

BRIDGES

CONNECTING THE NATION'S ENVIRONMENTAL LABORATORIES

THE VERMONT AGRICULTURE AND ENVIRONMENTAL LABORATORY: SUCCESS IN THE FACE OF NATURAL DISASTER

by Rebecca Harvey, director, Vermont Agriculture and Environmental Laboratory

In August 2011, Hurricane Irene caused extensive damage along the Atlantic coast, from North Carolina to Maine. Despite being located 100 miles from the coast, Vermont was hit hard. Rivers quickly breached their banks—destroying farms, homes, roads and bridges—and damages throughout the state totaled \$700 million.

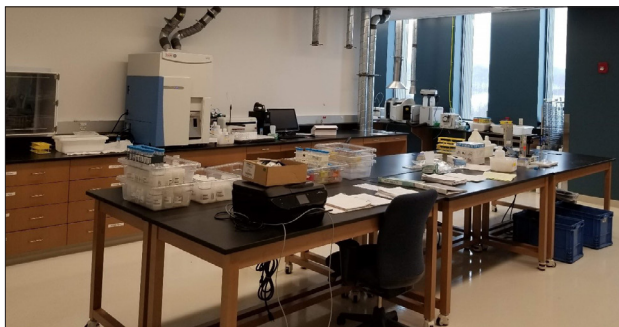
Among the wreckage was the Waterbury State Complex, which housed the laboratory facilities of both the Vermont Agency of Agriculture, Food and Markets (AAFM) and the Vermont Agency of Natural Resources (ANR). While the flood itself was short-lived, the labs were destroyed and any remaining equipment and daily operations needed to be re-located to temporary facilities across the state while a new laboratory could be planned, designed and built.

Despite these unexpected challenges, the flood became an opportunity for the two agencies to strategize and discuss merging the AAFM Agriculture Lab and ANR La Rosa Environmental Lab into a single laboratory. In July 2015, the Vermont Agriculture and Environmental Laboratory (VAEL) was formed. The merging of the two labs allowed for the streamlining of administrative and analytical processes and improved efficiencies that allow VAEL to better serve its clients.

Construction of the new VAEL facility in Randolph Center took 14 months, from December 2017 and February 2019. The AAFM



VT Dept. of Environmental Conservation Ambient Biomonitoring Laboratory after Irene's flood waters receded, leaving behind a wake of destruction and a thick layer of fine silt. (Jim Deshler)



The state-of-the-art facility was built with growth in mind; ample bench space and extra ventilation ports in each laboratory. (VAEL)

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The Association of Public Health Laboratories (APHL) works to strengthen laboratory systems serving the public's health in the US and globally. APHL's member laboratories protect the public's health by monitoring and detecting infectious and foodborne diseases, environmental contaminants, terrorist agents, genetic disorders in newborns and other diverse health threats.

Funders

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About the VAEL

Name:

Vermont Agriculture and Environmental Laboratory

Location:

Randolph Center, VT

Number of Staff:

14 full time employees, two summer temps

Funding Source:

VT special and general funds

State Agencies Served:

- VT Agency of Agriculture, Food and Markets
- VT Agency of Natural Resources

Populations Served

States:

- VT (pop. 624,000)
- Some of NH (animal health and water quality testing)
- Some of NY & Canada (water quality testing)

Specific Populations:

- Dairy Industry
- Volunteer
- State and EPA-sponsored Water and Air Quality Monitoring Groups
- Hemp Industry
- Consumer Protection
- Food Safety Inspectors
- Fair Associations
- Livestock Industry

Matrices:

Water, air, soil, food products, dairy and dairy products, animal blood, hemp and hemp products

Tests Provided:

- Dairy and dairy products
- Animal health (e.g., brucellosis, equine infectious anemia, mastitis, horse/cattle doping for pulling competitions)
- Air and water quality
- Virus and pathogen
- Hemp compliance and safety
- Maple product safety
- Pet food, commercial meat, pesticide, feed and fertilizer quality

Instrumentation:

- GC-MS
- GC-FID
- HPLC
- LC-MS
- HPLC-MS
- ICP-MS
- ICP-OES
- AA Spectroscopy
- Hg Cold Vapor
- Q-PCR
- Flow Cytometry
- IR Spectroscopy
- Liquid Scintillation Counter
- TOC Analyzer
- AA Spectrometer
- Auto-analyzers
- Ion Chromatograph
- Auto Analyzers
- Fluorometer
- Spectrophotometer
- Wet Chem Methods

VAEL's 2019 by the Numbers

Despite being a year of transition, VAEL realized many accomplishments in 2019, thanks to the drive, talent and resilience of the staff:

28,000+	Environmental samples processed*
10,000+	Water samples processed for phosphorus
1,000+	Tests provided to support VT Animal Health
130+	Tests offered to support state agencies, volunteer groups and academia
90+	Dairy producers supported through routine quality and safety testing
80+	Environmental monitoring projects supported, state-wide
7	New methods developed in 2019
6	National laboratory accreditations held
5	New employees hired in 2019
1	Giant bronze frog named "Big Frog," courtesy of the Arts in the State Buildings Program

* Most of the environmental sampling occurs over the course of five months.

Agriculture and Environmental Lab began its move in January 2019, though one third of the staff, including the director, decided not to join in the move. By March 2019, VAEL was in full operation and was again fully staffed by December 2019. The brand-new, state-of-the art facility is located on the VT Technical College campus, offering opportunity for collaborative learning and student involvement.

After nearly six years of being homeless, VAEL is finally settled. The staff can breathe a collective sigh of relief and look forward to a new era of strength, growth and long-term strategic planning.



VAEL staff celebrate the opening of their new facility with "Big Frog." (VAEL)

EPA'S COMPTOX CHEMICALS DASHBOARD: A ONE-STOP-SHOP FOR CHEMICAL DATA

by Lauren Gessner, former Oak Ridge Associated Universities science communications contractor, US EPA, Office of Research and Development

Picture this scenario: your local drinking water facility conducts routine chemical analyses and detects a potentially hazardous chemical in their drinking water. How does one determine if the chemical poses a potential public health concern? You may already know some information about the chemical, but it has historically been challenging to locate the specific information needed to better understand and conceptualize how concentrations of the chemical in drinking water can cause potential health impacts.

Consolidating Chemical Data in One Place

Until recently, the diverse information on any given chemical was scattered across numerous databases, reports, and publications, limiting its accessibility and use for decision-making. Seeing this data accessibility gap as a barrier to informing public and environmental health decisions, US Environmental Protection Agency (EPA) researchers set out to solve it. Their solution: the [Computational Toxicology \(CompTox\) Chemicals Dashboard](#). The dashboard is a unified, online platform of chemical information that integrates data from multiple sources from around the globe and provides the information through a publicly available interface. The dashboard includes many types of chemical-specific information including chemical structure, experimental and predicted physicochemical data, exposure data, bioaccumulation data, toxicity data, and more.

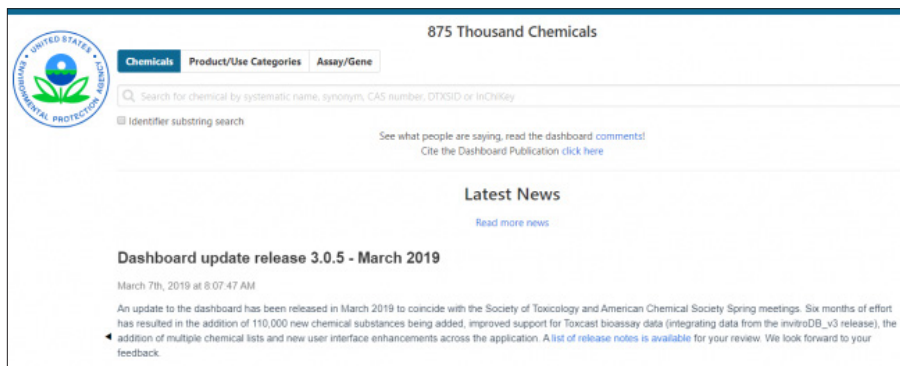
We think of the dashboard as a foundation – a one-stop-shop for chemical information. It currently includes data for over 875,000 chemicals and continues to grow. With the dashboard at their fingertips, decision-makers and scientists can now quickly and efficiently gather the information needed to evaluate chemicals, whether they need to quickly look up existing risk assessment values or need more fundamental chemical information, such as solubility, persistence, ecological effects, etc.

How it Works

The dashboard can be searched by chemical identifiers (e.g., chemical names, synonyms, and chemical abstract registry numbers - CASRN), consumer product categories to view chemicals found in certain product types, and assays/genes associated with high-throughput bioactivity screening data. It also compiles and integrates data from a variety of sources and public domain databases including:

- EPA's computational toxicology research databases
- EPA's ECOTOX Knowledgebase
- National Center for Biotechnology Information's [PubChem database](#)

Included in these data are quality assurance flags that indicate the degree of curation and confidence associated with the structural data and associated identifiers.



**Learn more about the
COMPTOX CHEMICALS
DASHBOARD**

Visit the [CompTox Chemical Dashboard site](#) for more information and tutorial videos, including a step-by-step walk-through on how to use the Dashboard. Meanwhile, we welcome the opportunity to integrate new data and resources from you into the dashboard as appropriate to our mission of supporting environmental scientists.



TEXAS ENVIROMENTORS PROTECT PUBLIC HEALTH

By Hunter Adams, water laboratory supervisor, and Mark Southard, water source/purification superintendent, City of Wichita Falls, TX

The Texas Commission on Environmental Quality (TCEQ) uses an [EnviroMentor program](#) to assist small businesses, local governments and independent school districts with environmental regulation-related matters such as paperwork and technical questions. The program is managed by TCEQ's Small Business and Local Government Assistance (SBLGA) section, which provides confidential assistance without the threat of enforcement. EnviroMentor assistance is confidential and does not lead to inspections, citations or fines. The program has been in place since 1995, and sees an average of 65 matches per year.

Who are EnviroMentors?

EnviroMentors are qualified professionals with technical or legal expertise on environmental issues who volunteer to help small businesses, local governments and independent school districts to navigate state environmental rules. Many EnviroMentors are private-sector consultants, while some are engineers or successful professionals who provide peer-to-peer advice.

EnviroMentors, who volunteer up to 20 hours a year, must meet one of these qualifications:

- Technical: have a college degree in an environmental field, or comparable experience
- Water/Wastewater Utility: hold a current Texas Class C (or above) water or wastewater operator license
- Legal: have a law degree and current State Bar of Texas membership

Who Qualifies for Assistance?

To receive free, confidential help from environmental professionals as part of the EnviroMentor program, you must:

- Be a small business with 100 or fewer employees, or
 - a county with less than 100,000 population, or
 - a city with less than 50,000 population, or
 - a school district with less than 100,000 students.
- Be committed to complying with state rules to protect the environment, and to correcting violations as soon as possible.
- Be unable to afford the cost of hiring a consultant.

Those seeking help must contact a SBLGA specialist in their TCEQ region. A specialist will provide them with the necessary paperwork and get them started. Then, the EnviroMentor coordinator will review the information and match them with an EnviroMentor whose expertise matches your needs.

CONTRIBUTE TO THE 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 clearing-house 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.

The APHL MRC is a vital instrument for the environmental laboratory community to remain knowledgeable in meeting today's challenges. Visit the [MRC site](#) to learn more and submit a resource. Please send feedback to memberresources@aphl.org.

Examples of MRC resources:

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

The Matching Process

The EnviroMentor coordinator sends out a match request with location information, request details, and any deadlines and required certifications. Interested EnviroMentors are then put in touch with the requesting party. In emergency situations, the coordinator may reach out to specific EnviroMentors already known to be capable of meeting the request needs.

A 2019 Success Story

On June 12, 2019 around 1 pm, TCEQ dispatched an urgent request for EnviroMentor assistance. A public water system (PWS) had been abandoned by their contract operator and help was requested to ensure public health and safety.

A match needed to hold a water operator license that could take free chlorine and system pressure readings and bacteriological samples to comply with federal and state Safe Drinking Water Act regulations. The minimum required free chlorine disinfectant level is 0.2 mg/L, the minimum required system pressure under normal conditions is 35 psi, and the Maximum Contaminant Level Goal (MCLG) for *E. coli* is zero. A site inspection and determination of the amount of remaining PWS disinfectant (free chlorine) was also required.

Hunter Adams and Mark Southard from the City of Wichita Falls, TX, responded to the call. Upon arrival they met with several homeowners to hear their concerns and assure them that TCEQ was monitoring the situation. Homeowners then allowed system pressure and free chlorine residual sampling (**Photo, top**). Fortunately, all samples were found to be in compliance, demonstrating public health protection, and results were forwarded to the EnviroMentor Coordinator.

A PWS facility site inspection was also conducted. Several security issues were noted and reported to TCEQ, including a section of cut fencing (**Photo, bottom**) and a broken chemical room door lock. Disinfectant levels were checked and it was determined adequate disinfectant was available on site to meet system demands until it could be resupplied the following week.

All sampling and facility inspection requirements were accomplished throughout the afternoon, and TCEQ was notified of the findings within four hours.

Summary

TCEQ's implementation of the EnviroMentor program successfully protects the public by matching systems, small businesses, and independent school districts in need with qualified volunteers that help ensure compliance and public health protection. If you have questions, please contact Hunter Adams (hunter.adams@wichitafallstx.gov) or Mark Southard (mark.southard@wichitafallstx.gov).



Free chlorine residuals were analyzed to ensure compliance with disinfection regulations (City of Wichita Falls, TX)



Cut security fence at the public water system (City of Wichita Falls, TX)



CYAN APP HELPS COMMUNITIES MONITOR HARMFUL ALGAL BLOOMS

By Blake Schaeffer, PhD, physical scientist, EPA Office of Research and Development

Certain environmental conditions in water bodies can intensify algae growth, causing algal blooms. Some of these blooms, called harmful algal blooms (HABs), can cause harm to human and animal health, aquatic ecosystems, and local economies. Even though they are classified as bacteria, cyanobacteria—sometimes referred to as blue-green algae—exhibit characteristics of algae and are often associated with HABs. These cyanobacterial HABs have the potential to:

- Produce toxins,
- Create nuisance odors, hypoxia and unappealing surface scums, and
- Adversely impact drinking water sources.

These effects can often increase community drinking water treatment costs. Water quality managers need access to current, inexpensive and quality data to make fast decisions for their community.

To address this need, the US Environmental Protection Agency (EPA) developed the Cyanobacteria Assessment Network (CyAN) mobile app, an early-warning indicator system for cyanobacterial blooms in US freshwater systems. The CyAN app allows users to assess weekly satellite-derived cyanobacteria biomass concentrations data for over 2,000 larger lakes and reservoirs across the country. This app reduces the need for scientific expertise in satellite data processing, analysis and interpretation, and eliminates barriers to computer hardware requirements associated with the use of satellite data files. This information may also help determine opportune sampling times for laboratory staff or researchers.

The CyAN app's easy-to-use interface enables water quality managers to rapidly distill critical water quality information for their communities. The app provides approximately 70% of the monitoring information, with the user inputting information such as site locations and warning thresholds during the app setup process. Once set up, the georeferenced app data allows users to passively monitor a specific water body without needing to filter through numerous unassociated satellite images. Users simply open the app to receive updated imagery and monitoring data for locations of interest.

The CyAN app is publicly available for Android™ devices and can be downloaded on Google Play™.

[Learn more and download the CyAN app.](#)



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

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Questions? Contact Drew Gaskins, senior specialist, Member Services, at 240.485.2733 or drew.gaskins@aphl.org

CYANOTOXIN MONITORING IN OREGON PROTECTS PUBLIC DRINKING WATER

By Dan Brown, MS, natural resource specialist, Oregon Department of Environmental Quality Laboratory

Across the US, freshwater harmful algal blooms (HABs) have become an increasingly troublesome issue. HABs typically occur when CyanoHABs (e.g., certain blue-green algae or dinoflagellates) encounter excessive levels of nutrients in warm, slow-moving water, allowing them to reproduce explosively, or “bloom.” These algae, also known as cyanobacteria, can produce toxic compounds known as cyanotoxins, which can cause a range of health effects in humans, pets, fish and livestock from mild skin irritation to liver and kidney damage and in rare cases, death.

HABs’ Impact on Oregon Drinking Water

Oregon has not been immune to the occurrence of HABs. In fact, the Oregon Health Authority (OHA) began issuing public health advisories for recreational waters based on their presence as early as 2004. Since then, the state agency has issued recreational contact advisories for reservoirs, lakes, ponds and portions of rivers. In 2010, Oregon Department of Environmental Quality (ODEQ) began including waters with HAB advisories on the 303(d) list of impaired waters, which requires the agency to assess the affected waters and establish a scientifically based clean-up plan, known as a total maximum daily load, or TMDL.

Some of these impacted waters also happened to be drinking water sources. In May 2018, the detection of cyanotoxins in the public drinking water system of Oregon’s capital, Salem, triggered a drinking water advisory that lasted nearly a month and affected nearly 200,000 customers. During that time, vulnerable residents were cautioned against ingesting any city water and fresh water was trucked in by the National Guard.

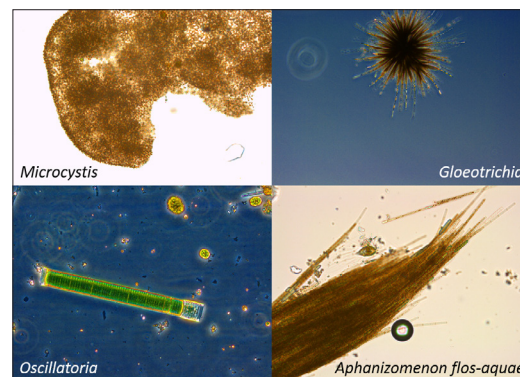
Laboratory Sampling Helps Identify HABs and Protect the Public

This event prompted OHA to establish rules requiring drinking water systems that use water sources with elevated HAB risk to routinely test their source water for cyanotoxins and notify the public of the results. OHA and ODEQ collaborate with drinking water providers to conduct this testing.

In 2019, ODEQ received 958 source water samples in biweekly deliveries from 60 facilities across the state, which serve over a third of Oregon’s population. ODEQ analyzed these samples for total microcystins via enzyme-linked immunosorbent assay (ELISA) and for cylindrospermopsin via liquid chromatography with tandem mass spectrometry (LC MS/MS). ODEQ developed an ELISA method for cylindrospermopsin that is currently used to screen samples. All ELISA tests were run on an Abraxis Cyanotoxin Automated Assay System and results were reviewed and reported to the facilities in less than three days. Since the cyanotoxins are often intracellular, an initial gentle filtration or settling out of the CyanoHAB cells to keep them intact is usually




A hazardous algal bloom in the Willamette River (Mike Mulvey)



Microscope photos of toxin producing cyanobacteria collected in Oregon (Mike Mulvey)



Photo: DEQ chemist, Kale Clauson, prepares samples for analysis using the ELISA method (Laura Gleim)



If cyanotoxin concentrations in a source water sample exceeded the health advisory level, then the affected facility is required to sample finished water weekly. If cyanotoxins are detected in any finished water sample, then a “Do Not Drink” advisory is enacted and the affected facility is required to test daily until concentrations no longer exceed the health advisory level for two consecutive samples. At that point, the advisory is lifted.

followed by treatment with powdered activated carbon. If necessary, treatment with a strong oxidizer such as chlorine, potassium permanganate, UV light or ozone can be used to break down the toxins.

Cyanotoxins, specifically microcystins, were detected at six locations in 2019, but none of these detections resulted in drinking water advisories. OHA and ODEQ plan to carry this project forward into 2020. Sampling in 2020 will also include a quantitative polymerase chain reaction (qPCR) method. When fully implemented, this approach will detect increases in the expression of certain genes that may lead to cyanotoxin production. This method could potentially serve as an early warning system for susceptible water systems and allow OHA and ODEQ to even better protect Oregon’s public drinking water sources.

If you’d like further information on these processes, please contact Dan Brown (brown.daniel@deq.state.or.us).

NEW ADDITIONS TO EPA WATER CONTAMINANT INFORMATION TOOL

The US Environmental Protection Agency’s (EPA’s) Water Contaminant Information Tool (WCIT) is a secure online database that provides information on chemical, biological and radiological contaminants of concern for water security. The WCIT database has over 800 contaminant profiles. Most of these contaminant profiles provide information on contaminant identification and available analytical methods. A growing number of the profiles feature physical-chemical properties, fate and transport, toxicity, health effects, water and wastewater treatment, infrastructure decontamination, and other information for emergency response decision making. WCIT is updated regularly as new information becomes available or new contaminants warrant inclusion.

If you are a Water Laboratory Alliance member, log in to your WCIT account to check out the most recent additions:

- *Legionella pneumophila*
- Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS)

Upcoming additions include:

- Fentanyl
- Bromoform
- Cylindrospermopsin
- Microcystins



The National Defense Authorization Act authorizes FY2020 appropriations and sets forth policies for US Department of Defense programs and activities.

The NDAA recognizes WCIT as an integral component in federal efforts to address emerging contaminants of concern in water systems and allocates additional resources towards expanding the database.

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