

Online Monitoring for Water and Wastewater Processes – Global Sustainability at Your Fingertips



Presenter

- Edward F. Askew PhD
- Inorganic Chemistry and Analytical Chemistry
- 25+ years experience in analytical chemistry for water, wastewater, RCRA, and FIFRA
- Currently: Technical Director with Askew Scientific



WWW.ASKEWSCIENTIFIC.ORG
easkew@askewscientific.org



Reminder

- All regulatory requirements for your Drinking water Permit or Wastewater NPDES permit must be met.
- Check with your regulatory authority (Local, State, Provincial, Federal, etc.) for their Online Monitoring requirements and interpretations.



3

On Line Monitoring

- Positive Points
 - Continuous Information
 - Connected to a SCADA System
 - Remote Operation
 - Optimize Manpower Resources
- Questions ??
 - Validity
 - Reliability
 - Accuracy
 - Regulatory Compliance
 - Defensibility



4

Current EPA Guidance or Method

- Office of Science and Technology
 - Clean Water Act Only!!
 - Richard Reding Memo, April 2, 2007
www.scdhec.gov/environment/envserv/docs/DiscreteAnalyzerMemo-Regions-02Apr07RR.pdf
 - *Potentially acceptable modifications regardless of current method performance include changes between automated and manual discrete instrumentation (40 CFR 136.6(b)(1)(i)).*



5

Drinking Water

- EPA Method 334.0 Determination of Residual Chlorine in Drinking Water Using an On-Line Chlorine Analyzer
www.epa.gov/oqwdw000/methods/pdfs/methods/met334_0.pdf
- **Section 15 Tables and Flow Charts and Appendix A**



6

Table 1. Summary of Start-up QC for Grab Sample Methodology			
Method Reference	Requirement	Specification	Acceptance Criteria
10.1.1.2	Generate or validate calibration curve	Analyze method blank & 3 calibration standards that span concentration range (Lowest standard ≤ 0.2 mg/L or the minimum required by primacy agency.)	Each standard is within $\pm 15\%$ of its expected concentration when compared to curve
10.1.1.3	Verify accuracy of secondary standards	Analyze secondary standards on each meter for which they will be used.	Each secondary standard is within $\pm 10\%$ of its expected concentration
10.1.2.1	Initial Demonstration of Capability (IDC) - Accuracy	Analyze method blank & 5 replicate independent reference samples fortified at a concentration near the drinking water concentration	Method blank $\leq 1/3$ concentration of lowest calibration standard; Average of 5 replicates is within $\pm 15\%$ of expected concentration
10.1.2.2	Initial Demonstration of Capability (IDC) - Precision	Calculate relative standard deviation (RSD) for 5 independent reference sample replicate analyses	RSD $\leq 15\%$
10.1.3	Field Sampler IDC	Each sampler must successfully complete 10.1.2.1 and 10.1.2.2 (IDC samples may be prepared by laboratory personnel for analyses by field samplers.)	



 7

Table 2. Summary of Start-up QC for On-line Chlorine Analyzer			
Method Reference	Requirement	Specification and Frequency	Acceptance Criteria
10.2.1	Verify or adjust analyzer calibration	Analyze grab sample & compare to analyzer reading; Adjust analyzer to agree with grab sample measurement; Iterative process until agreement is reached	Analyzer reading is within ± 0.1 mg/L or $\pm 15\%$ (whichever is larger) of grab sample measurement
10.2.2	Initial Demonstration of Capability (IDC)	Compare analyzer measurement to a grab sample analysis on a daily basis for 14 consecutive days (or business days)	Analyzer reading must be within ± 0.1 mg/L or $\pm 15\%$ (whichever is larger) of the grab sample measurement for each data pair
Table 3. Routine QC for Grab Sample Methodology			
Method Reference	Requirement	Specification and Frequency	Acceptance Criteria
11.1.1	Routine calibration check	Analyze a check standard: • When calibration of the on-line chlorine analyzer is adjusted • At least quarterly	Standard is within $\pm 15\%$ of its expected concentration
11.1.2	Secondary standards	Recommended: analyze each day grab sample method is used (This is only applicable to methods that use a spectrophotometer/colorimeter.)	Each secondary standard is within $\pm 10\%$ of its expected concentration

 8

SETTING UP A CHLORINE MONITOR

QA/QC Bumps

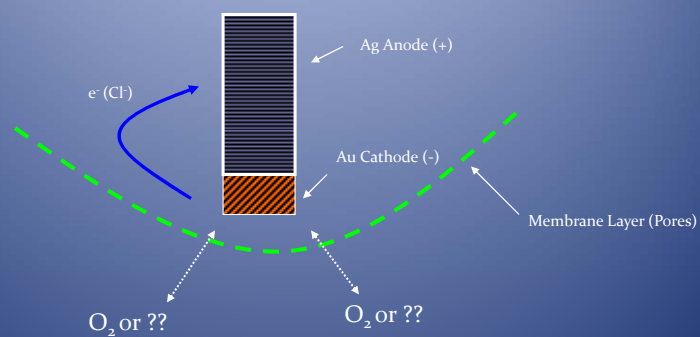
- No Color Wheels for Grab Analysis!!!!
- Initial Demonstration of Capability for Field Sampler
- On Going Demonstration of Capability For Field Sampler
- Standards:
 - On Line Calibration, Grab Sample Calibration, Secondary, Independent Reference
- Back-Up Compliance Grab Sample Method !!!!!!



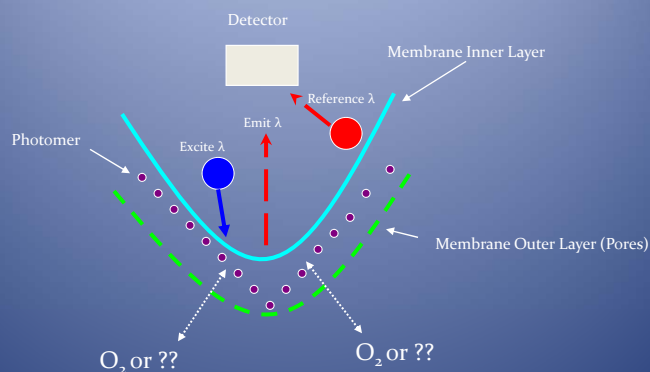
Hanna Instruments® PCA Series

DISSOLVED OXYGEN (DO)

Typical DO Membrane Clark Cell



Fluorescence DO Optode Schematic



Dissolved Oxygen

- Minimum QA/QC
 - Duplicate from a Grab Sample: Follow protocol from EPA Method 334.0
 - Grab sample should be analyzed with comparable probe technology as the On-Line monitor
 - Set QA/QC frequency following suggested procedure in Appendix A 334.0



In-Situ TROLL®.



Further References

- **Web Based Training:** *On Line Monitoring for Environmental Compliance*, American Chemical Society,
http://www.proed.acs.org/courses/course_overview.cfm?course_code=OMWEB
- **Book:** *Online Monitoring for Drinking water Utilities*, American Water Works Association,
[Spring 2011](#)

Questions

Do you feel there is a place for "high energy- short time" treatment techniques such as ultrasonic processing in the water industry given the increasing demand placed on the water industry to treat and remove recalcitrant pollutants from water supplies?	If effective for high volumes of water and relatively inexpensive.
Does this figure into my GHG reporting?	As GHG is currently defined water and wastewater emissions as non-combustion. But your boilers and engines are covered.
Former employee of Prime IT Co, in SW development and maintenance for a private bank national Portuguese website. Currently looking for a job. Chemical Engineer, with post-degree in Water Treatment technologies.	Go to AWWA website www.awwa.org or WEF website www.wef.org for more career information
How do I get more information on water purification business	Go to AWWA website www.awwa.org
How to use renewable energy for waste water treatment plant.	Broad subject
How would a synthetic organic chemist transition into this field	Go to AWWA website www.awwa.org or WEF website www.wef.org for more career information
I am in environmental toxicology, and interested in learning more about issues related to water quality and treatment.	Go to AWWA website www.awwa.org or WEF website www.wef.org for more information
I am looking for a niche market in the Philly area to better serve industries, office buildings and residential dwellings that are water conservation or green minded. Any help with gov't grants/help to finance is appreciated	Go to AWWA website www.awwa.org or WEF website www.wef.org for more information



I have a personal interest in this field. It is not related to my employment.	Go to AWWA website www.awwa.org or WEF website www.wef.org for more career information
I'd like to get the guidance on selection and specifications for chemical and physical online monitoring equipment	Currently there is a reference book in the works and ACS has an online class
Interested in bottled water industry	International Bottled Water Association www.bottledwater.org
What are the latest trends and concerns for waste water treatment in the Pulp & Paper, Food and Dairy, Pharmaceutical, and Chemical Industries? What are the plans to deal with the concern for antibiotics in the water system?	Trends for online monitoring only increasing due to water quality standards setting lower NPDES discharge limits and anti-degradation standards. Antibiotics are an open topic as they are not being addressed except in the Safe Drinking Water Act
What do you see as the best opportunity for someone with experience developing products for the water industry to capitalize and consult?	Based on your experience in plant operations and chemistry, the field is opening up. But, if you have never been out of the lab, it will be more difficult.
What is the state of art for industry corrosion and deposition monitoring. Typically what principles are employed, and how to improve the reliability in brutal environments.	If you can correlate corrosion coupons to an ORP value, then ORP is a good guide for online monitoring for corrosion.



Finish

