

## Connecting the Nation's Environmental Laboratories

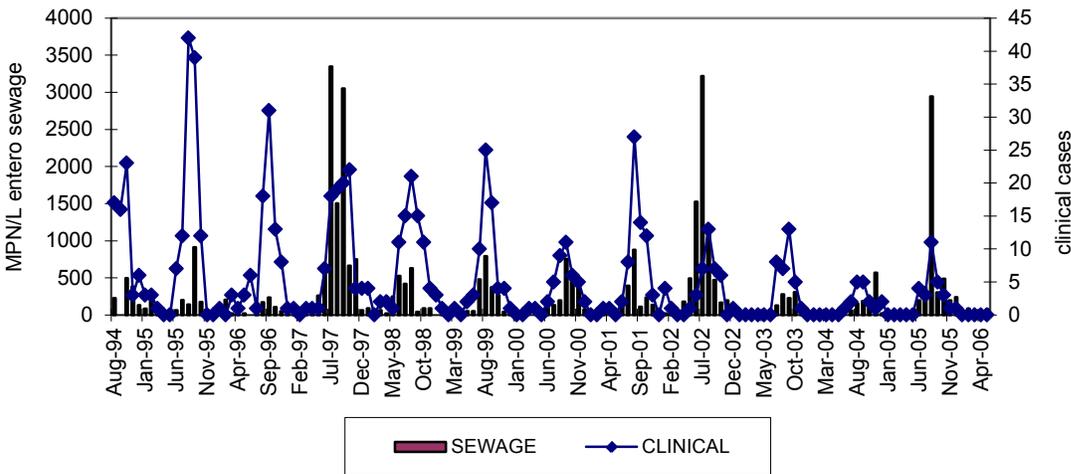
### Milwaukee Investigates: Enterovirus Surveillance in Sewage

By David Bina, Gerald Sedmak\*, Elizabeth Zembrowski, Steve Gradus, and Sanjib Bhattacharyya, City of Milwaukee Health Department Laboratory

Environmental testing of pathogens, as a reflection of clinical illness in the community, is difficult to document, but is a truer measure of disease than testing indicator organisms. The City of Milwaukee Health Department Laboratory (MHDL) began its environmental virology testing in 1994. Initially, MHDL limited its testing to source

and effluent at the city's Wastewater Treatment Plants (WWTP). This led to a study comparing the seasonality and variety of enterovirus (EV) serotypes detected in sewage with the clinical cases.<sup>2</sup> Figure 1 (below) shows the comparison of monthly clinical EV cases with monthly EV sewage titers from August 1994 through May 2006.

Comparison of clinical enterovirus cases with sewage enterovirus titers for Milwaukee August 1994 through May 2006



water for culturable viruses, per US EPA Information Collection Rule (ICR) requirements.<sup>1</sup> However, the search for an appropriate positive control to challenge the multiple cell lines used for clinical virology testing led MHDL to sample the influent

EVs are small RNA viruses that include poliovirus, coxsackieviruses, echoviruses, and other enteroviruses. Non-polio enterovirus infections are second only to rhinoviruses as the most common viral infectious agents in humans.

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Infection is often asymptomatic, but may range from mild respiratory symptoms and rashes to myocarditis and aseptic meningitis. While infections can occur throughout the year, the enterovirus season in Milwaukee typically runs from June to November with peak activity in August or September.

Each season, laboratories typically see a dozen or more EV serotypes, with three or four predominating. MHDL's study detected EVs in the sewage influent throughout the year. In eight of the study years, the most common clinical EV serotypes seen during summer were also the most common viruses detected in the wastewater. EVs in sewage demonstrated seasonality patterns similar to the clinical cases with approximately 70 percent of sewage isolates and 80 percent of clinical cases detected between July and October. WWTP samples contained slightly lower diversity of serotypes (between 4 and 11 different serotypes identified each year) than clinical samples (9 to 19 serotypes identified).

In the years with good correlation between clinical and wastewater enteroviruses, MHDL often detected serotypes in the sewage prior to being found clinically, and this often forecast which serotypes would predominate in the late summer—for example, in 2001 when Echovirus-13, which was rarely seen in the United States from 1970-2000,<sup>3</sup> was detected in two separate sewage samples prior to clinical detection. Echovirus-13 would go on to be the predominant EV isolated both clinically (44 percent of cases) and in sewage (36 percent of typed isolates) in 2001. However, the model did not hold up in other years. In 1996, for example, coxsackieviruses A9 and A10 were the most prevalent clinical isolates,

but neither was isolated from sewage samples.

Enterovirus surveillance at public health laboratories using a combination of traditional virus culture and molecular assays like qPCR and nucleotide sequencing for quantitation and typing could potentially allow early detection and typing of circulating EV. This could facilitate EV-related outbreak investigations and provide valuable information to local physicians and patients for clinical case identification. Sewage testing can be a useful surveillance tool for monitoring enterovirus activity in a community.

*\*Former Chief Virologist currently retired from the City of Milwaukee Health Department Laboratory*

1. US Environmental Protection Agency. 1995. Virus monitoring protocol for the information collection requirements rule: ICR-EPA manual-EP-A/814-B-95-002. US Environmental Protection Agency, Washington, DC
2. Sedmak, G., D. Bina, and J. MacDonald. 2003. Assessment of an enterovirus sewage surveillance system by comparison of clinical isolates with sewage isolates from Milwaukee, Wisconsin, collected August 1994 to December 2002. *Appl. Environ. Microbiol.* 69:7181-7187.
3. Krishna, N., M. Little and R. Ratard. 2001. Echovirus type-13-United States, 2001. *Morbid. Mortal. Wkly. Rep.* 50:777-780.

## Successful Debut: National Environmental Laboratory Professionals' Week

By Michael Heintz, MS, JD, APHL Senior Specialist, Environmental Laboratories

**O**n April 23-27, 2012, environmental laboratories across the country celebrated the first National Environmental Laboratory Professionals' Week (NELPW). Paired with National Medical Laboratory

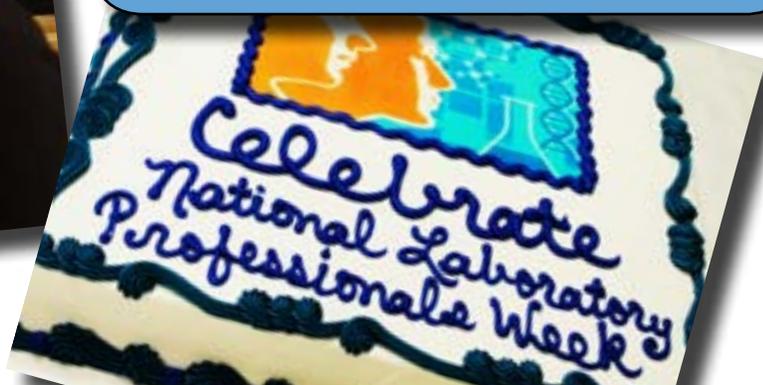
Professionals' Week (NMLPW), and supported through APHL's cooperative agreement with US EPA, NELPW was a rousing success. See what environmental laboratorians had to say and do!

*Our lab celebrated both the NMLPW and the NELPW. Activities included a tour of the lab, links to suggested videos, and I also customized the powerpoint presentation for Saginaw County Department of Public Health. I received positive feedback, and the non-lab staff really appreciated the effort. As a matter of fact, one of our nurses thought that the Environmental Health Division was sponsoring this, and I explained to her that the lab does environmental testing in addition to clinical work. I think it was one of the ah-ha moments. — Tammy Theisen, Laboratory Director, Saginaw County (Michigan) Department of Public Health*



*We had a hula-hoop contest, and here are the three winners - Melissa Levesque, Wendy Lamothe (1st Place!), and Amanda Cosser, on the red carpet. We chose a hula hoop, as the work that the laboratory performs and the people who do it create an integrated cycle that is continually working together successfully for the public's health and safe environment in NH.—Jill Power, Quality Manager New Hampshire Public Health Laboratories*

*Our lab celebrated both the NMLPW and the NELPW together. We celebrated it within the lab by having a "Get To Know Your Co-Workers Baby Photo Contest," a Best Dressed From the '70s Contest, and a Lab-Wide Pizza Luncheon on Wednesday.... Prizes were given out during the lab luncheon that included the gift package we received from APHL. We had tours of our new lab, which we should be moving into next month, all during the week. — Wanda Ingersoll, Environmental Organic Chemistry Division Director, Mississippi State Department of Public Health Laboratory*



*The PA Department of Environmental Protection, Bureau of Laboratories had a successful laboratory tour yesterday with our department's Secretary, Harrisburg University students and two local news crews. [View the news report at <http://bit.ly/YP13nl>] The BOL has another tour tomorrow with a dozen state legislators and/or their staff attending. Tomorrow, we are showing appreciation for our laboratory staff with a pizza luncheon and drawings for APHL prizes. Thank you so much for your support! —Martina McGarvey, Laboratory Director, Pennsylvania Department of Environmental Protection*

## Iowa Laboratory Responds to Largest Fire in Johnson County History

By Pat Blake, Strategic Communications Director, Iowa State Hygienic Laboratory

While seven-and-a-half acres of the Iowa City Landfill burned over the 2012 Memorial Day weekend, the dedicated and responsive staff at the Iowa State Hygienic Laboratory tested air samples for environmental contaminants. Because tires lined the landfill, the laboratory also tested samples from more than 100,000 gallons of volatile pyrolytic oil created as they burned.



“Air samples were collected by Hygienic Laboratory staff that Sunday and on Memorial Day to assess the quality of the air in terms of chemical contaminants in the smoke plume,” said Michael Wichman, PhD, associate director of Environmental Health Programs. “Air testing continued well into the next week, and urgent testing of pyrolytic oil byproduct was provided.” Officials collected samples from 12 different sites to assess potential exposure and background levels of various compounds.

Volatile organic compounds (VOCs) identified as potential health concerns included benzene, toluene, 1,3-butadiene and styrene. Benzene and toluene were detected at concentrations of 8.27 and 8.64 parts-per-billion (ppb) respectively at 1,000 feet from the fire. Both compounds’ concentrations were above 10 ppb at the fire’s edge.

Although they raise health concerns, the levels detected were considerably lower than the EPA lifetime Reference Concentration (RfC) of 95 ppb for benzene and 18,800

ppb for toluene. The detected levels were also less than the NIOSH short-term, recommended exposure limits of 1,000 ppb and 150,000 ppb respectively for benzene and toluene.

While the laboratory did not detect VOC concentrations at levels of concern for public health, additional observations by other University of Iowa (UI) researchers helped complete the picture. Betsy Stone from the UI Department of Chemistry detected carcinogenic polycyclic aromatic hydrocarbons (PAH) at levels higher than those found in large US cities. Particulate matter measurements by Charles Stanier, UI Civil and Environmental Engineering, and modeling by Scott Spak, UI Public Policy Center, indicated that exposure to high fine particle concentrations ( $>35 \mu\text{g}/\text{m}^3$ ) may also be an immediate concern for public health.

The county public health agency issued a health advisory recommending that those in the path of the plume stay inside, particularly if they were elderly, children or people with a respiratory or heart conditions. Officials removed the pyrolytic oil from the landfill and transported it to incineration facilities in four different states and Canada.

In addition to officials from Iowa City and the County, the Hygienic Laboratory collaborated with the Iowa Department of Natural Resources, the Environmental Protection Agency, and the University of Iowa College of Public Health, Center for Global and Regional Environmental Research, IIHR Hydrosience & Engineering, and the UI Operator Performance Laboratory.

“I cannot commend our staff enough for the long hours and rapid testing services that they provided to better understand the chemical makeup of the smoke as well as the oil byproduct,” Wichman said. Matt Mainprize, a chemist who performed much of the sampling and analyses, added, “This is why we are here. It is part of our job to provide testing services as needed, 24 hours per day, 365 days per year.”

## Safe Drinking Water Information System News

By Jack Krueger, APHL Informatics Consultant

Drinking water programs remain one of the oldest and most notable examples of environmental laboratory participation in public health activities. Under the Safe Drinking Water Act (SDWA), delegated states monitor public drinking water systems within their jurisdictions to ensure they meet state and US Environmental Protection Agency (US EPA) standards.

Each quarter, states send drinking water data to US EPA's Safe Drinking Water Information System (SDWIS). Currently, SDWIS states exchange only the most minimal of laboratory data.

One of APHL's goals is for environmental laboratories to provide verifiable, quality data to all users (including SDWIS) through a comprehensive, standardized electronic data deliverable (EDD). This aligns with the push from environmental agencies, public health agencies, non-governmental organizations, and the public for increased access to drinking water data.

In response to this demand, states and US EPA chartered an Implementation Working Group to identify a set of compliance monitoring data elements that would support transparency goals and provide additional data through SDWIS. US EPA then established an Integrated Project Team (IPT) to meet these goals. APHL regularly participates in the IPT conference calls.

The IPT supports APHL's request to include additional laboratory data in the elements that states and US EPA exchange. These include the date of the laboratory test, field-generated or laboratory-generated samples, target and non-target substances, and batching information. Importantly, APHL included the same data elements in a requirements document for multi-agency data exchange.

So what does the addition of these data elements mean? Just because the requested data elements will be included in the state's transfer of SDWIS data to US EPA does not mean that laboratories will be required to provide these data elements to the state program. Trials must first test many of the other data elements such as inventory, sample schedules, and water system operations and treatment techniques that states and EPA exchange.

The addition does mean that EPA becomes one of the first agencies to document the importance of quality data in a standardized EDD.

### LISTSERV FOR WATER SECTOR LABORATORIES

Join APHL's new listserv: the Public Environmental Laboratory listserv (APHL-PEL). Membership is open to any public environmental laboratory, including utility laboratories, military laboratories and other government-operated laboratories. To sign up, send an email to [lyris@lists.aphl.org](mailto:lyris@lists.aphl.org), leave the subject line blank, and put "join *aphl-pel* first name\_last name" in the body. Note, this listserv remains open to the public in that anyone can subscribe and that it is not secure. Any reply will go to everyone on the listserv.

## Using Environmental Laboratory Experience to Make a Difference

Dr. Rochelle Holm, Analytical Services Manager, Vista Engineering Technologies, Inc.

Satisfying Resource Conservation and Recovery Action (RCRA) closure in the United States has much in common with environmental sample analysis in developing countries of the world. Training personnel, matrix effects, quality instrumentation, and cross contamination all apply to both situations. Yet, when diarrheal diseases, often associated with unsafe drinking water, lead to over 6,000 children under five-years-old dying annually in Malawi, the need for an environmental laboratory in developing countries takes on new meaning.

I recently used my environmental laboratory professional experience from the Umatilla Chemical Depot, Umatilla, Oregon, and a bit of creativity and sweat, as a volunteer to establish a water quality laboratory in Malawi. Prior to establishing the Mzuzu University Centre for Excellence in Water and Sanitation laboratory (a collaboration with Washington State University), such a publicly accessible laboratory in the northern region of Malawi did not exist. The laboratory capability is unique in that it is equally open to anyone to walk in with a water sample to test and for larger regional projects.

The goal was to create a laboratory designed to process samples even during the frequent municipal water and power outages. To minimize the impact of power failures, the laboratory used a battery-powered incubator and stockpiled boiled water for microbial analysis dilutions. In addition, wiping down all surfaces with bleach water at the beginning of each day helped cut down on cross contamination in the working laboratory where

the windows were open due to the heat and humidity. Overall, the laboratory analyzed total coliform, *E. coli*, nitrate-nitrogen, alkalinity, hardness, pH, free chlorine and total chlorine. There are plans to add soil matrix



capability in the near future. Trainers used standard sample collection and analysis operating procedures to educate technicians on the difficulties of ensuring results, accurately reflecting the make-up of the samples in this unique environment.

Beyond the triumph of the working instrumentation, the true success was seeing trained technicians, after only three months, seamlessly analyze samples to ensure a sustainable laboratory. Ultimately, this environmental laboratory enables better decisions on development projects by addressing the need for safe water within Malawi.

For further information on collaboration with the Mzuzu University Centre for Excellence in Water and Sanitation, contact me at [rochelledh@hotmail.com](mailto:rochelledh@hotmail.com).

# National Analytical Management Program Radiochemistry Series

Berta Oates, NAMP Administrator, Carlsbad Field Office Technical Assistance Contractor, Portage, Inc.,

In 2011, the Global Security Newswire reported on studies identifying “serious gaps in US radiological preparedness.” Today, the National Analytical Management Program (NAMP) initiative, led by the US Department of Energy’s Carlsbad Field Office (CBFO), fills some of those gaps.

The Departments of Energy and Homeland Security offer these free webinars as live, interactive conferences. Recorded and archived versions comprise a library vital to future generations of radiochemists.

Each of the ten unique webinars in the series provides an understanding of the fundamental chemical and physical properties of different actinides, and describes advances and challenges in current applications. Since they launched on April 20, 2012, NAMP has conducted seven webinars and scheduled three additional webinars (see Table 1) through February. In addition, Dr. Bahman Parsa from the New Jersey Department of Health will present a webinar on radium chemistry in March 2013. Future series will address environmental radiochemistry, nuclear forensics, nuclear medicine, and the nuclear fuel cycle.

The overwhelmingly positive feedback from participants clearly demonstrates that the NAMP radiochemistry webinars are making a difference by providing unique educational opportunities in radiochemistry. Visit [www.inl.gov/namp](http://www.inl.gov/namp) for more information, to register

for upcoming NAMP radiochemistry webinars, and to access archived presentations.

*Acknowledgements: Oba Vincent, CBFO, NAMP Director, and Education and Training Subcommittee chairs Mansour Akbarzadeh, WIPP Laboratories; Patricia Paviet-Hartmann, Idaho National Laboratory; and John Griggs, Director, US EPA National Air and Radiation Environmental Laboratory.*

Webinar Title	Presenter	Affiliation	Date
Overview of Actinides	Dr. Alena Paulenova	Oregon State University	April 20, 2012
Uranium Chemistry: General Properties of Uranium	Dr. Mikael Nilsson	University of California--Irvine	June 14, 2012
Plutonium Chemistry: General Properties of Plutonium	Dr. Patricia Paviet-Hartman	Idaho National Laboratory	July 12, 2012
Environmental Chemistry of Uranium and Plutonium Part 1: Environmental Behavior of Plutonium	Dr. Brian Powell	Clemson University	August 7, 2012
Part 2: Environmental Behavior of Uranium	Dr. Brian Powell	Clemson University	August 14, 2012
Analytical Chemistry of Uranium and Plutonium	Dr. Ralf Sudowe	University of Nevada Las Vegas	October 11, 2012
Source Preparation for Alpha Spectroscopy	Dr. Michael Schultz	University of Iowa	November 8, 2012
Sample Dissolution	Dr. Ralf Sudowe	University of Nevada Las Vegas	December 13, 2012
Neptunium Chemistry	Dr. Alena Paulenova	Oregon State University	January 31, 2013
Trivalent Actinide Chemistry: Americium and Curium	Dr. Alena Paulenova	Oregon State University	February 28, 2013

The Department of Energy originally created NAMP to help coordinate its analytical capabilities, and to address national needs in technology and resources. In support of this mission, NAMP established a subcommittee to promote training and education in radiochemistry. In cooperation with the US Environmental Protection Agency and university partners, NAMP developed a series of two-hour webinar presentations by experts on different topics relevant to radiochemistry.

## Contribute Today—Member Resource Center

The APHL Member Resource Center (MRC) provides an extensive range of resource materials designed to provide technical assistance within the public health and environmental laboratory sector. Created by and for the APHL member community, the MRC provides a virtual clearinghouse of documents designed to exchange practices, communications, protocols, state newsletters and more. The MRC assists APHL members in accessing timely, peer-contributed, public and environmental health information—rapidly and easily. These resources are not necessarily endorsed by APHL.

For more information, visit the MRC, <http://www.aphl.org/MRC/Pages/default.aspx>. Send questions/feedback to [memberresources@aphl.org](mailto:memberresources@aphl.org).

Examples of MRC resources include:

- Promising laboratory practices
- Media relations procedures
- Laboratory newsletters
- Human relations processes
- Lab testing protocols and guidelines
- Local fact sheets
- Energy management practices, etc.

The APHL Member Resource Center is a vital instrument for the environmental laboratory community to remain knowledgeable in meeting today's challenges. To submit a resource item, please visit <http://www.aphl.org/MRC/Pages/Submit.aspx>.

## Join APHL, an Association for Environmental Laboratory Leaders

APHL serves as a focal point for environmental laboratory communication, training, policy and interactions with the federal government.

An Associate Institutional membership with APHL offers environmental laboratory directors and their staff opportunities to connect with their counterparts from across the country to address shared issues and strengthen relationships with other health decision makers at the local, state and federal level.

Membership benefits include:

- Networking and laboratory linkages
- Professional development, training
- Policy and regulatory updates
- Technical assistance
- Unlimited access to APHL's MRC

For an application, visit [www.aphl.org/becomemember](http://www.aphl.org/becomemember).

**New Associate Institutional members receive a discount of 50% their first year of membership.**

Questions? Contact Drew Gaskins, associate specialist member services, at 240.485.2733 or [drew.gaskins@aphl.org](mailto:drew.gaskins@aphl.org)

## Bridges

Connecting the Nation's Environmental Laboratories

### Funders

This publication was developed under Assistance Agreement No. 83483301 awarded by the US Environmental Protection Agency. It has not been formally reviewed by EPA. The views expressed in this document are solely those of APHL and the authors, and EPA does not endorse any products or commercial services mentioned in this publication. This publication was funded 100% with federal funds. \$200,000 in federal funds supported this program.

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The Association of Public Health Laboratories is a national non-profit located in Silver Spring, MD, that is dedicated to working with members to strengthen governmental laboratories with a public health mandate. By promoting effective programs and public policy, APHL strives to provide public health laboratories with the resources and infrastructure needed to protect the health of US residents and to prevent and control disease globally.

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