

# Total Suspended Solids

## Monitoring with the LiquID™ Station

### Measuring Total Suspended Solids

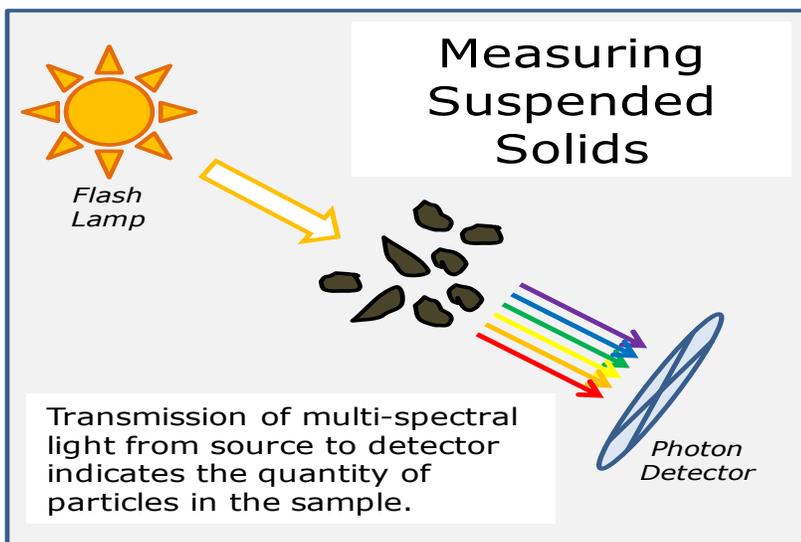
**Total Suspended Solids (TSS)** is a key measurement for wastewater and certain industrial processes. Typically, TSS is monitored through periodic grab samples and a filter test performed by a skilled technician.

The LiquID Station provides real-time, effectively continuous TSS measurement by measuring solids optically. The instrument hits the sample with light and multiple frequencies, and the key to suspended solids measurement (as opposed to dissolved compounds) is **non-specific absorption**. The system uses frequencies known to have low or nil specific absorption from the common dissolved constituents of a wastewater matrix to isolate the absorptive properties of the solids. The rate at which light is non-specifically absorbed when passing through the fluid sample (pictured below) is one indication of the quantity of solids in the system.

In addition, the LiquID Station uses another optical technique based on reflectance which is used in many technical fields to characterize various types of solid particles. It is the combination of these measurement techniques – absorption spectroscopy and reflectance measurement – combined using proprietary software analytics developed by ZAPS, which allow for the repeatable and

### 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.



reliable continuous measurement of total suspended solids in a flow through system. Using these techniques, the LiquID Station produces a robust TSS measurement of wastewater, with a range of less than 1mg/L to over 5,000 mg/L, about every two minutes.

### Effective in Different Matrixes

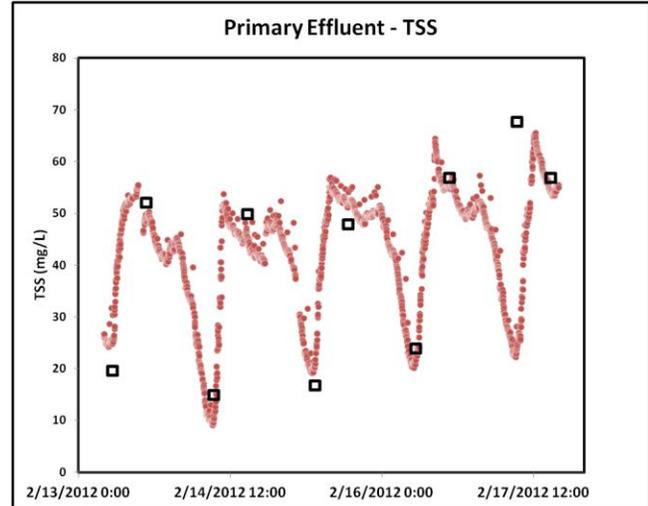
One key benefit of LiquID's optical-algorithmic methodology for solids monitoring in the LiquID Station is its extensibility across a broad range of solids concentrations. Stated another way, the LiquID Station can monitor TSS down to below 1.0 mg/L and up to 5,000 mg/L at the current specification, and ZAPS is actively developing plumbing solutions to increase this range for monitoring in even higher solids environments.

What that means is the LiquID Station can monitor TSS in wastewater matrixes ranging from cleaned finished effluent, to primary effluent (example data pictured right), and even all the way up to raw wastewater plant influent.

### Value in Real-Time Monitoring

Typically, wastewater treatment facilities collect suspended solids readings from grab samples or composite samples on a periodic basis. However, what these periodic or composite sampling regimens miss is often a tremendous degree of variation. We at ZAPS refer to this as "the secret life of a wastewater plant." The graph above illustrates how one fairly conventional municipal wastewater treatment plant would experience over three-fold swings in TSS concentration in the diurnal cycle, which would never be captured by daily grabs or composites.

Monitoring solids on a continuous basis changes the way operators think about the plant. At first, continuous monitoring just makes them aware of the changes that have always been taking place, as well as alerts them to sudden unexpected changes that occur from things like industrial discharges or process failures upstream. And with time, continuous monitoring data enables improved operations over changing conditions, through such efforts as better flow/load equalization or advanced process control. Quite often, significant plant efficiency, in terms of energy and chemicals consumption, is achievable simply through improved operations and without major capital investment.



The graph above shows comparative data from grab samples analyzed using traditional lab techniques (black squares) and continuous data from the LiquID Station (red dots) over a 1 week period.

### Contact ZAPS For More Information

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