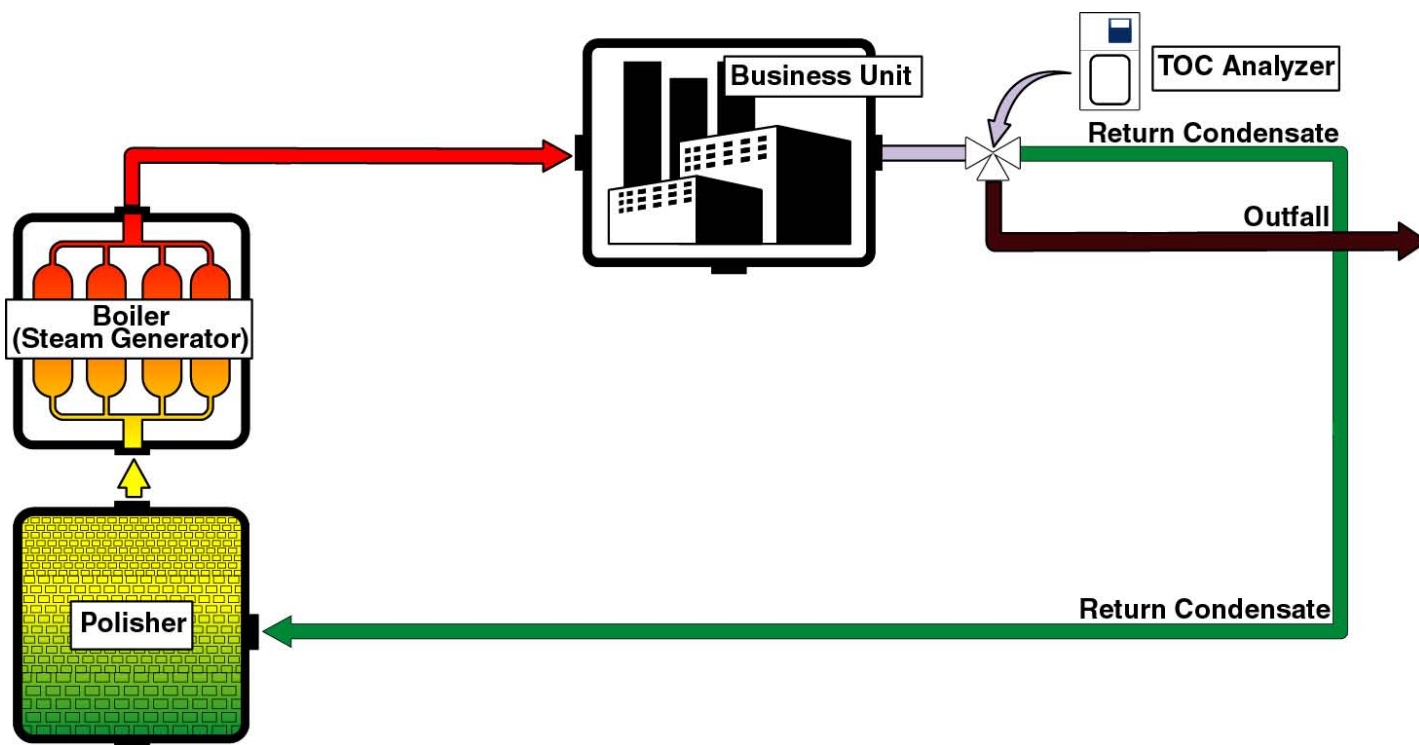


TOC monitoring in the chemical/petrochemical industry



Return Condensate Application for TOC analysis

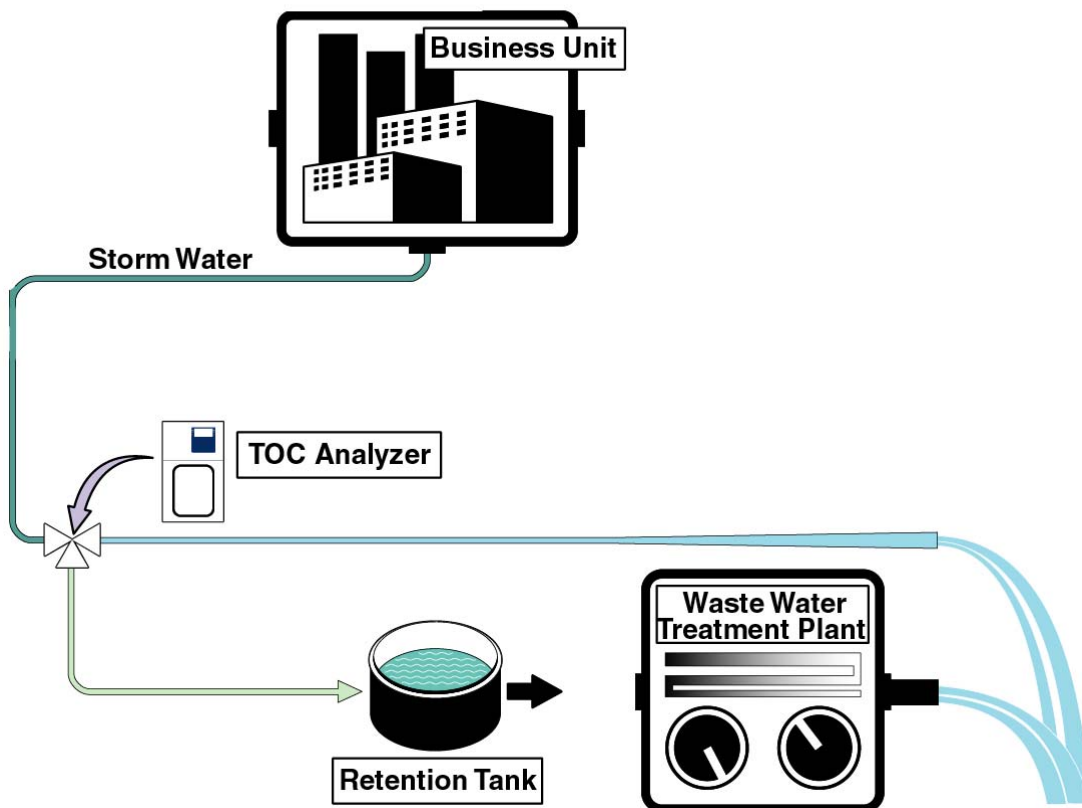
Chemical and petrochemical plants consume large amounts of water for processing product. Typically these plants (owned by a company like Bayer, Novartis, Equistar, DuPont, BASF, Henkel, Rhone-Poulenc, Union Carbide, Exxon, Shell, B. P. Amoco etc.) are organized into business units that are responsible for the fabrication of a particular raw material (such as polypropylene, polyethylene, acids and caustics) or for the refinement of product (Teflon®, Kynar®, fertilizers, cleaning agents and specialty chemicals).

Water is heated in the boiler to create steam that is used for power generation, and cracking hydrocarbons in preparation for further processing. Once the steam is used for heating in the production process in the business unit, the steam is condensed and the TOC levels are measured to determine if they are low enough for the steam condensate to be repolished and recirculated to avoid the high cost of the initial clean-up.

If the steam condensate can be reused, the business unit receives a credit for the returned steam. In many plants the business unit receives a higher credit if the steam condensate is monitored for TOC. If TOC levels in the steam condensate exceed the limit for repolishing, then it is sent to the outfall or waste.

Once steam condensate has been sent to the outfall, it is considered consumed, and the business unit is charged the complete cost of making up new water to replenish the steam condensate that was contaminated. The business units are individually responsible for their own productivity and efficiency, based in part on steam consumption. A central steam plant feeds all of the business units at a particular site, and charges the business units according to their usage. Measuring TOC not only makes the use/reuse decision automatic, it provides a gauge for the amount of cleanup that will be necessary.

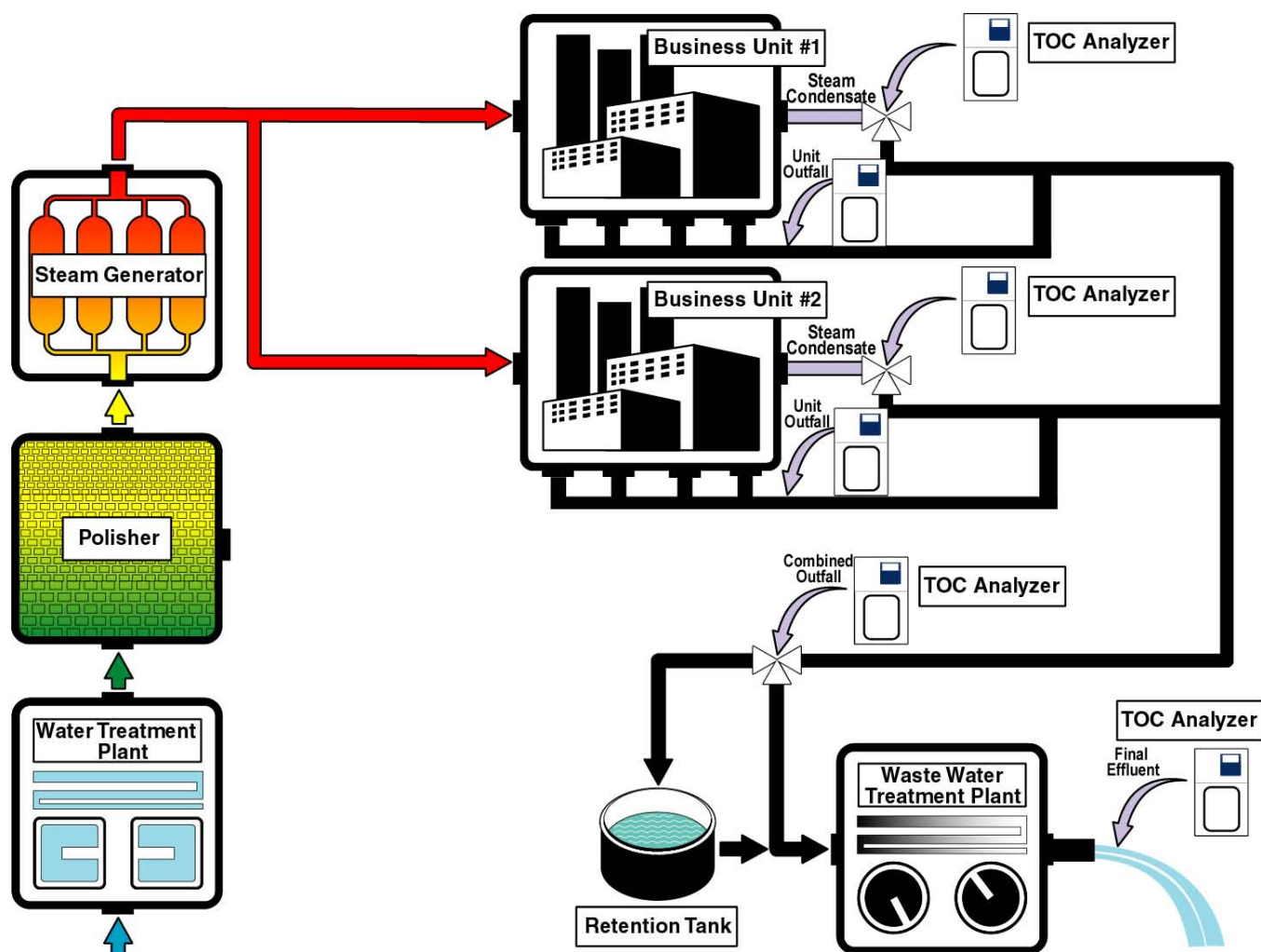
To be repolished, the steam must be cooled or condensed into water and it must be relatively clean; therefore this application requires low-level monitoring. We recommend an astroTOC TOC Analyzer in the range of 0–10 mg/l, 0–25 mg/l, 0–50 mg/l or 0–100 mg/l, typically installed between the condenser and the return condensate pipe in a temperature controlled analyzer shelter or in the utilities building.



Storm Water Application for TOC analysis

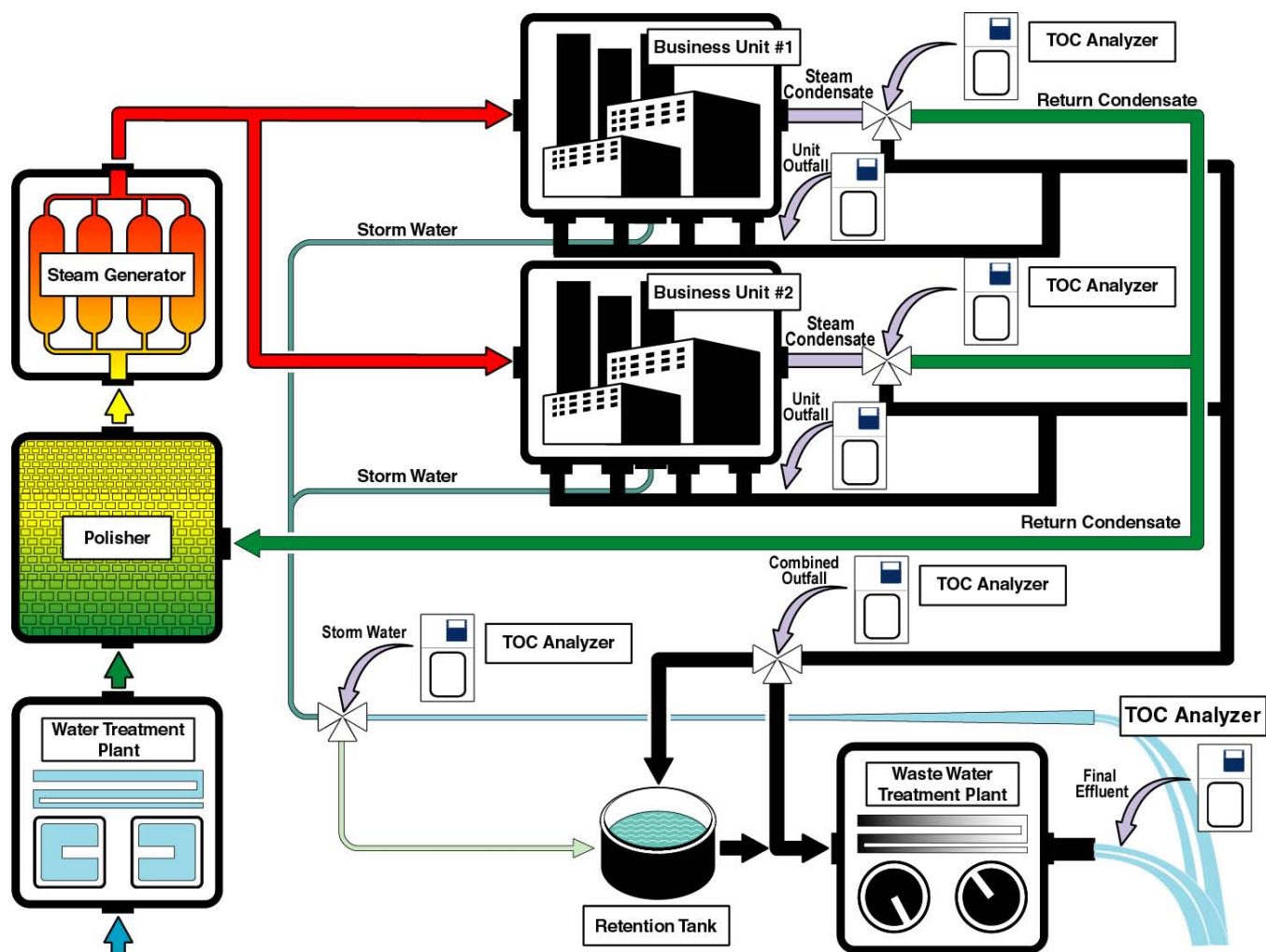
Chemical and petrochemical plants are surrounded by storm water ditches. These ditches are designed to contain storm water run off during rain conditions or a major spill. Typically storm water run off is permitted for discharge into a body of water untreated, however because of the nature of chemical and petrochemical processes the storm water may have a high content of organic contaminants. When the TOC measurement is higher than the permitted level, it is diverted into a retention (holding) tank to be slowly released into the wastewater treatment plant. When the TOC measurement is lower than the permitted, it is discharged untreated.

For example, at a chemical plant, an astroTOC HT TOC analyzer (0-100 mg/l) is being used to measure the Total Organic Carbon of the storm water run off. The customer chose the high temperature oxidation method because of the high concentration of hard to oxidize organic products in the sample and potential high salt content. In order to achieve constant monitoring during dry weather conditions (low-flow), the analyzer switches to service water to keep the analyzer continuously monitoring. Service water is non-potable water that is typically high in minerals such as iron and calcium. In this application, filters were installed to protect the instrument from minerals in the service water and increase analyzer uptime. During a storm event a level switch (rain gauge) will actuate a pump to draw sample from the storm water ditch to the analyzer.



Unit and Combined Outfall Application for TOC analysis

Because each business unit is judged on its own profitability, process water from each business unit and sometimes each individual stream is monitored for TOC. This assures that the business unit is charged fairly for the clean up. This measurement is typically performed by an astroTOC HT or astroTOC UV analyzer (depending on the sample composition). The analyzer is installed in the water line between the business unit and the waste stream. Without a TOC measurement at each unit outfall, a combined outfall TOC measurement is taken and all the business units divide the cost of clean up evenly. Then the combined outfall is sent to the wastewater treatment plant for treatment. The Final Effluent is monitored for TOC and will have to meet the discharge permit before being discharged into a body of water.



Summary of Applications

As you can see, petrochemical and chemical plants have many applications for TOC monitoring. With the astroTOC family of analyzers astroTOC HT, astroTOC UV, and astroTOC UV TURBO, we have the right tool for all the applications. All three of these analyzers can be used in chemical/petrochemical applications. Please be sure to fill out an application questionnaire and work with technical support to determine which analyzer is best for your customer's application. Here are some general guidelines below:

- astroTOC HT-designed for samples with high salt content (anything above .1% salts and hard to oxidize carbons such as humic, amines, xylene, and benzene)
- astroTOC UV-designed for samples with high concentration of solids
- astroTOC UV TURBO-designed to provide a fast response (T90 < 5 minutes, T20 < 3 minutes)

An application questionnaire can be obtained through technical support at ext. 6421.



FOR TECHNICAL ASSISTANCE, PRICE INFORMATION AND ORDERING:

In the U.S.A. – Call toll-free 800-227-4224

Outside the U.S.A. – Contact the HACH office or distributor serving you.

On the Worldwide Web – www.hach.com; E-mail – techhelp@hach.com

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Telephone: (970) 669-3050
FAX: (970) 669-2932
