GLP 2009 Abstracts

AM Concurrent Session

The NELAC Institute Efforts to Assist Laboratories- Pat Conlon, Environmental Standards, Inc.

The NELAC Institute (TNI) Technical Assistance Program was established to provide tools, training, and other resources to:

- Develop tools and templates to assist laboratories with implementing accreditation programs,
- Ensure that training programs relevant to the needs of the stakeholder community are provided,
- Ensure that laboratory assessors have a forum to discuss common issues,
- Develop a mentoring program to assist laboratories with implementing accreditation programs, and
- Provide a voice and solution strategies for small laboratories.

This presentation will summarize the activities TNI has completed as well as those activities that are planned to be implemented in 2009.

Introduction to VELAP- Cathy Westerman, DCLS

Representatives from Virginia's Environmental Laboratory Accreditation Program will provide a summary of the current status of the program, which will be fully implemented by January 2012. The electronic application procedure will be demonstrated, and members of the DCLS VELAP staff will be available to answer questions regarding the application process.

The NELAC Proficiency Testing Program Basics- Henry Beauchamp, Wibby Environmental

The purpose of this presentation is to discuss the basics of the NELAC PT program. This includes topics such as the purpose, committee and board responsibilities, and the certification requirements of the PT providers. Requirements of the laboratory based on the Virginia regulations will be discussed. Also, the proper data reporting and information about the preparation of the PT standards will be reviewed. A brief description of the different type of studies available and the standards in these studies will be reviewed. The NELAC Field of Testing tables will be shown and the different features of the spreadsheet will be pointed out. Finally, a brief summary will describe the future topics of the PT committee and board.

Virginia's Water Reclamation and Reuse Regulation- Valerie Rourke, VA DEQ

As part of an effort to promote and encourage water reuse in Virginia, the Department of Environmental Quality developed a regulation for the reclamation and reuse of domestic, municipal and industrial wastewater that became effective October 1, 2008. This regulation, the Water Reclamation and Reuse Regulation (9 VAC 25-740), has two sets of treatment standards and monitoring requirements for the reclamation of municipal wastewater, and provisions to develop treatment standards for the reclamation of industrial wastewater on a case-by-case basis. For six reuse categories (urban – unrestricted access, irrigation - unrestricted access, irrigation – restricted access, landscape impoundments, construction, and industrial), the regulation specifies minimum standard requirements of reclaimed water for the reuses in those categories and allows for the approval of other unlisted reuses. This regulation also details requirements for application and permitting; design, construction, operation and maintenance of water reclamation systems and reclaimed water distribution systems; access control and signage; public education and notification; management of reclaimed water in use areas; record keeping; and reporting.

HRSD Water Reuse Efforts- Kevin Parker, HRSD

Virginia, which is now one of the many states to recognize the value of reclaimed water, has developed a water reclamation and reuse regulation. Hampton Roads Sanitation District (HRSD) is now partnering with localities in determining how water reuse can produce the most positive environmental and economic outcomes. Integral to the success of the program is the consumer education program that is currently being developed. HRSD recognizes that customers need to first understand and believe the benefits of reclaimed water before they will fully and confidently accept it as a viable alternative to potable water for certain applications. Quality analytical data is vital to providing safe recycled water and meeting all regulatory requirements. Water reuse conserves drinking water supplies, reduces the nutrient load to the Chesapeake Bay, provides a drought-proof water source, potentially saves money, facilitates economic development, offsets the need for new water sources and treatment plants, and is the right thing to do for the community and the environment.

PM Session #1

BOD Troubleshooting is Like Peeling an Onion (A Case Study in Eliminating Variables)- Tabb Justice, CH2M Hill

A large industrial laboratory had difficulties with BOD GGA performance. My evaluation involved equipment, reagents, glassware cleanliness and individual techniques. This was particularly arduous because there were issues with almost every aspect. Correction or identification of any single variable produced no lasting improvement.

In the end, the BOD permit analyses were contracted out because the failure rate of the GGA was unacceptably high. A single technician worked with me for three months to eliminate each deficiency and develop the techniques, instrument calibration and reagent validation to resolve the issues and allow the lab to return to performing the BOD in house.

The approach I initially took was very time consuming but resulted in development of another approach that was far more effective.

The Use of COD Results to Determine BOD Dilutions at a Wastewater Treatment Plant- Kimberlee Stubbs, City of Richmond

The wastewater treatment plant uses the biochemical oxygen demand (BOD) test to monitor treatment plant efficiency in addition to evaluating industrial discharges to prevent plant upsets. It is important to provide accurate and reliable results to plant personnel. Analyzing an unknown industrial sample can be problematic for the analyst if the strength of the waste is not known. There are several options the analyst can take in this case – 1) guess, 2) evaluate historical data, if there is any and 3) use COD as a predictor of strength.

BOD is a five day test - if the wrong dilutions are chosen it will take five days to know, by which time it will be too late. Depending on the relative strength of the sample, different dilutions are set up to obtain depletions that follow the 7-2-1 rule. A chemical oxygen demand (COD) result can be used to determine the appropriate dilutions for BOD. The presentation will cover several approaches to using COD results to determine BOD dilutions and any benefits and/or drawbacks to each..

The presentation will also discuss the use of advanced technology by the City of Richmond to setup and read samples. The use of a “robot” increases sample throughput and decreases potential errors in the laboratory. The robot adds seed and dilution water and then automatically reads the initial and final dissolved oxygen.

How Successful LIMS Selections are Made- Tiffany Bown, Accelerated Technology Laboratories

For laboratories that are interested in adding, upgrading or replacing their Laboratory Information Management System (LIMS) software, key requirements typically focus on system features and functionality. For example, can the system automatically calculate sample turnaround times, can it automatically create pdf reports and e-mail them, can it schedule all the laboratories’ samples, and does it contain an integrated Quality Assurance/Quality Control module? Although these are all important considerations, what a LIMS can and cannot do is only a small aspect of many critical components that should be considered against the background of the entire laboratory data management solution. It is very important to also consider the technology as well as the vendor. Not all vendors have the same customer focus or credentials, such as alliances with database vendors, ISO Certifications, or years in business. Many companies have been bought and sold many times, leaving customers that invested in one solution without long term service, upgrades or support. Selecting a LIMS partner should be a long-term commitment. By including multiple variables in the decision making process, customers can be sure that they are making an accurate and long-term decision for their laboratory needs. This talk will cover several key factors that should be considered when evaluating a LIMS solution, such as: Technology, Platform, Product Demonstrations, Implementation Times, Support Quality, and the Consultant Catch.

Laboratory Information Management Systems (LIMS) Technology Issues and Associated Costs- Bill Moss, Ethosoft Inc.

When searching for a LIMS, a laboratory is often faced with many decisions it must make in terms of vendors, functionality, and technology. Typically, in the LIMS selection process, a laboratory devotes much of its effort into evaluating the functionality of a LIMS. For instance, a laboratory will evaluate how a prospective LIMS system will log in samples. The laboratory knows that how a LIMS log in samples is important to laboratory traceability and time savings. In general, most laboratories understand this type of relationship and do a good job in evaluating LIMS functionality.

There is another factor in choosing a LIMS that is not based on functionality, but is based on the technology a LIMS uses. Technology issues such as system architecture, operating systems, and databases are routinely not as carefully evaluated as LIMS functionality. In larger organizations, the technology may be mandated by an IT team. In smaller organizations, the technology can often be overlooked, misunderstood, or minimized in the LIMS selection process. Whatever decision is made, the laboratory may be accepting technology that causes increased costs due to system architecture limitations, needless software licensing, and increased implementation and maintenance cost.

In these times of "doing more with less", evaluating all aspects of a prospective LIMS system becomes more important than ever before. Being able to decipher and navigate the LIMS technology landscape will allow a laboratory to make informed technology decisions that can save money. This presentation will give a simple overview of technology issues facing a laboratory when evaluating LIMS systems and will highlight hidden costs that each can bring to a laboratory.

PM Session #2

Rapid Toxicity Testing Methodologies- Robin Parnell, HRSD

In 2005, HRSD established a Regional Rapid Toxicity Testing Program on behalf of several local drinking water utilities. A number of Rapid Toxicity Testing systems are commercially available based on a variety of technologies. None of them is fully reliable, sensitive to all potential contaminants or free of interferences. Therefore, a commonly accepted strategy is to use a combination of systems. HRSD utilizes three systems to test each sample for toxicity: Microtox – bacterial luminescence, IQ Tox – Daphnia bioassay and Eclox – chemiluminescence. Baseline monitoring was completed for approximately 50 sites in the Hampton Roads region and continuous monitoring is on-going. Each of the three methodologies will be discussed and explained in detail.

Toxicity Testing, A Water Utility's Perspective- James M. Cherry, Virginia Beach Public Utilities

Prior to September 11, 2001, water utilities typically reacted to acts of vandalism or trespassing such as graffiti or homeless persons on or near water assets. Poor water quality related to seasonal source water changes or accidents at the water treatment plant or within the water distribution system. The possibility of intentional and planned terrorist attacks to poison the water supply was a new area that water utilities needed to prepare for. One of the tools in an emergency response is early detection of a contaminant in the source water or the finished potable water. This paper will cover the joint effort of water utilities in the Hampton Roads area to jointly sponsor background testing of the source water and treated potable water. How routine toxicity testing can be used in conjunction with emergency response plans and other on-site haz-mat testing will be discussed. There are limitations to toxicity testing but it can be used as one of several tools and tests to assure the public that their water remains safe to drink.

What is qPCR? An Overview- Tiffany Elston, HRSD

E. coli and *Enterococcus* are two main microbiological indicators used to help evaluate water quality. Current microbiology methodologies take 24 to 48 hours to complete. While these methodologies have been proven to be reliable, often times the results come too late for officials to make the best decision to protect the public. Quantitative polymerase chain reaction (qPCR) techniques eliminate this factor, by providing results in as little at 1 to 2 hours. This presentation will focus on the techniques used for *E. coli* and *Enterococcus* assays and how they are used for environmental samples.

Advances in the Use of Liquid Chromotography- Tandem Mass Spectrometry in Environmental Analysis- John M. Flaherty, Corporate Environmental Solutions

Since the early 1980s, gas chromatography coupled with mass spectrometry (GCMS) has been the primary analytical technique for the measurement of trace level organic compounds of interest in environmental samples. In recent years, new organic compounds (e.g., pharmaceutical and personal care products or PPCs) have become of interest. However, many of these emerging compounds of interest are either difficult to get into a gas phase or difficult to extract from aqueous samples. For these compounds, liquid chromatography combined with tandem mass spectrometry (HPLC-MS/MS) has become a powerful analytical tool for separation and quantification. The past 15 years has produced significant advances in HPLC-MS/MS instrumentation which allows it to be used as a reliable technique for environmental analysis.

The objective of this presentation is to describe the current capabilities of HPLCMS/MS for environmental samples, in particular, water and wastewater samples. The presentation includes a brief discussion of the differences between HPLC-MS/MS and GCMS in terms of instrumentation, ionization (electron impact versus electrospray and chemical ionization) and detection (full scan versus selective reaction monitoring). A summary of the evolution of HPLC-MS/MS will also be included in this section.

The remainder of the presentation will give examples of the use of HPLC-MS/MS for environmental analysis. Discussion will be centered on current and emerging environmental compounds of interest, including perfluorinated compounds (e.g., PFOA, PFOS), bis-phenol A, melamine and cyanuric acid. The final topic will be a discussion of EPA Method 1694 for PPCs. Included in these discussions will be guidance on sample preparation techniques, choice of solvents, instrument calibration, and quality control procedures to ensure the generation of reliable data.

__**PM Session #3**__

Developments to Achieve Lower Detection Limits (PPT) in Continuous Flow Analysis- Stuart Smith, Seal Analytical, Inc.

The optical, electronic, hydraulic and software components of an SFA analyzer all contribute to attaining a low detection limit. Based on cooperation with several leading Oceanographic research institutes we have optimized these components to increase method sensitivity, and the improvements are incorporated in a new High Resolution (HR) colorimeter.

This presentation will show how matrix effects and refractive Index issue's have been removed utilizing the changes in instrument design and the options manufactured in conjunction with demanding users to facilitate robust parts per trillion detection limits.

An Effective Method for TKN by Discrete Analysis- Jennifer Marland, Microbac Laboratories

A new laboratory procedure for the determination of Total Kjeldahl Nitrogen (TKN) has been developed based on EPA Method 351.1. This new method is an improvement upon EPA 351.2 because the detection limit has been cut in half, with an analysis range of 0.25 to 10.0 mg/L, and the precision and overall effectiveness of the chemistry are increased with the different reagents cited in 351.1. Several issues can arise with Method 351.2 used on a discrete analyzer, including the reduction of reaction effectiveness occurring during analysis. This can result in wasted supplies as well as much unnecessary time and effort spent to correct the problem. An alternative method was investigated to allow the discrete analyzer to successfully analyze TKN. With help from Seal Analytical, the reagent volumes for 351.1 were scaled down while still ensuring proper reaction pH. While the Seal method improved the analysis, there were still erratic results obtained, and the desired detection limit of 0.5 mg/L could not be reached. This problem was addressed by adding a surfactant and a small amount of a stock ammonia-nitrogen standard to the buffer reagent. This allows for proper flow through the detection cell and raises the overall baseline to avoid lower level readings being affected by background noise. This newly developed method has reduced analysis time previously spent on re-running poor analyses and has improved overall quality control checks while providing clients with a desired lower detection limit.

Calibration- The Good Curve- Greg Hudson, Envirocompliance Laboratories

It should come as no surprise that the correlation coeffecient is only one way to judge the quality of a calibration curve. The fact is that there are numerous tools available to evaluate how good a calibration curve represents a given data set. With a basic understanding of how to use regression analysis, some simple methods can be applied to determine both the quality of calibration and the corrective action necessary to improve calibration technique.

Optical DO Applications-Rugged DO (RDO) Probe Performance in Water and Wastewaters- Kelly Sweazea, Thermo Scientific

Optical dissolved oxygen (DO) probes are the biggest innovation in DO measurement since the 1950's and 1960's, when Clark-type polarographic and galvanic membrane electrodes were introduced for water and wastewater testing. Optical DO probes offer more than the portability, ease of calibration, and fast measurement associated with traditional membrane electrodes. Optical DO technology makes for a probe that is easier to use, requires little or no maintenance, requires no sample flow or stirring, has improved accuracy at low levels of DO, and shows minimal drift over time. Optical DO technology is written into DO methods by ASTM and USGS, and is currently being tested for incorporation into Standard Methods for the Examination of Water and Wastewater. The Federal EPA has issued a recommendation for interim approval of ASTM D888-05 pending promulgation in the next Clean Water Act methods update rule, and EPA Region 4 has issued interim approval for testing NPDES discharges in Region 4.

Optical DO sensors measure dissolved oxygen using the principle of "dynamic luminescence quenching". The RDO sensor advances lifetime-based optical fluorescence technology to provide an extremely stable, accurate, low-maintenance DO sensor. Sensor optics include a lens, blue LED and filter, red LED and filter, and a photodetector or photodiode. When the blue LED emits light, it causes the lumiphore molecules embedded in the gas-permeable sensing foil to emit red photons. The RDO sensor measures the "Phase" (or delay) of the returned signal compared to the excitation signal, and is thus based on the "lifetime" rather than the "intensity" of luminescence. The presence of oxygen in the foil quenches the luminescence and causes a phase shift in returned signal. The phase difference between the blue excitation light and the return red light is measured, and the result is used to quantify DO. There is no consumption of oxygen during the interaction, and therefore, no sample flow is required for accurate readings. There is no membrane or electrode to degrade or foul. The lumiphore cap is durable and has a use life of one year.

The history, applications, and regulatory status of optical DO and RDO probes are presented. Performance testing of the Orion RDO probe is presented for various matrices including groundwater, wastewater, and saltwater. Competitive optical DO probe and membrane comparisons are shown.