Continuous SAC_{254} and TOC Measurement of Airport Runoff Streamlines Separation of Polluted and Unpolluted Waters

Introduction

The pollution of the surface water on airport land is caused by the de-icing of aircraft wings and taxiways with glycols and acetates, and by fuel or oil spillage.

Control of airport runoff waste water containing these contaminants consists of diverting it to a treatment plant as needed, where contaminating agents are completely broken down. An advanced drainage system with suitable pollution loading measurement is a prerequisite for addressing increasingly stringent environmental requirements.

Continuous monitoring of the airport waste stream is key in controlling runoff. Measurements signal the end of pollutant presence, so that only contaminated waste water is fed to the treatment plant and treatment costs are minimized. Monitoring also documents water quality at transfer to the treatment plant or receiving body of water.

Airport drainage system

The objectives of airport drainage control are to –

- Avoid pollution of receiving water, by collecting contaminated waste water in a holding tank for feed to a treatment plant
- Make separation of unpolluted and polluted water efficient, sending only polluted water to the treatment plant, at a rate at which the plant can process the waste

The water that is fed either directly to the receiving water body or the municipal treatment plant comes from **drainage areas** (apron, take-off and landing runways, and paved areas around the terminals).

The airport drainage system illustrated in *Figure 1* prevents the feed of polluted waste water to the receiving water body in case of a surge in pollution. When aircraft or paved areas are de-iced, an alarm triggers the drainage system to feed all runoff to the buffer tank II.

Upon trigger of an alarm indicating a fuel or oil spill, waste water is fed through a large fuel separator, then through the buffer tank I and discharged.

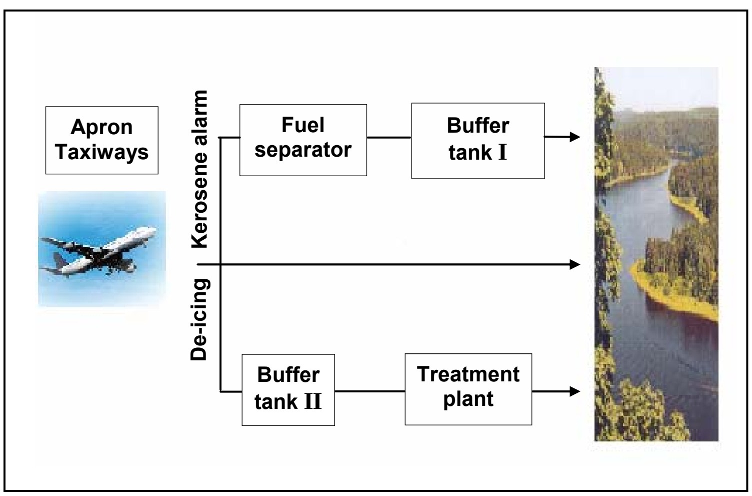

Figure 1 – Example of airport drainage scheme

Characterizing the waste water using total parameters

Pollution of airport waste water is typically defined using total parameters such as Chemical Oxygen Demand (COD), five-day Biological Oxygen Demand (BOD_5), Total Organic Carbon (TOC), or Spectral Absorption Coefficient (SAC). UV absorption measurement, or SAC (m^{-1}), indicates the level of organic pollutants in the sample.

Despite their different definitions, all of these total parameters can be used to characterize pollution in the waste water. They demonstrate similar qualitative dynamics, allowing correlations between them for a particular waste water. For example, *Figure 2* shows the similar trending between grab sample COD measurement and continuous UV absorption measurement.

Product Application

In area I of the drainage system depicted in *Figure 1*, two monitoring stations are in place, each with a Hach UVAS® sc Sensor for continuous SAC measurement, a conductivity sensor, and a level sensor that monitor contaminated waste water diverted to the buffer tank. When SAC and conductivity values drop below a set point, drainage system sluices automatically reset to direct unpolluted waste water to natural discharge. This continuous surveillance assures all de-icing agent is removed from the paved areas, none is sent to the receiving body of water, and waste water volume sent to the treatment plant is minimized.

Drainage area II of this airport operates in a similar manner: when an alarm signals waste water is polluted with de-icing agent, drainage system sluices feed to the large buffer tank II for intermediate storage. From this tank, waste water is released to the treatment plant in batches. TOC measurement here (*Figure 3*) documents the exact TOC concentration sent to the treatment plant. (While UV absorption is complementary to TOC analysis, not all organic species absorb UV light.)

TOC also is monitored on directly discharged waste water to protect the watershed.

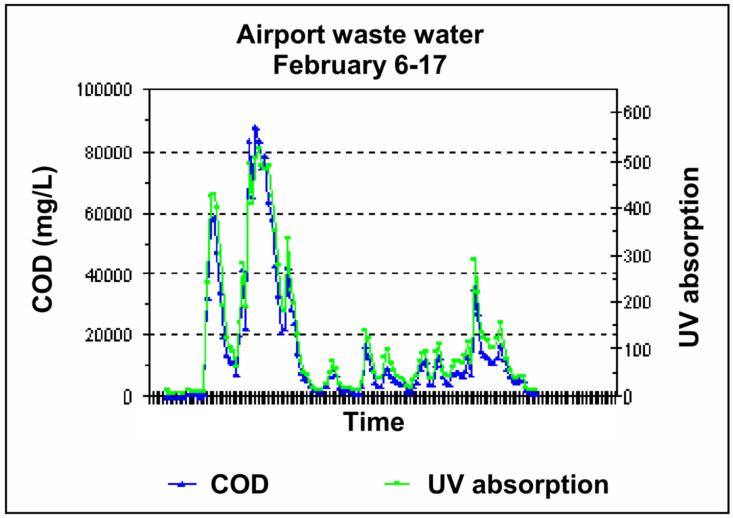

Figure 2 – Correlation of manual COD measurements and online UV absorption measurements

Figure 3 – TOC measurement in drainage area II

This application solution note is one of several Hach documents describing wastewater process control based on continuous SAC measurement. For more detail, refer to:

"Continuous SAC_{254} Determination of Organic Pollutants Supports Management of Municipal Collection Systems," Hach Application Solution AS-SAC1

"Continuous SAC_{254} Determination of Organic Pollutants Is Key in Real-time Wastewater Treatment Control," Hach Application Solution AS-SAC2

"Online SAC_{254} Measurement Yields Operational Savings in the Paper Production Ozone System," Hach Application Solution AS-SAC4

"SAC_{254} Sensor Provides Reagent-free, Sampling-free Monitoring of Organic Materials in Drinking Water Treatment," Hach Application Solution AS-SAC5

"SAC_{254} as an Oxygen Demand Predictor: the Relationship and Correlation of Oxygen Demand Parameters and SAC," Hach Application Solution AS-SAC6

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