

Online Wastewater Monitoring of COD/BOD with Spectral Sensors

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WTW PRODUCT MANAGER



a xylem brand

WTW Webinar Series



June 25
How to monitor BOD
with OxiTop
(Part #1)



July 7
Online Wastewater
Monitoring of COD/BOD
With Spectral Sensors



July 9
How to monitor BOD
with OxiTop
(Part #2)



July 14
Photometry basics
& Automated Chemistry
Analyzers

Dr. Tao Su

- PhD in Environment Science (Tokyo Univ.)
- 5 years research with Tokyo university
- 3 years with Xylem
- Product manager for WTW instrumentation





Poll Question #1

Where are you currently monitoring
BOD/COD?



Importance of COD Monitoring



Environmental issues



Polluted waterbodies



COD Measurement Method

Chemical Oxygen Demand (COD) is a measure of water and wastewater quality. The COD is the amount of oxygen consumed to chemically oxidize organic water contaminants to inorganic end products.

- Standard Method

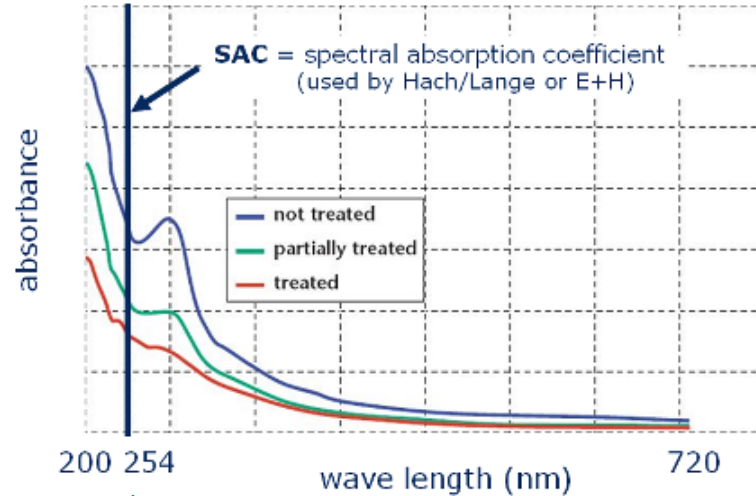
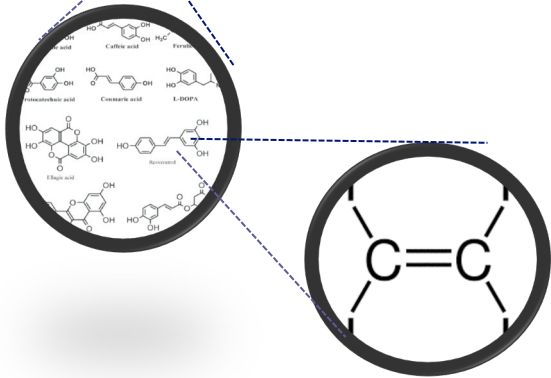


Oxidant: potassium dichromate, potassium iodate, potassium permanganate
Toxic, management troublesome

- WTW Cabovis UVVIS method

NO Reagent, No wait (1min), No toxic reagent Management

UV Method Principle



(Gutsche and Pasto, 1975)

Double carbon band structure has strong light absorbance in UV spectra, especially at 254nm, concentration can be calculated with [Lambert-Beer law](#)

$$E_{\lambda} = \epsilon_{\lambda} \cdot c \cdot d$$

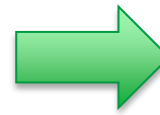
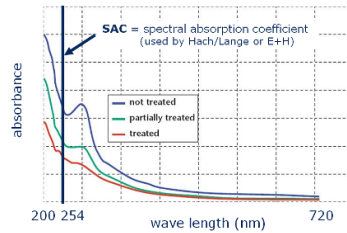
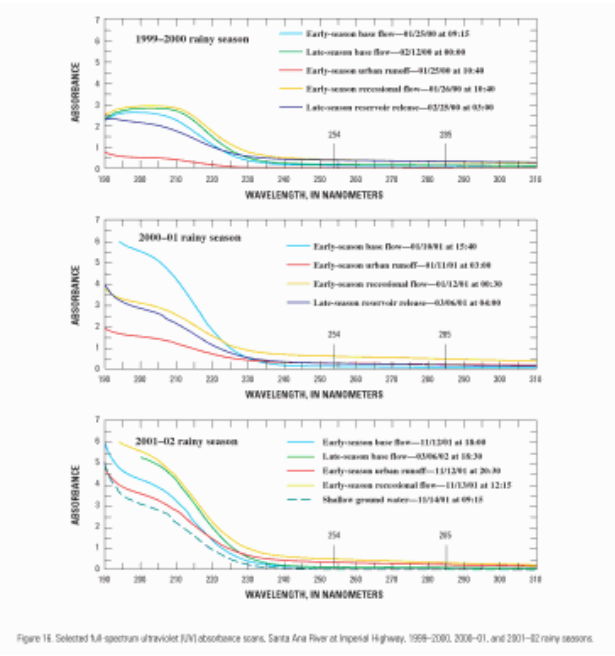
E = absorbance

ϵ = molar extinction coefficient

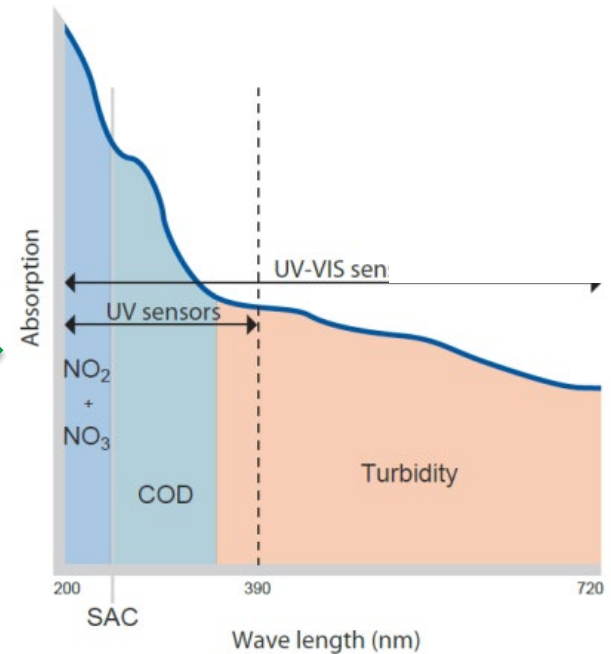
d = path length in cm

c = molar concentration

Multi Wavelength vs Single Wavelength



Single wavelength



Multiple wavelength scan

(John A. Izbicki 2004)

Spectra: more information, more reliable data

Sensors Types

1 mm => high concentrations, 5 mm => lower concentrations

NitraVis®: NO₃, (TSS)
1 or 5 mm (influent, aeration, effluent)

CarboVis®: SAC, COD, BOD, DOC, TOC, UVT (TSS)
1 or 5 mm (influent, effluent)

NiCaVis®: NO₃, SAC, COD, BOD, DOC, TOC, UVT
5 mm (effluent)

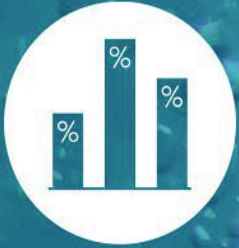
NitraVis®NI: NO₂, NO₃
1 or 5 mm (influent, aeration, effluent)

NiCaVis® NI: NO₂, NO₃, SAC, COD, BOD, DOC, TOC, UVT
1 or 5 mm (influent, aeration, effluent)

gap size of optical windows: 1 or 5 mm



Show 5 parameters



Poll Question #2

How are you currently measuring BOD/DOC in your applications?

Application Examples

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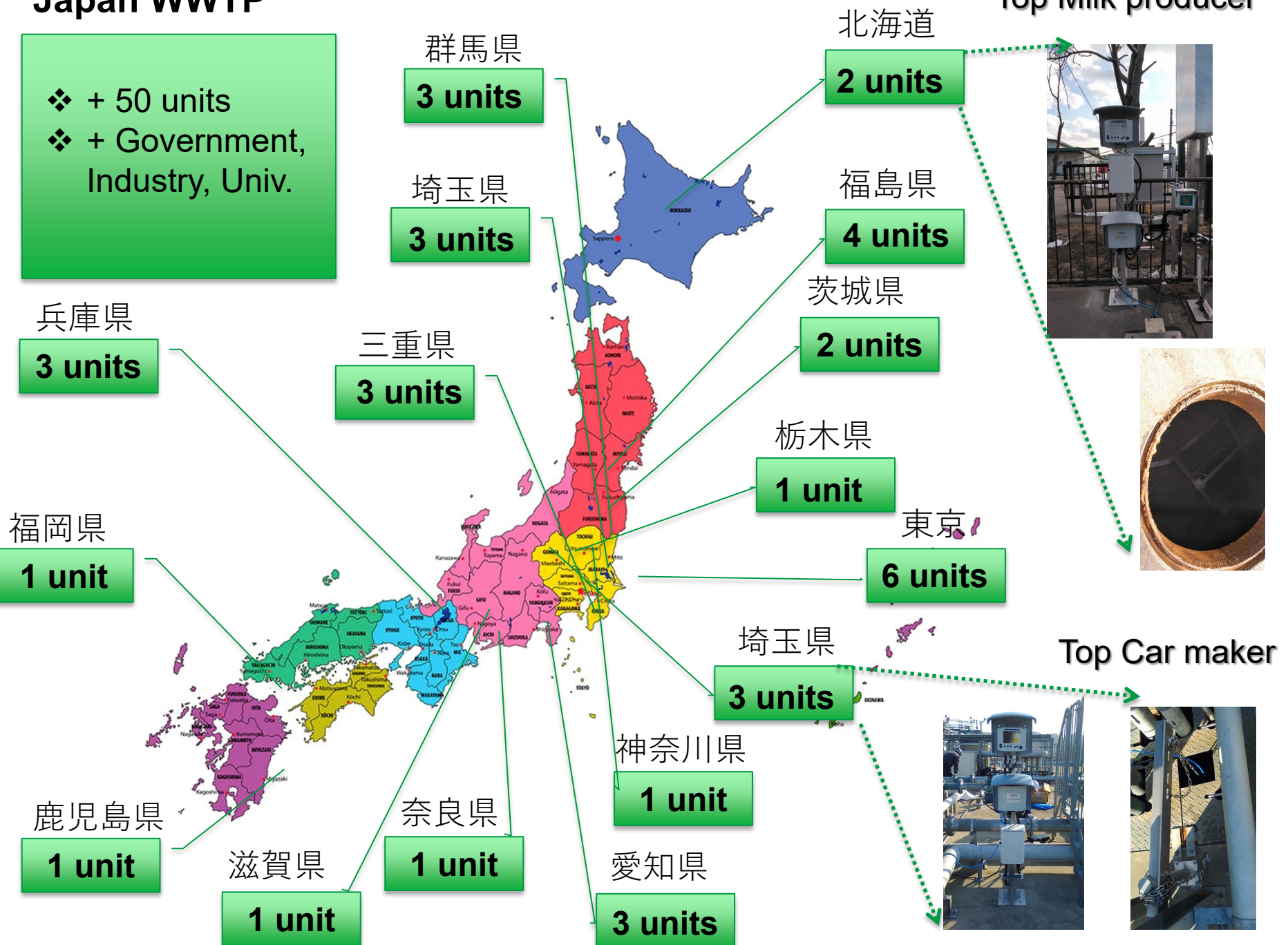
Japan WWTP

❖ + 50 units
❖ + Government, Industry, Univ.

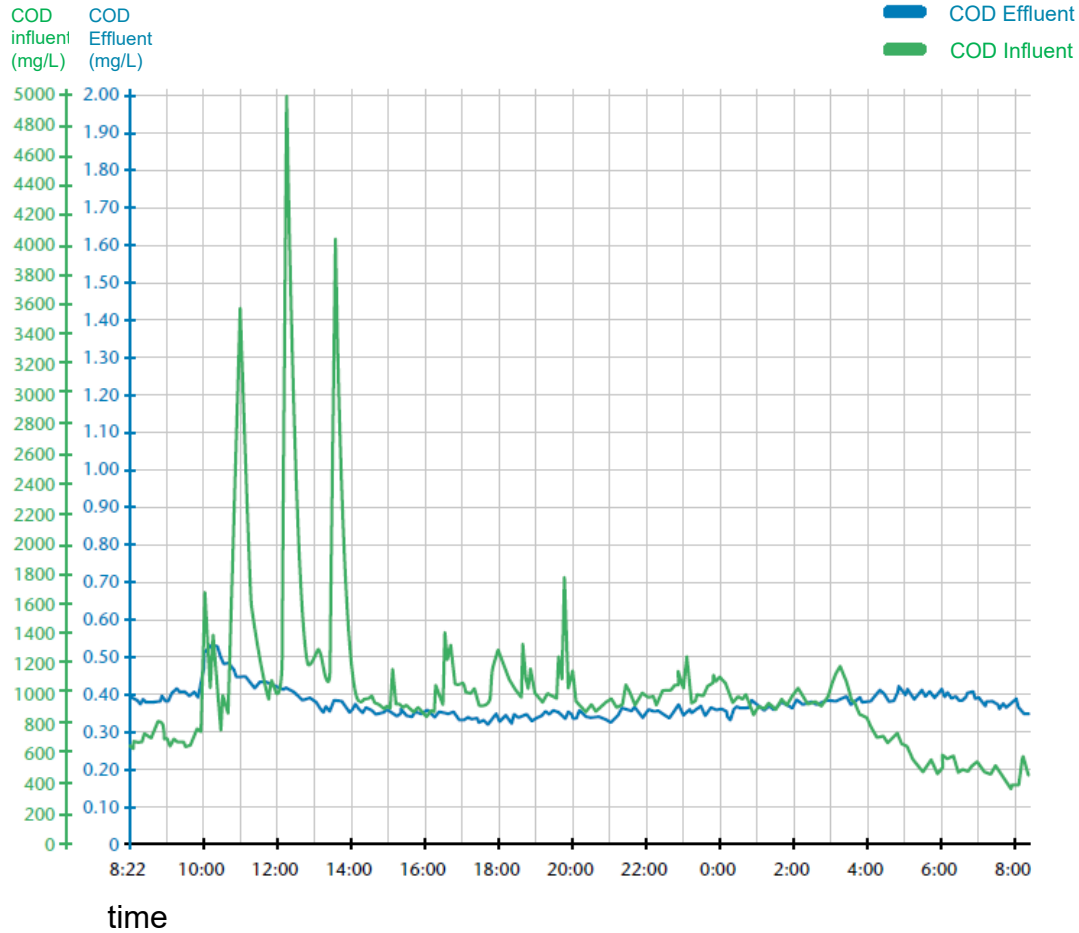
Top Milk producer



Top Car maker

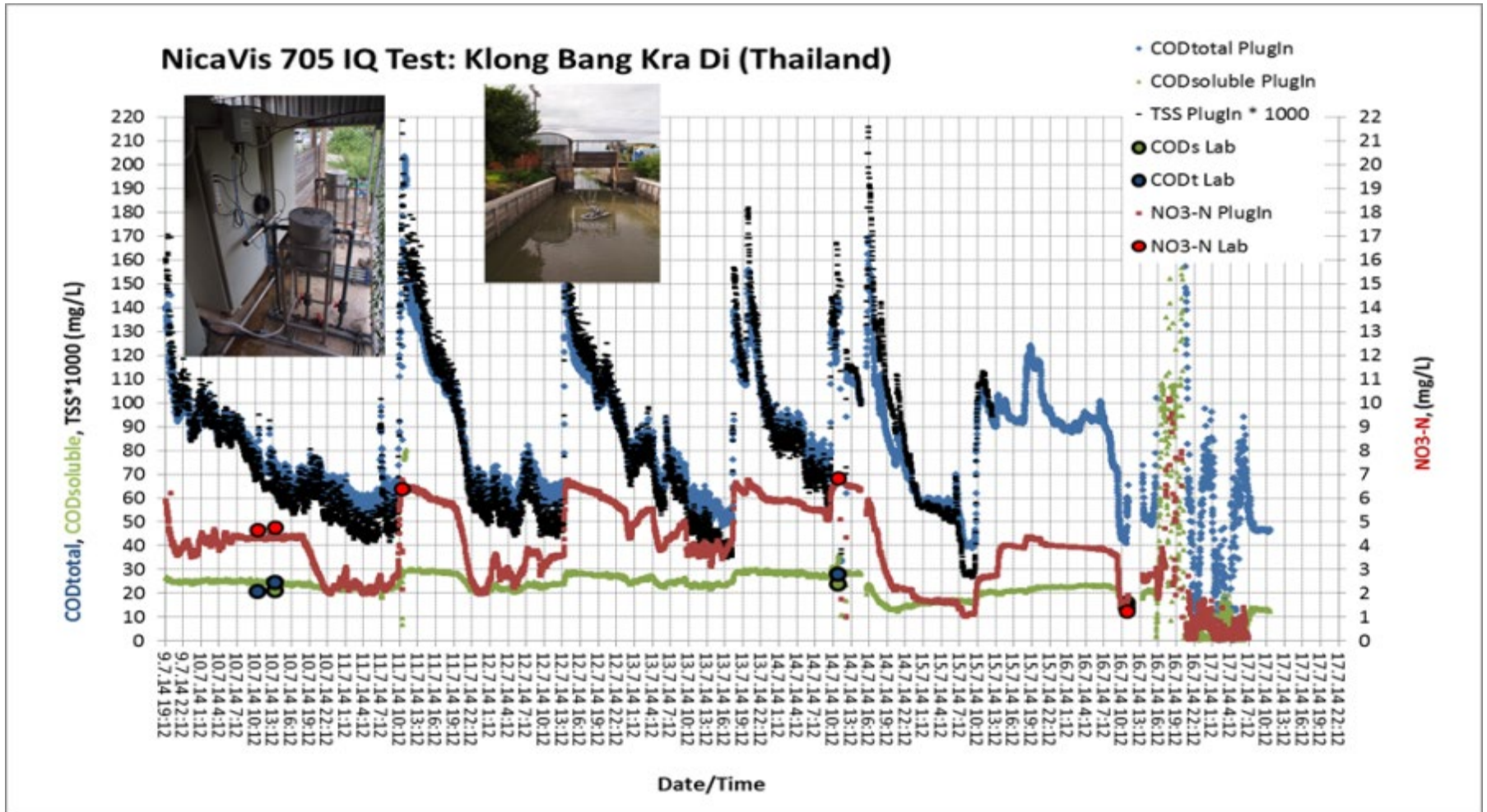


Germany - WWTP Salzgitter Nord



Thailand – Klong Bang Kra Di

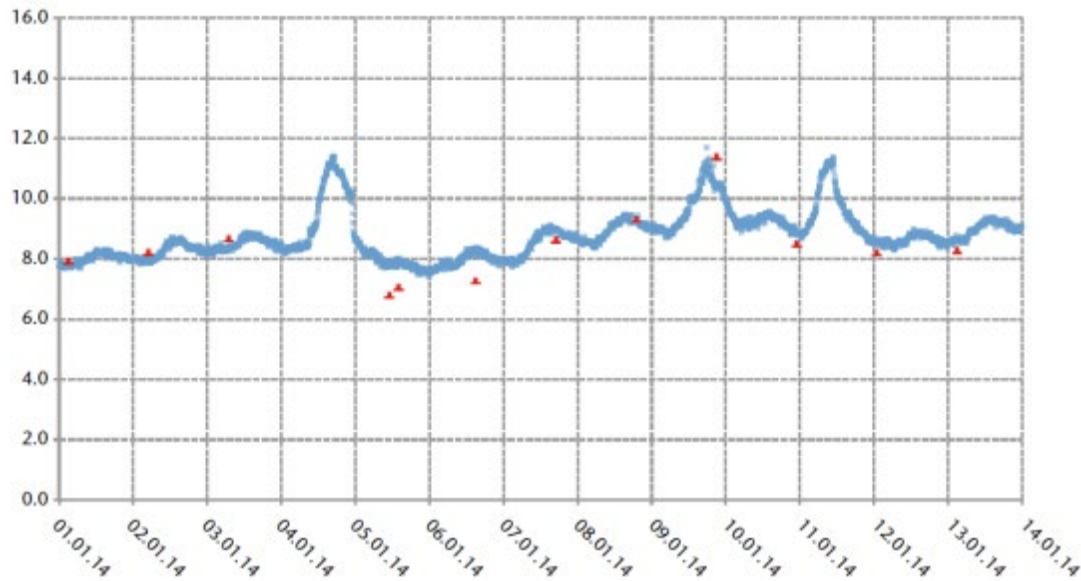
Model: WWTP effluent, COD soluble



Germany – WWTP Neuruppin

Effluent TOC Monitoring Model: WWTP effluent, COD soluble

- Spectral TOC online measurement
- ▲ TOC lab measurement (2 hrs mixed sample)



Summary

- UV-VIS sensor method is the main trends on COD/BOD monitoring.
- WTW Carbovis Sensor has been demonstrated a stable and reliable method on COD/BOD monitoring.



Point and Non-Point Pollution Monitoring

UDIT KUMAR
PROCESS SALES MANAGER

