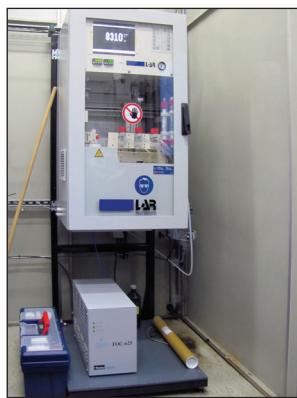


# Analysis of Waste Water Without the Use of Particle Filtration

The reliable and continuous Total Organic Carbon analysis (TOC) of industrial waste water is known to be problematic, especially when the analyser is used as a spill monitor for heavily polluted waste water containing a high-load of particles. LAR's QuickTOC analysers have proved to be very suitable for these raw waste water applications and we want to present two remarkable cases where LAR's analysers brought about a much appreciated solution.

“ QuickTOC analysers proved to be very reliable, even without particle filtration, measuring raw process waste water, including organic particles and reducing maintenance tremendously. ”



The QuickTOC analyser is very suitable for measuring high TOC levels

## The QuickTOC analyser

LAR's TRUE TOC analysers are capable of handling unfiltered waste water up to 50,000 mg C/litre by using a sampling system without dilution and an advanced filter-free robot driven injection technique, in combination with a non-catalytic 1200°C combustion. Waste water flushed through an overflow sample vessel, is sucked into the needle and injected into the reactor. Due to the high temperature, this guarantees that all Dissolved Organic Carbons and Particulate Organic Carbons are fully oxidised to Carbon Dioxide (CO<sub>2</sub>), which is

then measured with a Nondispersive Infrared Detector (NDIR). The ability of the QuickTOC analyser to measure all organics, is known as the TRUE TOC. After every sample injection, the needle is flushed with rinse water; a unique technique offering a comprehensive, self-cleaning, reliable operation with outstanding analytical performances.



Wet Chemical analysers consume many different reagents

## Case study ONE: Replacement of two Wet Chemical Analysers by one QuickTOC&TN analyser

A leading international company, producing nitrogen based mineral fertilisers, was obligated to monitor their waste water effluent stream, which contained a variety of components, e.g. ammonia nitrogen, methanol, organic nitrogen, phosphate and sulphate. In 2002 the company installed two wet chemical process analysers, one to determine ammonia and urea and a second to determine nitrate, nitrite and TOC.

Firstly, wet chemical analysers consume many different reagents, e.g. acids, buffers, caustics, demineralised water, oxidisers and oxidation fluids, costing the company a lot of money. Secondly, the use of numerous peristaltic pumps, valves, thin "spaghetti tubing" and other mechanisms, made the apparatus complex and incomprehensible, and just one single measurement took over 15 minutes. Additionally, the analysers needed disposable 1 micron disc particle filters, to prevent the

wetted parts from clogging, which needed to be replaced three times a day.

In spring 2011 these analysers were replaced by one QuickTOC&TN (combines TOC and TN analysis). A magnetic stirrer is located in the sample vessel that thoroughly mixes the waste water, including particles, to a homogenised representative sample. Carbonaceous and nitrous species in the sample are fully oxidised to CO<sub>2</sub> and Nitrogen Oxide (NO) respectively. The NDIR detector and an electrochemical NO-detector determine these concentrations that have a linear proportion to the TOC and TN concentration in the waste water. The automatic periodic flushing with demineralised water, results in little maintenance.

This new QuickTOC&TN analyser provided the company with great advantages; an unattended online analysis of unfiltered waste water and the simultaneous measurement of TOC and TN, resulting in TRUE TOC and TRUE TN, within 5,5 minutes.

## Case study TWO: The replacement of many TOC analysers at one industrial site

A huge petrochemical site, with over 30 different production facilities, e.g. blending installations, crackers, distillation towers and reformers, used predominantly Total Carbon (TC) analysers, to monitor the grade of pollution in their waste water streams. The measurement ranges of these analysers varied from 10,000 - 30,000 mg C/litre and their reliability and availability was of extreme importance to the factory's operators to prevent spillages of costly base products, resulting in a 24/7/365 day maintenance response for service personal.

The twenty plus analysers in use at this petrochemical site, were mainly based on the batch injection and catalytic oxidation technique, and were sensitive to clogging, caused by slime and algae. To prevent this, only partially helpful, sample filter systems were used. Furthermore, these analysers had many parts that came into contact with the sample. Petrochemical installations discharge very sticky oil and contaminated analyser parts suffering from memory effects, especially after measuring a TOC peak, when a long recovery period is needed to recover a correct low TOC level. Personnel needed to flush and clean the fouled and contaminated parts frequently, besides the foreseen intensive preventative maintenance.

These analysers used a lower combustion technique at 680°C to 950°C,



The QuickTOC uses a robot and only a few wetted parts

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with a lower oxidation potential, requiring catalysts, and could still not cover ranges > 2000 mg C/litre. For higher ranges sample dilution with demineralised water was needed.

In 2009, this petrochemical site replaced one of the older analysers. After thorough research they selected LAR's QuickTC&TOC analysers and started with a three-month trial period. Within weeks the QuickTOC analysers proved to be very reliable, even without particle filtration, measuring raw process waste water, including organic particles and reducing maintenance tremendously. The analyser is checked weekly, occasionally calibrated and there is a monthly 20 minute standard service. Due to the oxidation strength

at 1200°C, TOC levels up to 50,000 mg C/l can be analysed without dilution. Even after measuring a TOC peak the QuickTOC rapidly recovers, proving clearly the lack of memory and absorption problems. Following the success of the first QuickTOC analyser more LAR TC&TOC analysers were successfully brought into operation here over the following years.

### **Sweet success sells itself**

A single sale leads to the installation of even more Quick analysers. Presently, both these facilities have respectively five and fourteen

Quick analysers in operation. LAR offers these robust online analysers well-known for their effective, straightforward and reliable technique, capable of measuring up to six streams, with a variety of measurement parameters, e.g. TC, TIC, TOC, TN, TP and VOC/POC. This in addition to their low-maintenance and operational costs, means we are most likely to be able to offer a solid solution for your company as well. Please feel free to contact us if you would to receive more information or take a look at our website [www.lar.com](http://www.lar.com)