

# The Importance of Maintaining Wastewater Quality

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In the typical wastewater treatment process, the goal of primary, secondary and tertiary effluent treatment is to reduce or remove organic matter, solids, nutrients, disease-causing organisms and other pollutants from the treated wastewater before it is discharged to a body of water. In addition to disinfectants, other chemicals are sometimes added during the treatment process to help settle out or strip out nutrients including phosphorus or nitrogen. Some examples of nutrient removal systems include coagulant addition for phosphorus removal and air stripping for ammonia removal. To ensure efficient operation of any wastewater treatment plant, three different but equally important sets of measurements must be analysed.

- 1) Parameters essential to cleaning processes: pH as measured at the inlet and DO as measured in the aeration tank
- 2) Parameters essential to measuring efficiency: BOD and COD as measured at the inlet and in the treated effluent
- 3) Parameters essential to plant optimization: DO, ammonium, nitrate, nitrite and phosphorous

## Ammonia, Nitrogen and Phosphorus

The environmental rationale associated with monitoring nitrogen levels in wastewater treatment is to ensure that nutrient levels are sufficient to allow the optimum population of bacteria to proliferate to break down waste. In tandem with this, there is the fundamental requirement to minimise concentrations of ammonia in the final outfall so that the effluent is fully compliant with environmental discharge standards. Additionally, ammonia monitoring is used to document discharge levels set by regulatory authorities, especially where non-compliance can result in penalties.

For control of a nitrification/denitrification process in a waste water treatment plant, ammonia measurement is a must. Nitrogen is a nutrient which will encourage undesirable, oxygen depleting growth in rivers and lakes, and is poisonous for fish and micro-organisms.



Phosphate in wastewater will also encourage growth in rivers and lakes. Due to this eutrophication process, algae and seaweed amass causing massive impact on the ecological balance of the ecosystems. Two methods are conventionally applied in the sewage treatment process for removing phosphorus from the aquatic environment; biological nutrient removal, which proves challenging on many sites due to the precise conditions required, for example carbon substrate levels in the crude influent. The more commonly applied method is to dose iron salts to precipitate the phosphorus and remove it as a sludge. As a result of the costs associated with this method, such as chemical costs and logistics associated with increased sludge volume handling, it is of paramount importance to optimise the chemical dosing regime. An essential element being applied in this optimisation process is to measure real time phosphorus concentrations with feed forward / feed back signals to the chemical dosing equipment.

Historically, measuring phosphorus early in the sewage treatment process has been extremely problematic due to the content and nature of the sewage prior to significant treatment. However, Severn Trent Services are coming to the end of a pioneering development project, which will allow the Aztec™ series of online instrumentation to be reliably applied in untreated sewage.

Severn Trent Services have developed an ultrafilter, which can either be insitu or a "pump-to" installation to deliver the volumes required for online phosphorus analysis. This will allow real time determinations of the phosphorus load to be removed using the optimum coagulant dose at any given time.

## Wastewater Quality Analysers

As industries are required to more stringently monitor wastewater parameters, demand grows for high-quality analytical instruments that facilitate regulatory compliance. This trend has resulted in many public bodies and industries increasingly seeking manufacturers who can supply all their required instrumentation needs. As a result, continuous, on-line instruments have gained popularity because they reveal more through their ongoing analysis and better identify containment sources, and process changes. Continuous instruments also operate and calibrate automatically, reducing the need for human intervention.

In addition, optimising and controlling a wastewater treatment process is dependent on the availability of water quality data. Outside laboratory testing has a longer lag time than results obtained from on-site water quality analytical instrumentation. Therefore, with properly maintained continuous on-line instruments, a wastewater treatment facility can benefit from immediate data that can then be used to optimise their wastewater treatment process.

## About Severn Trent Services – Wastewater Capabilities

Severn Trent Services has over a quarter of a century's experience in designing, manufacturing, installing and servicing on-line instrumentation, covering the range of parameters critical to the optimisation of the wastewater treatment process. Our family of



instruments have been developed to satisfy a range of budgets and technical requirements.

At the heart of the family are the Aztec™ Series 5000 Dissolved Oxygen (DO) and Mixed Liquor Suspended Solids (MLSS) monitoring instruments. We are unique in offering the ability to simultaneously measure the oxygen content and the concentration of solids or biomass in a system. The system can of course be set up to measure D.O. or M.L.S.S. individually if so required. The instrument control system also offers the favourable feature of being able to accommodate two measuring points, thus reducing costs for the operator. The series 5000 is the only system that performs full self cleaning and calibration in situ without the need for an operator.

For the other critical parameters we have a reference base of over 1000 installations for our colorimetric and ion selective instruments which cover the process critical parameters of phosphate, ammonia, nitrite and nitrate. The instruments have been designed to deliver a high degree of accuracy and reliability with extremely low whole life costs. The consumption of reagents has also been reduced to a minimum to further reduce operating costs. The design of the instruments have been standardised to permit one instrument to be switched simply to measure a range of parameters. The standardised design also vastly reduces and simplifies the maintenance and spares holdings requirement.

In conjunction with our expertise in the field of instrumentation, Severn Trent Services are recognised as one of the leading disinfection businesses in the world with a range of instruments including the MicroChem2™. This transmitter, analyser and controller has multiple sensor capability for a variety of disinfection measurements including chlorine (free & total), pH, ORP, DO, chlorine dioxide, ozone and temperature. In addition, the Aztec™ 1000 Series residual analysers employ microprocessor-based electronics to offer precise control of the critical components in the measurement process. The result is the most accurate family of analysers on the market today.