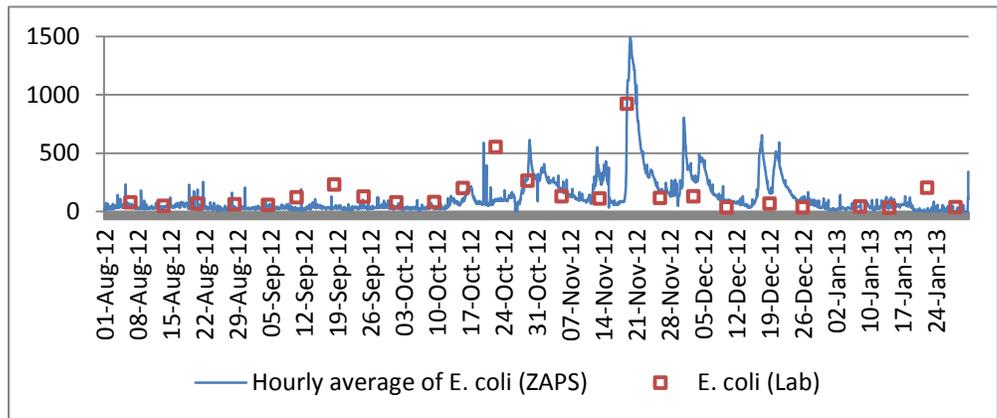
The LiquID Station is a robust, ruggedized instrument, designed for monitoring in indoor or outdoor environments and matrixes ranging from ultrapure waters to natural ground or surface waters to wastewater. With broad spectrum, hybrid multispectral analysis and intelligent on-board analytics, the LiquID Station provides *E. coli* monitoring with a higher sensitivity and in environments where many instruments fail.



The graph above is one week of *E. coli* near the mouth of the Tillamook River. The peaks are associated with low tides and the minima with high tides. The concentrations shown are consistent with data reported by the Oregon Department of Environmental Quality in the 2001 report: Tillamook Bay Watershed Total Maximum Load (TMDL).

Value of Real-Time E.coli Monitoring

The LiquID *E. coli* parameter can be used to monitor treatment processes, to determine system loading, to provide an indication of the quality of discharged water and also track plant efficiency. The graph below shows real-time *E. coli* data for a 6-month period collected by a LiquID station installed at the intake of a drinking water facility. Not only does this demonstrate the range and applicability of the LiquID *E. coli* parameter, but also demonstrates excellent agreement with comparative lab sampling.



The real-time measurements of *E. coli* and other key parameters provide treatment plant operators with a better understanding of their system, and in some cases, opportunities for advanced process control.

Contact ZAPS for More Information

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