

LAB

MATTERS

analysis|answers|action

Spring 2024 Issue 1

Public Health on the Frontier

Inside:

5 Navigating Biomonitoring in Rural Communities: The Iowa Experience

18 Connecting STEM Students to Environmental Laboratory Careers

20 APHL Makes an Impact at ASLM 2023

ASSOCIATION OF PUBLIC HEALTH LABORATORIES

APHL[®] 2024

where laboratory science and public health meet

#APHL



May 6–9, 2024 • Milwaukee, WI

The APHL Annual Conference, an in-person event for the public health laboratory community, brings together more than 1,000 leaders, scientists, influencers and partners to share issues, trends and best practices driving laboratory science and public health today.

Join us in Milwaukee as we explore public health laboratory issues, trends and technologies relative to emerging infectious diseases, environmental health, emergency preparedness, quality systems and safety, informatics, food safety, newborn screening, global health, workforce and more!

Not-to-Miss Keynote!

Katherine Kelley
Distinguished Lecture:
The Deadly Rise of Anti-Science
Peter Hotez, MD, PhD

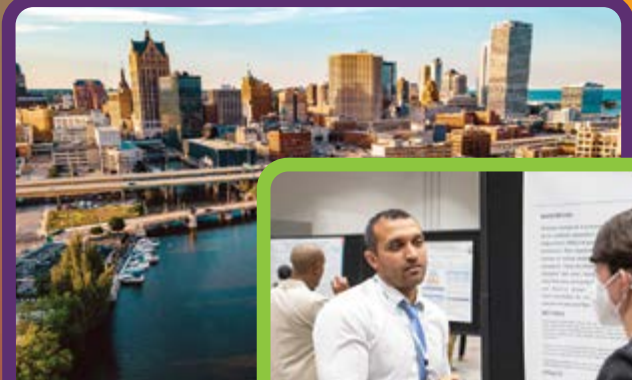


View conference highlights and register at www.aphl.org/AC

Attendee Benefits

Attendees in Milwaukee will enjoy live sessions and roundtables, networking, receptions, events such as the Dr. Katherine Kelley Distinguished Lecture and the Annual Awards Ceremony, and 100+ scientific posters and 70+ exhibitors.

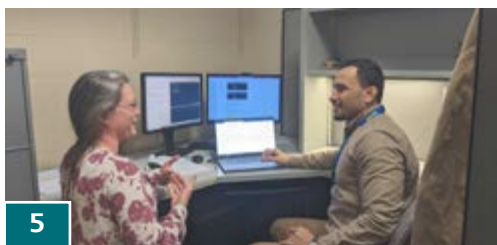
- 46 sessions
- 70+ exhibitors
- 100+ scientific posters
- Networking, receptions and events
- P.A.C.E.[®] and CPH CEUs
- Registration bag and other special giveaways
- Seeing friends and colleagues
- All the fun of Milwaukee!



COLUMNS

- 2 President's and CEO's Message
- 3 Fellowship Project Supply Fund Aims to Eliminate Barriers

FROM THE BENCH



5

- 5 Navigating Biomonitoring in Rural Communities: The Iowa Experience

INDUSTRY MATTERS

- 6 Advancing Public Health Through the Integration of NGS and Automation
- 7 Molecular Diagnostics: How Do You QC?

FEATURE



8

- 8 Public Health on the Frontier

APHL PROGRAMS



16

Environmental Health

- 16 Vermont LRN-C at the Ready
- 18 Connecting STEM Students to Environmental Laboratory Careers

Global Health

- 20 APHL Makes an Impact at ASLM 2023

Infectious Diseases

- 21 Alabama Hosts In-person *Mycobacterium tuberculosis* Diagnostic Workshop

Informatics

- 22 The Use of Intermediaries to Facilitate ETOR for Public Health

Public Health Preparedness and Response

- 24 Embracing Evolution: Navigating Changes to the Laboratory Response Network
- 25 Advancing Biosafety and Emergency Preparedness Through Fellowship Initiatives



7700 Wisconsin Avenue, Suite 1000
Bethesda, MD 20814
Phone: 240.485.2745
Fax: 240.485.2700
info@aphl.org
aphl.org

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.

LAB MATTERS STAFF

Gynene Sullivan, MA
Editor

Brittany Robertson
Art Director

David Fouse
Advisor

To submit an article for consideration, contact Gynene Sullivan at gynene.sullivan@aphl.org.

2023-2024 BOARD OF DIRECTORS

Timothy Southern, PhD
President

Megan Crumpler, PhD
President-elect

Godfred Masinde, PhD, MBA, HCLD(ABB)
Secretary-Treasurer

Sharon Massingale, PhD, HCLD/CC(ABB)
Public Health Institutional State Representative

Michael Pentella PhD, D(ABMM)
Public Health Institutional State Representative

Scott Shone, PhD, HCLD(ABB)
Public Health Institutional State Representative

Pamela Higgins, PhD
Public Health Associate Institutional Member Representative

Deborah Severson
Public Health Institutional Local Member Representative

Leslie Wolf, PhD, HCLD(ABB)
Public Health Institutional Local Member Representative

Daphne Ware, PhD
Past President

Scott Becker, MS
Ex Officio, Chief Executive Officer, APHL

The production of this publication was supported by Cooperative Agreements #NU60OE000104 and #NU2HGH000080, funded by the US Centers for Disease Control and Prevention (CDC). Its contents are solely the responsibility of the authors and do not necessarily represent the official views of, nor an endorsement by, CDC, HHS, or the US Government.

Practicing Resilience from a Values-based Perspective

Resilience is a funny word in the world of public health laboratories. Often, we are asked—and sometimes forced—to cover emergency responses with the bare essentials of supplies, resources and staff. We are responsive to the emergency, we advocate for keeping that base of preparedness “warm” to be ready for the next emergency, and then we are taxed again with dwindling funding to keep the lights on. And the next emergency arrives. Wash, rinse, repeat.

Public health laboratories and public health laboratorians were thrust to the front of the stage in 2020, 2021 and 2022. The US Centers for Disease Control and Prevention (CDC) states that 70% of medical decisions are based upon some sort of laboratory diagnostic testing. That awareness, while a bit uncomfortable, really cast a new light on the work of our member laboratories. Our members have become part of the health care provider network in the general consciousness. But unlike our colleagues in other health care facilities, we are still very much affected by the whims and winds of politics.

One thing we can do, both as leaders and laboratorians, is to maintain the awareness of laboratory science not just as a tool to be pulled out when there's an emergency, but as a 24/7/365 partner to other health care providers. During the pandemic, many of our laboratory staff worked in tandem with other health professionals and federal agencies to provide drive-through specimen collection. From taking nasal swabs, to packaging and shipping to laboratory analysis and reporting, we were able to process a phenomenal amount of tests and distribute results quickly. We collected, we tested and we reported. And we tested—and continue to test—while ensuring that our day-to-day laboratory functions were still maintained. Now that we are on the other side of the response, we can look back and say, “this is what got us through.” It's more than just the funding, however, it's the people we were with during the response.

When APHL first published its member values last year, we talked about the process in getting to those values. Even through the roller coasters of response, funding and personnel changes, the member values that we discussed and ultimately decided upon were very much apparent before, during and after the pandemic. The good news is that the pandemic did not change those values; rather it helped cement them into the DNA and lexicon of the association.

As we approach the next federal funding cycle, we are looking at an unprecedented recession. Because of the support we received during the pandemic, we are facing a fiscal cliff in many states. While this situation for the association and our members is not a new one, we remain very concerned about the ability of our public health laboratories to continue to respond to the demands placed upon them. Innovations in technologies and equipment within the laboratory have been game-changing for turnaround times and ensuring quality of testing. Some laboratories have been able to finally staff up from dangerously low pre-pandemic levels of expertise and are now just getting back on their feet.



Scott Becker, MS, Chief Executive Officer, APHL and Timothy Southern, PhD, President, APHL

At the state and local level, our laboratory directors and senior staff are answering to a different level of the legislature than before. Before 2020, it was harder to have a seat at the table when public health decisions were being made. Laboratory science, and scientists, were on the fringes. As we begin 2024, however, we have a new, respected voice in those public health decisions. We help senior leaders understand things like PFAS and mpox for example, as well as the kinds of at-risk populations that are most impacted. We may now be on speed dial at the Governor's office, rather than a card in an outdated rolodex in a chief of staff's office.

All of our laboratories are connected to each other, through their work and through APHL. Through each temporary extension of federal funding because of the failure of Congress to complete the appropriations process, APHL's staff are listening to federal partners and our members' feedback about what is needed to further the innovations of the past three years. The association is also in year four of an unprecedented workforce recruitment and retention initiative funded by the American Rescue Plan, having recruited 280 public health laboratory fellows and interns for our laboratories so far, extending some fellowships for an additional year. We also have early anecdotal evidence that fellows are finding homes as full-time or part-time staff in their host laboratories or other public health laboratories. We are committed to providing professional development opportunities for every staffing level of the laboratory—from packaging and shipping training and seminars on the newest microbiology testing, to our Laboratory Leaders of Today and Emerging Leader programs.

As this is an election year, APHL is watching and waiting but also considering changes that may occur. We are keeping our eyes on all forms of laboratory innovation while still presenting a respected voice to the public and our partners. ■

Fellowship Project Supply Fund Aims to Eliminate Barriers

By Rudolph Nowak, MPH, senior specialist, Marketing & Communications

Money and personnel. Those are two things in short supply at many public health laboratories. The [Public Health Laboratory Fellowship Program: an APHL-CDC Initiative](#) wants public health laboratories to connect with APHL's aspiring fellowship applicants, so the program actively seeks creative ways to remove obstacles preventing laboratories from taking part in the Fellowship Program. A recent enhancement to the program is the Fellowship Project Supply Fund. Mentors can apply to receive a reimbursement of up to \$10,000 per fellow, per contract year to support individual fellowship projects.

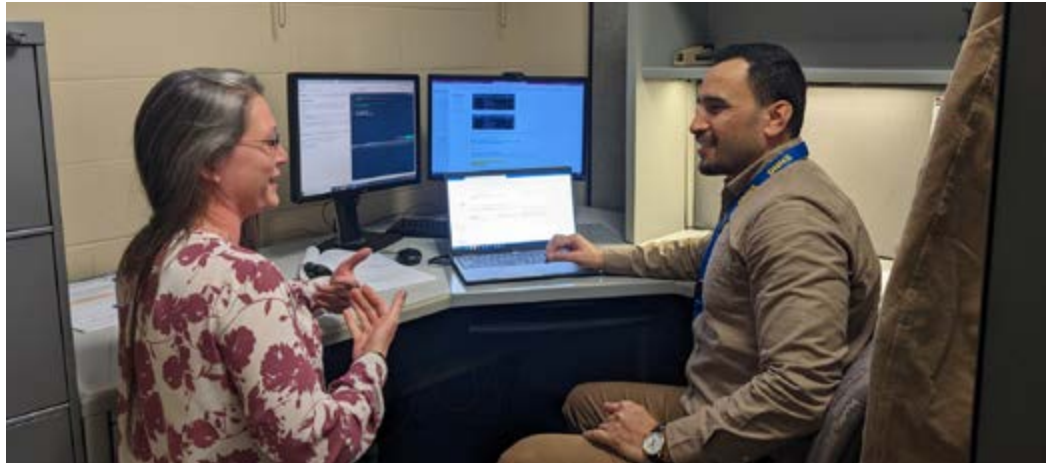
“The majority of public health laboratories struggle with their budgets, that’s a common fact. They don’t have extra money and they’re always needing to trade something in their budget because they just don’t have the extra money for these fellowships at all,” said Rob Nickla, APHL’s Fellowship Program manager.

Providing Support

The idea behind the Project Supply Fund is to give the fellowship host laboratory funds to offset the cost of a fellow’s project.

“The host laboratory doesn’t have to use money that they already have for their critical testing needs and laboratory operations,” Nickla added. “They can keep all their normal operations the same. The fellowship really shouldn’t impact their laboratory budget.”

Additionally, the work the fellows can do with these funds can be consequential to the communities the laboratories serve. In New Hampshire, the supplemental funding directly contributed to the Department of Health and Human Services biomonitoring initiative. Melissa Josefiak, biomonitoring administrator at the [New Hampshire Public Health Laboratories](#), was mentor to two fellows whose projects looked at chemicals in the population by analyzing whole blood, urine and other tissue.



Environmental health fellow Farooq Salangi (right) and his mentor Melissa Josefiak (left), administrator of the biomonitoring program, discuss what he has learned about R statistical software to begin planning data analysis for part of his project at the New Hampshire Public Health Laboratories. Photo courtesy of New Hampshire Public Health Laboratories

“We are working on increasing our state’s capability and capacity for testing volatile organic compounds (VOCs) and then looking at polycyclic aromatic hydrocarbons (PHS) in urine. Each fellow had one of those methods to validate,” Josefiak said. But when Josefiak and the host laboratory proposed the fellows’ projects, they were surprised by the cost of the proficiency testing materials. The [Florida Department of Health, Bureau of Public Health Laboratories-Tampa](#) faced similar obstacles.

“We do get a good amount of funding for arbovirus from Epidemiology and Laboratory Capacity (ELC) grants, but we go through it quickly,” said Lea Heberlein, Virology administrator at the Florida laboratory.

The last couple of years Florida has been dealing with a lot of dengue outbreaks, both local cases and cases from travelers coming into the state. Since much of their funding was getting used up for everyday testing—which stays a priority—there was a question of whether they had the funding to support fellowship projects.

“Now we know we can really get those projects done because we have financial support for it and we’re not trying to juggle funding,” Heberlein said.

A Funding Lifeline

A situation like what Josefiak and Heberlein encountered is why the Project Supply Fund was started: to ensure laboratories have the resources needed for the fellows’ projects to be successfully completed.

According to Nickla, “They say, ‘Hey, I want to buy these things for the fellowship project, reagents or PPE or things that are directly related to the project. And we say, ‘Yes, you are approved to go ahead and buy those things.’”

The simplicity is intentional to encourage not only use of the funds, but to promote the fellowship experience to laboratories who might want to take part in the program but are challenged by budget. Microbiology supervisor Megan Nelson submitted the funding request for the Diagnostic & Clinical Division in the [State Hygienic Laboratory at the University of Iowa](#).

“It was a lot easier to do than I thought it was going to be. It was really nice that it was one form to submit, and you max out at \$10,000,” Nelson said. “For us it was,

(continued on page 4)

(continued from page 3)

‘Well these things cost this much, and we bought two of them.’ It was very easy.”

At the Iowa laboratory, the funding allowed for software upgrades the fellows needed to complete their projects.

“[The Project Supply Fund] covered the funding that we needed to do a sequencing validation and we needed to buy a bunch of reagents. Then there was a software upgrade for the analysis software that we used,” Nelson said. Shortly after the laboratory finished the validation, the software company released an upgrade to the software the Iowa laboratory just purchased.

“They gave us that upgrade for free and gave us a bunch of sequencing reagents. They also came on site and did some more hands-on training with us,” Nelson added. “And then [Infectious Disease Fellow] Kanwal Alvarez went through and updated all of our SOPs again to

make sure that the new software analysis instructions were in there.”

Other laboratories echoed the significance the funding has made in their ability to successfully host their fellows.

“I think if we did not have funding available, we would have been very surprised about our inability to move forward with these projects in the way that we’d hoped. We would have been cutting other work to finish validating or preparing to validate these two methods,” Josefiak said.

Driving Innovation

In Florida, a fellow’s project involving rabies validation received help from the program and removed a funding obstacle for the Tampa laboratory.

“One of our fellows is working on validating our rabies molecular assay and we’ve received limited funds from ELC for any rabies testing. All our rabies testing is basically supported by state funds, and

those are very limited. So, her project is benefiting from the funding. I’m not sure how we would have gotten approval to use the state funds for that project,” Heberlein said.

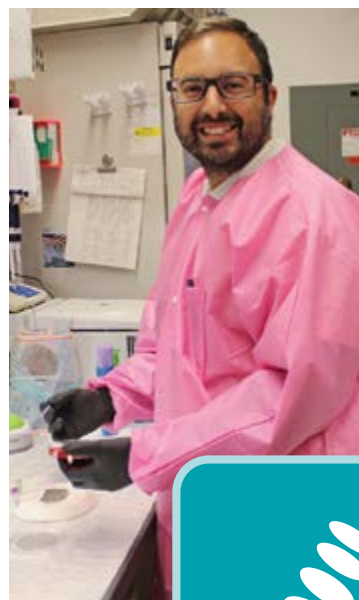
The Project Supply Fund ensures that the fellowship project work will happen, be completed and be successful, and have all the resources needed. The funding is an added perk for having fellows, but mentors and host laboratories are reaping benefits as well. While laboratories benefit from the fellows by getting wish list projects completed that may not otherwise be done, mentors benefit from the enthusiasm fellows bring with them to the laboratory.

“I’m a little longer in my career, and I still love my job, but I don’t get all excited about some of the little things that they do,” Heberlein said. “It brings me back to when I was early in my career and had that same excitement. I enjoy getting that feeling again from them.” ■

Don’t miss out on the benefits—
Renew your membership!



Renewal notices will be emailed to current members in April.



www.aphl.org/benefits

colLABorate

APHL eUPDATE

APHL®

Navigating Biomonitoring in Rural Communities: The Iowa Experience

By **Don Simmons**, PhD, manager, Environmental Laboratory, State Hygienic Laboratory at the University of Iowa; and **Michael Schueller**, MS, associate director, Environmental Health Division, State Hygienic Laboratory at the University of Iowa

Iowa is well known as an agricultural state, and for its hydrogeological characteristics that increase the potential for groundwater contamination. The total population of Iowa is approximately 3.2 million people (2021 USCB), with about 1.1 million (~36%) residing in rural areas. Many rural residents lack access to municipal water supplies and rely on community or private wells for drinking water. Private wells do not fall under mandated state or national water quality standards, and community wells lack adequate regulations, with far less stringent standards than municipal water supplies.

Iowa has 99 counties, and the majority are rural counties. Eleven of these counties are participating in the [State Hygienic Laboratory at the University of Iowa](#) (SHL) biomonitoring program. As of May 31, 2023, SHL had recruited and enrolled 1,189 participants from households across those 11 counties. The total population of the participating counties ranges from 8,717 to 105,607 and has a moderate to high density of private wells.

Making Contact with Rural Communities

Originally, county sanitarians were to assist with the recruitment and collection of survey information and specimens. However, due to the COVID-19 pandemic, home visits were not possible because of the risk of exposure to [SARS-CoV-2](#). The recruitment of participants pivoted to electronic and hard copy formats of engagement. We recruited participants by mail and once a participant registered and completed the eligibility survey, a follow-up phone call was made to determine final eligibility. Eligible participants took a more comprehensive survey and committed to the study. The survey consisted of 180 questions in the categories of general background

The biomonitoring program at SHL kicked off in 2019 with three objectives:

1. Enhance the laboratory capacity for biomonitoring analysis
2. Develop a state-specific output database that focused on Iowa's rural population exposure
3. Communicate and educate exposure risks.

information, water supply source, geographical area of residence, diet, general health behaviors, occupation, pesticide exposure, personal care product use and tobacco use. Enrollees were limited to one adult participant per household on private well water.

Sample collection kits were mailed to each participant to collect water samples from the spigot of their primary source of drinking water and urine specimens. We achieved a 13.2% enrollment rate and 85% sample submission rate by enrollees.

Reporting Results

Water and urine specimens were chilled on ice during transport to the laboratory. Once in the laboratory, water samples were held at 4°C until analysis, and urine specimens were frozen at -80°C until testing. Test results focused on metals with documented health action levels and included lead, cadmium, arsenic and uranium. Results for private well participants were reported back to the submitter. Results above the established action level were sent to a physician toxicologist for review and discussion with the individuals.

SHL is working on data analysis with biostatisticians from the [US Centers for Disease Control and Prevention](#) (CDC) and the Department of Epidemiology at the [University of Iowa College of Public Health](#). We have thus far looked at the results of metals in water samples and at unadjusted versus creatinine-adjusted metals in urine. We looked at distributions of urine results, both adjusted and unadjusted, relative to NHANES reported numbers from 2017–2018 for the adult population.

The results will be shared with the boards of health in the participating counties, and SHL plans to publish the results in the future. This project has been a wonderful opportunity for rural Iowans using private well water to know more about the water that they ingest every day. For those with results above expected levels, they can now be informed about their well water and take remedial action if an unusual result was discovered. ■

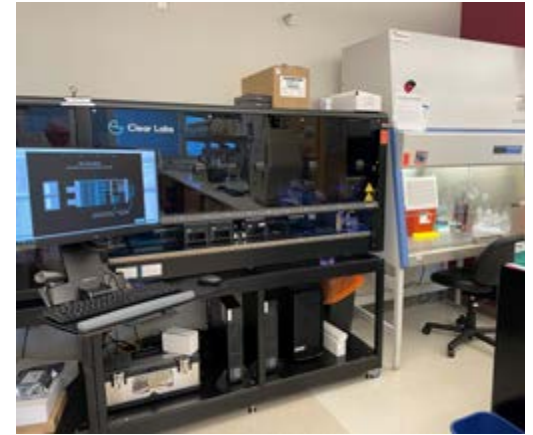
Advancing Public Health Through the Integration of NGS and Automation

By Peter C. Iwen, MS, PhD, D(ABMM), F(AAM), director, Nebraska Public Health Laboratory; and Justin H.J. Ng, PhD, Scientific Affairs, Clear Labs, Inc.

In the rapidly evolving landscape of healthcare and public health, next-generation sequencing (NGS) stands as a revolutionary force, enabling profound insights into the intricacies of pathogen evolution and transmission. However, this cutting-edge technology is not without challenges. As the demand for faster and more accurate sequencing rises, so do the obstacles associated with processing times, lack of technical expertise and human errors. Fortunately, the integration of NGS with automation holds the key to overcome these hurdles, to usher in a new era of efficiency and precision to apply genomics in the advancement of public health.

One of the primary challenges faced in NGS is the complexity of experimental steps and techniques used. The steps required from sample preparation to sequencing library generation are not only arduous and tedious, but also labor intensive. Traditional manual experimental workflows tend to be time-consuming and prone to errors, with the risk of sample contamination and cross-contamination posing a constant threat during wet processes. Even with stringent laboratory practices, the introduction of foreign nucleic acid or sample mix-ups can occur, leading to unreliable data and jeopardizing the integrity of clinical results. Automation, with the ability to streamline these complex workflows, offers a solution to efficiently manage complicated procedures, reduce the risk of error and contamination and accelerate the overall process. Automation also allows sample and library preparation to be performed unsupervised, outside of office hours, thereby enabling next-day result-reporting and reducing overall sample-to-results turnaround time.

Standardization of NGS protocols is crucial to ensure consistent and reliable results among different laboratories and research settings. Manual procedures are inherently susceptible to variations introduced by human operators, which lead to inconsistencies in data quality. Automation mitigates this challenge



An all-in-one turnkey end-to-end platform not only declutters and frees up precious real estate for essential benchwork (left), but also compliments with existing equipment to better serve the needs of public health laboratories (right). Photos: Nebraska Public Health Laboratory at the University of Nebraska Medical Center.

by enforcing standardized protocols, minimizing variations and enhancing the reproducibility of results. This not only assures data quality control and strengthens the reliability of genomic data, but also facilitates collaboration and comparison of accurate and reliable data between different studies.

Moreover, an all-in-one, turnkey end-to-end platform packed with crucial hardware can replace the multiple different pieces of equipment required for manual NGS workflow. This will not only help optimize use of precious laboratory space, but also enhance workspace safety for laboratorians. A well-organized and clutter-free laboratory environment will improve efficiency and productivity, while at the same time significantly reduce the risk of accidents and promote a safer work environment.

Furthermore, the shortage of skilled personnel with expertise in genomics poses a significant challenge to the widespread adoption of NGS. The integration of automation minimizes the dependency on highly specialized human skills by automating routine tasks, making NGS more accessible to a broader range of researchers and clinicians. This democratization of genomics empowers more professionals to leverage the potential of NGS without requiring extensive training in molecular biology,

to further lower the barrier of entry for the adoption of NGS technologies in the public health space.

In conclusion, NGS has transformed our understanding of genomics which leads to challenges associated with complex workflows, processing times, standardization and human errors. Automation emerges as a formidable ally to address these challenges by offering solutions that enhance efficiency, accuracy, and accessibility in genomic research and healthcare. By pushing the frontiers of NGS through the integration of automation, the future has been paved where the full potential of genomics can be harnessed for the betterment of public health. ■

Clear Labs is an APHL Gold Level Sustaining Member.

Molecular Diagnostics: How Do You QC?

By **Steven Kelly**, technical product manager, Streck LLC; **Chris Connelly**, PhD, director, Research & Development, Streck LLC; **Madison Stock**, PhD, technical writer, Streck LLC.

Introduction

In the last decade, sample-to-results molecular diagnostics (MDx) testing has grown exponentially, especially in the realm of infectious diseases. The ability of MDx testing to rapidly identify the microorganisms and any associated antimicrobial resistance mechanisms responsible for infection allows healthcare professionals to quickly implement appropriate treatment, reducing adverse patient outcomes. Further, cartridge based MDx assays can be easily and efficiently performed in facilities without a traditional MDx lab.

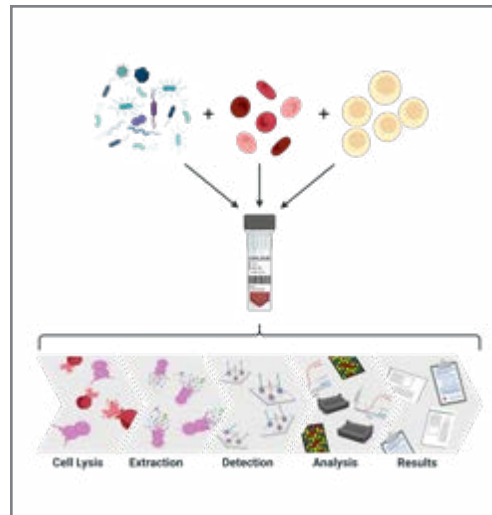
As with many laboratory assays, quality control (QC) for MDx testing is essential to ensure accurate results. Microbiology labs developing novel molecular testing methods require comprehensive individualized quality control plans (IQCPs) that address how to identify and mitigate areas of risk within the assay. With cartridge-based or other sample-to-answer MDx platforms, the system hardware, software, reagents, laboratory environment and testing personnel are important considerations in an IQCP.

Recent Changes to MDx QC Recommendations

IQCP procedures are subject to governance by various organizations including ISO, CAP, ASM and CLSI. In 2022, ISO and others revised the standards for the use of QC material in MDx testing to further define expectations of increased stringency for preferred measures. Do the controls you use today meet the newly outlined criteria? Examples include:

“The matrix is as close as possible to that of patient samples” and “the IQC material reacts to the examination method in a manner as close as possible to patient samples.” (ISO 15189 Section 7.3 7.2 b2 and b3, 4th Ed.)

“QC material is used as a surrogate for native patient samples to test precision and to detect systemic changes in a reagent or instrument system.” (CSLI MM06-A2 Section 7.4.1 – External Quality Control)



Created with BioRender.com

- “Controls are **samples that act as surrogates for patient/client specimens**. They are processed like a patient/client sample to **monitor the ongoing performance of the entire analytic process in every run.**” (CAP – Molecular Pathology Checklist (MOL.34220, MOL.34229, MOL.34270, MOL.34311))
- “The use of third-party QC material should be considered, either as an alternative to, or in addition to, the control material supplied by the reagent or instrument manufacturer.” (ISO 15189 Section 7.3.7.2 a3, 4th Ed.)
- “The laboratory shall select IQC material that is **fit for its intended purpose.**” (ISO 15189 Section 7.3. 7.2 b 4th Ed.)

Unique Cell Stabilization Technology in a Comprehensive MDx QC

Over the past 40 years, Streck has refined the development of patient specimen-like clinical quality controls for hematology, chemistry and flow cytometry. The proprietary cell stabilization technology provided the ideal foundation to create QC material for sample-to-results MDx assays such as the BIOFIRE® BCID2 Panel and VERIGENE® BC-GP and BC-GN tests (MD-Chex® for BCID2, MDx-Chex® for BC-GP and MDx-Chex® for BC-GN).

As Streck’s MDx-Chex® controls are comprised of intact and inactivated microorganisms, stabilized blood cells and blood culture media components, they precisely mimic and perform like a patient sample.

Reducing the Chance for Undetected Errors

Because sample-to-results MDx systems automate multiple processes that are standard to molecular sample preparation and testing, it is important for quality controls to evaluate the entire analytical process. Streck’s MDx-Chex® controls ensure that all steps of the BIOFIRE® BCID2 or VERIGENE® BC-GP/BC-GN assays are operating correctly. All targets are captured within only two control runs, reducing the amount of time and resources needed to complete QC prior to analysis of patient samples. Additionally, incorporating these controls into an MDx testing IQCP can limit the likelihood of time-consuming and expensive inaccuracies that affect the laboratory and the patient. Easy-to-use and comprehensive, Streck’s MDx-Chex® controls are well-suited for both full-service microbiology labs and smaller site laboratories who want greater confidence in their results reporting and subsequent treatment strategies. ■

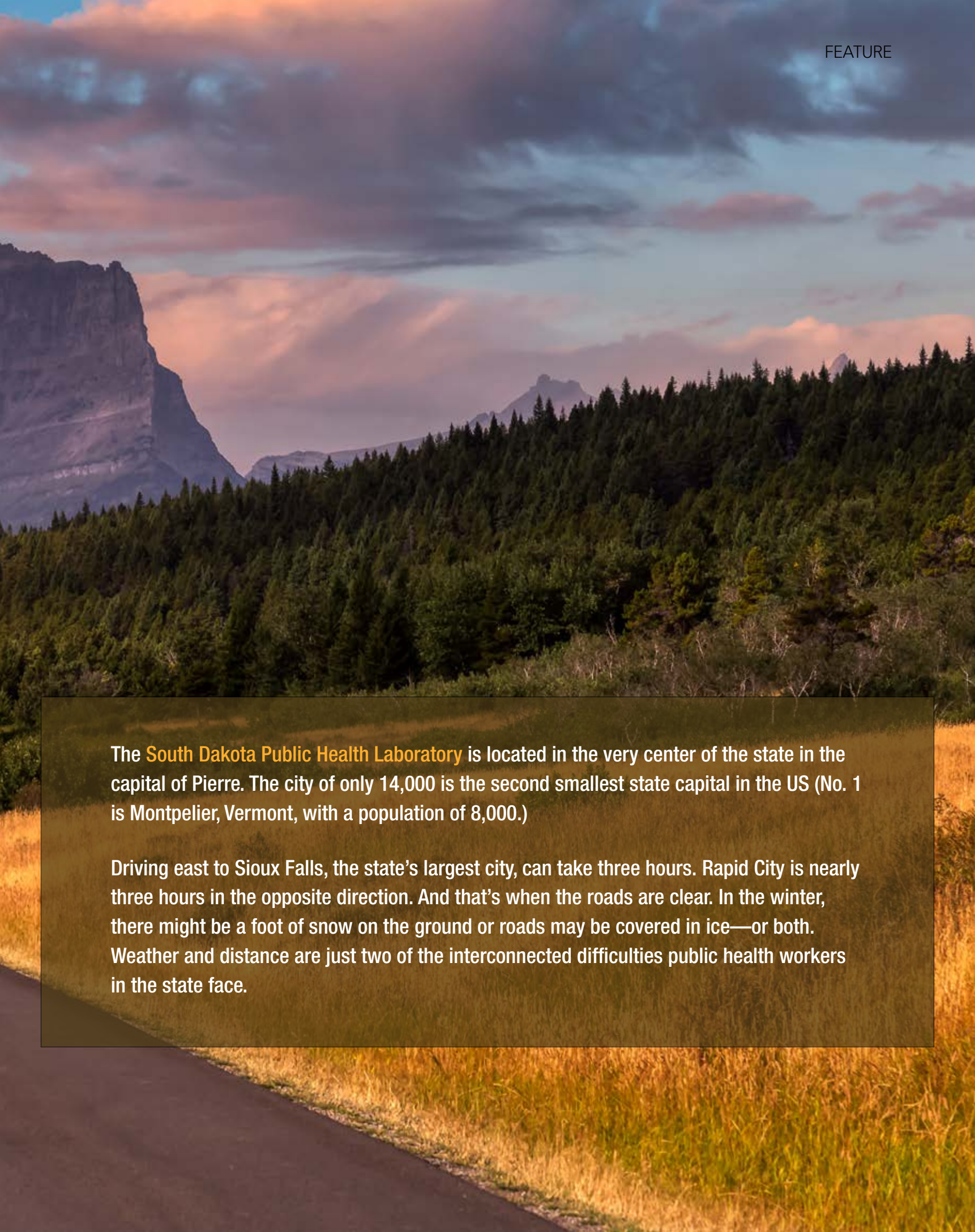
While Streck’s current MDx-Chex® controls are intended for use with the BIOFIRE® BCID2 Panel or the VERIGENE® BC-GP and BC-GN tests, opportunities for partnership to develop QC materials for other MDx-based assays are available. Please contact our Business Development team at bd@streck.com for more information.

Streck LLC is an APHL Gold Level Sustaining Member.

FEATURE

Public Health on the Frontier

By Melanie Padgett Powers, writer



The **South Dakota Public Health Laboratory** is located in the very center of the state in the capital of Pierre. The city of only 14,000 is the second smallest state capital in the US (No. 1 is Montpelier, Vermont, with a population of 8,000.)

Driving east to Sioux Falls, the state's largest city, can take three hours. Rapid City is nearly three hours in the opposite direction. And that's when the roads are clear. In the winter, there might be a foot of snow on the ground or roads may be covered in ice—or both. Weather and distance are just two of the interconnected difficulties public health workers in the state face.

Most public health laboratories across the US share the same challenges, such as lack of sustained funding and worries over staff recruitment and retention. But laboratories in more rural areas and remote locations, or in large states with sparse populations, have their own unique set of challenges. These circumstances often necessitate ingenuity, independence and creativity.

Before Tim Southern, PhD, D (ABMM), became director of the South Dakota Public Health Laboratory in 2015, he worked in the Omaha, Nebraska, state laboratory through a fellowship with the American Society for Microbiology.

“There are as many people in Omaha as there are in the entire state of South Dakota,” Southern said. “And the rural nature of South Dakota really changes the dynamic of service delivery. In South Dakota, we are highly resource limited, and our laboratory is geographically in the center of the state, hours from our major urban centers.”

Resource limitations have made the laboratory staff “fiercely independent,” Southern said. “We cannot order the kinds of supplies that other laboratories might order and get next-day delivery.” In addition, the staff tends to make most of their buffers and media and service their own equipment. “It’s very difficult to get technicians in Pierre,” he said. “They either have to drive a long way or they have to fly through our local airport that only has two flights a day.”

“When you’re dealing with a small state with a geographically dispersed rural population, you make do with what you have,” said Michael W. Edwards, PhD, HCLD(ABB), director of the [New Mexico Department of Health Scientific Laboratory Division](#). “You typically

“When you’re dealing with a small state with a geographically dispersed rural population, you make do with what you have.”

Michael W. Edwards, PhD, HCLD(ABB)

have less money than everyone else. You get less money from the [federal government], and if you want to be successful, you have to sort of punch above your weight class. You just find creative ways to make things happen.”

Finding a Way to Reach All Citizens

Scott Shone, PhD, HCLD(ABB), director of the [North Carolina State Laboratory of Public Health](#), can relate to the need for creativity. While North Carolina might not be as sparse as South Dakota, the state has a diverse geography and some very rural locations. “Some of the places we serve have a sizable population living in unincorporated areas,” Shone said.

Shone spent the first 12 years of his career in the [New Jersey Public Health and Environmental Laboratories](#) (including a year as an APHL Emerging Infectious Diseases Research Fellow). The two laboratories differ in a variety of ways beyond the population and geography.

“They differ just in the way public health is structured and how different groups rely on state public health for public health services,” said Shone, who joined the laboratory as director in 2019. “North Carolina has a decentralized system, so the local health departments are critical in the decision making and the provision of services for their constituents. The state public health laboratory perspective is we are a service provider to those local health departments who know and address the unique needs of the populations they serve.”

This requires the public health laboratory to embrace flexibility, he said, particularly because the Outer Banks islands, the Triad that includes the capital city of Raleigh, and the Blue Ridge Mountain communities in the west don’t have the same needs.

With this in mind, last year the public health laboratory and the state’s Department of Administration (DOA) created a courier service specifically for the laboratory. Historically, the laboratory was required to use DOA as its mail service courier, but that service wasn’t designed

to meet requirements by the [Clinical Laboratory Improvement Amendments \(CLIA\)](#) or the [US Environmental Protection Agency \(EPA\)](#), Shone said. Plus, DOA was concentrated on the center of the state, so the laboratory used UPS to reach the farthest parts of the state. But UPS didn’t visit every location every day, and specimens didn’t always arrive meeting regulatory testing requirements.

Shone’s team approached the DOA in 2021 to see how to improve the system. “My goal is that no matter where you live in the state of North Carolina, if you rely on your local health department for care that the state laboratory of public health is going to provide the best possible laboratory service we can,” Shone said.

The laboratory was approved to contract with a private courier for about 18 months, as DOA and the laboratory partnered to build the laboratory its own courier service, which launched in 2023. “It has been a great collaboration between different agencies of our state government,” Shone said.

Now, DOA medical courier service drivers visit 109 locations in 99 North Carolina counties every single workday. The drivers collect the clinical and environmental samples, store them properly during transit, and deliver them to the public health laboratory in Raleigh by 11 PM the same day.

“That allows us to ensure continuity of that sample quality to comply with CLIA and EPA and any other regulatory entities,” Shone said. “It’s been great, and having it be part of a state agency is very helpful because there is a shared mission to serve the citizens of North Carolina.”

Working with Underserved Communities

By definition, public health laboratories are a part of the larger public health mission to protect and improve the health of all people. This includes working with and for underserved communities, which in more rural areas of the country often means people with lower socioeconomic status. Rural residents across the US have lower incomes than those in urban areas, and rural areas have higher overall poverty rates, particularly among racial

and ethnic minorities, according to the [Medicaid and CHIP Payment and Access Commission](#) (MACPAC).

Rural residents also tend to be older, poorer and sicker. Access to care barriers include a lack of health care specialists and reliable transportation that is often needed to drive long distances to seek out care, according to MACPAC.

In Montana, many hospitals lack laboratory resources to complete the testing needed. “A lot of the rural hospitals are critical access and provide limited services,” said Deborah Gibson, MPH, laboratory services bureau chief for the [Montana Department of Public Health and Human Services Laboratory Services Bureau](#). “So at the state laboratory, we do try to provide support to fill the gaps.”

For example, she said, many of the hospitals and clinics only provide basic microbiology. “They rely heavily on rapid testing with limited or no culture-based testing available. We often receive those isolates and/or specimens for further testing and identification. We also provide a lot of confirmatory testing services.”

And while Montana has a courier service, it doesn’t reach the most remote northeastern parts of the state. “The courier service can hit about 80% of the state, but there’s still areas that are so far out there that they can’t even provide overnight service. So, we miss about 20% of the state,” Gibson said.

For those areas, the laboratory provides prepaid FedEx or UPS labels for overnight shipping. However, that still presents challenges—sometimes hospital staffers have to drive to a neighboring town that has FedEx or UPS service. And in Montana, “neighboring” might mean an hour’s drive away or more.

In states such as New Mexico and South Dakota, laboratory scientists work closely with the [Indian Health Service](#) (IHS), indigenous communities representing 23 tribes and independent tribal health clinics. Nearly **11% of the population** in New Mexico is American Indian. Every state agency has a tribal liaison, Edwards explained. The relationship between the tribes and agencies is unique.

“It’s not like you’re dealing with a local jurisdiction; you’re dealing with this autonomous group of people that don’t necessarily fall within your jurisdiction. It’s about offering partnership and being there for them,” Edwards said. “They don’t have the resources that we might have, so it’s about offering our capacity as an extension of theirs and sharing data and sharing our laboratory services.”

In South Dakota, where about **8.5% of the population** is American Indian, 1 in 11 residents is served by one of the state’s nine tribes, Southern said.

“We try to provide services to those communities by reinforcing the scientists that work and live in those communities,” Southern said. That has included hosting packaging and shipping classes so the tribal clinics can send the samples to the state public health laboratory. “We try to provide options for them so that they don’t have to send their samples out of state to other laboratories.” One of the laboratory’s goals, he said, is to provide the tribal communities the highest quality testing at the lowest price possible.

These partnerships are particularly vital when there’s a public health crisis. In 2016, one of the largest foodborne disease outbreaks in South Dakota was traced back to a meal service at a powwow, a traditional celebratory gathering that includes dancing and singing. A total of 112 cases were identified in the *Salmonella* outbreak.

While IHS took the lead on the response, the [South Dakota Department of Health](#) (SDDOH) provided support, according to an SDDOH presentation at the 2017 conference of Council of State and Territorial Epidemiologists. SDDOH provided outbreak investigation guidance, laboratory testing, data management, data analysis and traceback.

Recruiting and Retaining a Workforce

Recruiting for public health laboratories, especially for clinical microbiologists, is a challenge across the country—especially

“We have noticed that young people graduating from college would prefer a job where they can telework and where they get a good salary. And we can’t offer either those things in laboratory work.”

Edward Desmond, PhD

as state laboratories can rarely compete with salaries offered by private laboratories. But rural or more remote public health laboratories may face an additional burden, as they need to lure people to states and communities with seemingly fewer amenities and resources.

It may not seem like it would take much to lure people to Hawaii, but the state has its challenges, including the high cost of living and the remoteness from the rest of the US.

The [Hawaii State Laboratories Division](#) is headquartered on Oahu and has district health laboratories on three other islands: Hawaii, Kauai and Maui. Some of the communities on the smaller islands are quiet, remote and isolated.

“We have a problem with recruitment and retention for the district health laboratories on our neighbor islands and for the hospitals on those islands,” said Edward Desmond, PhD, Hawaii’s laboratory director and State Laboratories Division administrator.

In addition, he said, “It’s gotten worse since the pandemic. We have noticed that young people graduating from college would prefer a job where they can telework and where they get a good salary. And we can’t offer either those things in laboratory work.”

One program that could help with recruitment is the medical technology program at the University of Hawaii John A. Burns School of Medicine, he said. The program, which is the only undergraduate program in the School of Medicine, begins with a medical laboratory technician associate degree at a community college and culminates in a bachelor of science degree in medical technology. In addition, the State of Hawaii announced in September 2023 the new [Healthcare Education Loan Repayment Program](#), which will pay off educational loans for health care professionals who stay in the state and work for at least two years. Laboratory professionals are eligible.

Finding the right employees to work in more remote or rural locations might take some extra work, but once they're there, they often stay.

To build the pipeline even farther out, Desmond's team is working with the nonprofit [ClimbHI](#), which aims to inspire students in Hawaii to finish high school by teaching them about a variety of career paths. The laboratory team has participated in several ClimbHI job fairs, which often serve marginalized communities.

The Hawaii laboratory also has a partnership with a medical technology regulatory group in the Philippines, which provides expedited licensure in Hawaii for medical technology graduates who pass a board exam and work first in the Philippines for two years.

Still, the public health laboratory is competing with private laboratories. But Desmond pointed out, "the new kid on the block" at a private laboratory might be assigned to work evenings and weekends. "We've got a Monday to Friday schedule that seems to be attractive to people who want a work-life balance," he said. "And we have a defined benefit plan, while the private sector has defined contribution

plans with an unknown value at the time of retirement."

And if that doesn't sell someone, Desmond bragged that his laboratory building has the best view of any of the 50 state public health laboratories. It's no contest, he said. The state laboratory is high on a ridge overlooking a spacious lawn with palm trees, a nearby forest and Pearl Harbor in the distance.

Finding the right employees to work in more remote or rural locations might take some extra work, but once they're there, they often stay, these laboratory leaders said. In fact, it's often the geography and outdoor offerings that appeal to people, Gibson said.

After the height of the COVID-19 pandemic, the Montana laboratory had vacancies for six clinical laboratory scientists out of a staff of about 50. They're fully staffed again. "We've been really lucky recently to hire a few good people," Gibson said, "and those people who are coming to us from out of state

are interested in living in Montana. It's great for people that love the outdoors."

Gibson is one of those people. She has worked at the Montana laboratory for 26 years. She lived in Missoula, Montana, as a child, but her family moved around a lot due to military service. She graduated from high school in Oklahoma but knew she wanted to get back to Montana as soon as possible.

Now, when the workday is done, Gibson—who is an ultrarunner—changes clothes and slips on her running shoes. Instead of walking to the parking lot, she runs to a nearby forest trail. Once in the mountains, she is surrounded by pines, with a gorgeous view of the Helena Valley in the distance. ■



CALL FOR ARTICLES:

From The Bench

a regular feature of *Lab Matters*



Lab Matters, APHL's flagship publication, is seeking submissions from laboratorians at all levels of practice for "From the Bench," a member-driven section of its quarterly magazine.

We welcome both technical and non-technical articles covering topics across public health laboratory science, administration, careers and management. Articles may be 600-1200 words in length.

We're looking for a few key components in "From the Bench" articles –

- 1. A compelling story.** Tell us about an initiative that streamlined an administrative process or fostered relationships with external communities. Describe how your lab has worked with other public health partners to stop an outbreak or respond to an environmental health threat. Or tell us how you dealt with an initiative that failed.
- 2. A complete story.** Give us an article with a beginning, middle and end. The end should provide some resolution of the narrative. You don't need to have fully implemented the new algorithm, analyzed all the research data or completed the electronic laboratory reporting system discussed in your article.
- 3. An insider's view.** We want articles told from the unique perspective of a laboratory scientist that will be interesting and informative for APHL members and partners.

**Share your
story with
peers!**

We can help!

We will work with you to write the article, from connecting you to a writing consultant to providing editing assistance if you wish to write the article yourself.

If you have **questions** or would like to **submit a story idea**, please contact:

Gynene Sullivan, MA
Manager, Communications
gynene.sullivan@aphl.org
240.485.2750



Ruvos: Celebrating 20 Years of Partnership A Heartfelt Thank You to Public Health for Transforming Lives Together!

Who are we?

For the last 16 years, Ruvos has had the honor of partnering with APHL's Informatics Program to build, maintain and grow the [APHL Informatics Messaging Services \(AIMS\)](#) platform. AIMS is a secure, cloud-based platform that accelerates the implementation of health messaging by providing shared services to aid in the visualization, interoperability, security, and hosting of electronic data. AIMS use cases include Electronic Test Orders and Results (ETOR), Electronic Case Reporting (eCR) and aggregated Influenza test result data from public health laboratories to the US Centers for Disease Control and Prevention (CDC).

In addition to the AIMS Platform, Ruvos has worked with APHL on Technical Assistance and Global Health Informatics.

What do we do?

- **Staffing:** Recognizing the critical role of talent in tech-driven industries, Ruvos offers staffing solutions that go beyond mere placement. We connect organizations with professionals who not only excel in their technical skills but also share a vision for innovation and progress.
- **Managed Services:** Our managed services are designed to keep your IT infrastructure agile, secure and efficient. We handle the complexities of technology so you can focus on your core mission. From cloud management to cyber security, we ensure your systems are robust and ready for the future.
- **Consulting:** Ruvos' consulting services provide strategic insights and practical solutions to complex challenges. Our team of experts brings cross-industry experience and a deep understanding of technology trends to help you navigate the evolving landscape of data and IT.
- **Product Development:** Our product development team is committed to creating solutions that address real-world problems. From healthcare to innovations

spanning multiple sectors, we constantly seek to push the envelope of what is possible.

What are our key capabilities?

- **Data Integration:** At Ruvos, we excel in the art of data integration, using our deep expertise as data engineers to seamlessly connect and combine data across complex systems. Our goal is to facilitate the secure and timely flow of the right data when and where it's needed. We specialize in crafting tailored integration solutions that enhance data coherence and accessibility, thereby improving data quality and decision-making. Our range of services includes both customized enterprise integration solutions and comprehensive Integration as a Service, designed to empower organizations to effectively utilize their data across various platforms and systems.
- **Cloud Computing:** Our expertise in Cloud Computing empowers organizations with scalable, flexible, and efficient IT solutions. We specialize in leveraging cloud technologies to enhance operational agility, reduce costs, and increase data accessibility. As an AWS Advanced Tier Partner, Ruvos delivers tailored, cloud-native solutions that drive innovation and growth.
- **Cyber Security:** Recognizing the paramount importance of data security, Ruvos offers comprehensive cyber security services. Our approach encompasses threat assessment, risk management, and the implementation of robust security protocols. We ensure the integrity and confidentiality of your data, safeguarding it against cyber threats and maintaining compliance with industry standards, including AWS GovCloud, NIST, HIPAA, SOC2 and FISMA.
- **Data Intelligence:** Data intelligence is a pivotal aspect of our offerings. Ruvos harnesses the power of data through advanced analytics and business

intelligence. Our solutions transform raw data into meaningful insights, aiding in strategic decision making. We provide analytics that not only interpret the past and analyze the present but also predict future trends.

- **Secure Web Apps:** Our development of Secure Web Apps integrates the latest in web technologies with stringent security measures. Ruvos specializes in creating web applications that are not only user-friendly and responsive but also fortified against digital threats. These applications streamline operations, engage users and protect sensitive data, ensuring a safe and efficient digital experience.

Unlocking Potential: Your Data, Our Innovation

Join Ruvos in a transformative journey of innovation. We combine strategic expertise and advanced solutions to redefine data's potential, creating impactful technology-driven outcomes. Visit www.ruvos.com, contact hello@ruvos.com, or explore our AWS Marketplace solutions. Together, let's achieve remarkable advancements and shape a world driven by informed decisions and cutting-edge technology. ■

Ruvos is an APHL Diamond Level Sustaining Member.



RUVOS



Better Data. Better Health.

For 20 years, Ruvos has put human ingenuity to work creating innovative solutions that unleash data—freeing it to securely and seamlessly flow in service of our world. Dedicated to breaking through daunting data silos that thwart insights and stymie analysis, Ruvos is a proven contributor to positive public health outcomes.

In an industry where health tech startups regularly appear and disappear, Ruvos has consistently invested in a robust network of global relationships. Relentlessly committed to service, Ruvos helps our clients, partners, and local communities benefit from more insightful analysis—enabling better healthcare outcomes for all.



Core Services:

- Staffing
- Managed Services
- Consulting
- Product Development

Capabilities:

- Data Integration
- Cloud Computing
- Cyber Security
- Data Intelligence
- Secure Web Apps

Products:



OBJECTVISION



WellConnector

SPECIAL PROMOTIONAL FEATURE

Vermont LRN-C at the Ready

By Lacey Tefft, public health laboratory unit coordinator, Vermont Department of Health Public Health Laboratory

The **Laboratory Response Network for Chemical Threats (LRN-C)** maintains readiness for chemical threat public health emergencies. However, in recent years, participating in the LRN-C has proven to be a great asset for other public health emergencies, including responding to extreme weather events.

In July 2023, Vermont experienced historic flooding when a two-day storm dropped significant rainfall across the entire state. This storm was most severe across the spine of the Green Mountains with the highest rainfall measuring 9.2" in Calais. It had already been a rainy summer, and with the ground already saturated, this storm caused severe flash flooding and mudslides. Several towns were isolated as rising water caused over 100 road closures throughout the state. Communities experienced unimaginable devastation as floodwaters and contaminated sludge destroyed municipalities, storefronts and homes.

Assessing the Damage

When the rain subsided, the focus shifted towards recovery, and ensuring people had access to safe drinking water was a priority. Municipal water suppliers affected by the flood had to test for coliform bacteria/*Escherichia coli*, nitrates/nitrites, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and heavy metals to lift their boil water notices. But this posed an issue because not every Vermonter gets their water from municipalities. In fact, on average, one in four households get their water from private wells or springs in Vermont. On July 14, the governor offered free drinking water test kits to those affected by the flood and instructed the public to call the **Vermont Department of Health Public Health Laboratory**.

Answering the Call

It was all hands on-deck at the laboratory—including our LRN-C chemists. The laboratory received an unprecedented number of phone calls after the governor’s announcement, and a call center was quickly established.

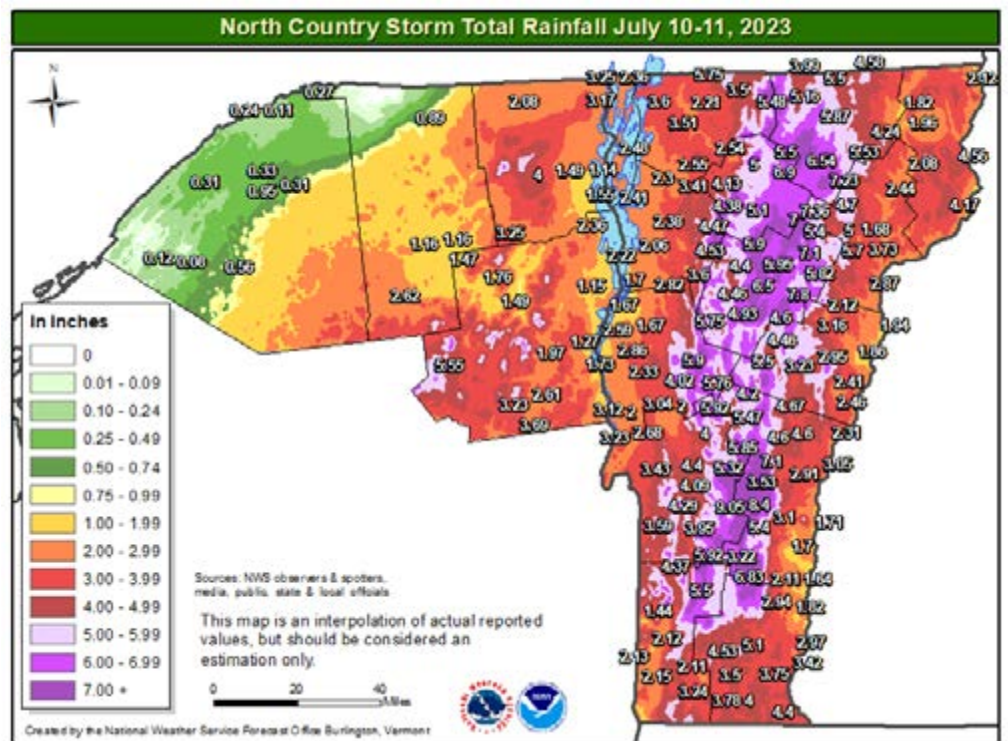


The village of Jeffersonville, VT, under water after the July 2023 floods. Photo: AJ Murray Photography

Administrative support was needed to take phone calls and return messages. Test kits needed to be assembled, so the laboratory’s break room transformed into a kit building hub as staff formed assembly lines to increase efficiency. Approximately 1,700 drinking water test kits were distributed to multi-agency resource centers (MARC) in six business days. MARCs were essential in quickly getting water testing kits out to the public and drinking water needed to be tested quickly. In addition to helping to assemble drinking water kits, LRN-C

chemists helped with metals, VOCs and SVOCs testing, which required working outside normal business hours as public water suppliers needed results as soon as possible.

The Vermont Department of Health is committed to serving the community. While the July 2023 flood response was not clinical in nature, LRN-C chemists utilized their specialized skillsets to support the laboratory response. They applied technical abilities to drinking water testing or simply offered administrative assistance to other programs in need. With extreme weather events on the rise, laboratory emergency response is increasingly important. Leveraging LRN-C staff and instrumentation broadens the capabilities of a laboratory during an emergency response, ensuring that the LRN-C is always at the ready. ■



Created by the National Weather Service Forecast Office, Burlington, VT.

Hello, we're Datapult.

As public health professionals, we've built solutions we believe in for Public Health



NGS Data Solutions

Easily and securely access prepackaged pipelines and workspaces tailored to public health sequencing needs.

NGS InSight™

Realize the value and the ability of efficiently analyzing pathogen genomes, enabling laboratories to recognize differences in public health threats. NGS InSight creates information that is actionable in protecting public health.

NGS gsT

More data is never a bad thing. With NGS gsT, sponsoring agencies can deploy interpartner connections for bidirectional sharing of FASTA and FASTQ NGS Data files.

NGS TB Pipeline

NGS TB Pipeline grants access to, and utilization of, the WGS pipeline for *M. tuberculosis* developed by and for public health.

Public Health Reporting Solutions (ELR)

With just a *single onboarding*, laboratories gain access to electronic laboratory reporting and routing to nearly all public health agencies that accept HL7 v.2.5.1 and FHIR ELR. Our Expanded ELR service automates jurisdiction-specific validation and ensure the highest data quality reporting to public health surveillance systems.

Public health agencies that need onboarding or data validation support can also utilize this service to help onboard laboratories or testing facilities to their surveillance systems—and benefit from the validation and normalization of Expanded ELR.

Informatics Consulting

Datapult professionals have over 70 years of scientific, informatics, laboratory, data and public health experience. As an APHL company and through our partnerships, we have two centuries worth of experience and subject matter expertise. Areas of expertise include:

- Data standards
- Terminology
- Vocabulary mapping
- Informatics
- Bioinformatics
- IT project management, short and long-term
- Interoperability architecture assessments and improvement plans
- Data visualization
- Custom system integrations

Learn more at
DatapultAPHL.org



Contact us at
info@datapult.aphl.org

Join the Datapult
community on LinkedIn®
for insights, resources
and updates.



Connecting STEM Students to Environmental Laboratory Careers

By **Hunter Adams**, environmental laboratory supervisor, City of Wichita Falls, TX; **Cody Danielson**, assistant director, State Environmental Laboratory Services, Oklahoma Department of Environmental Quality; **Mui Koltunov**, research scientist supervisor, California Environmental Chemistry Laboratory; **Sydney Comet**, associate specialist, Environmental Health; and **Sarah Wright**, manager, Environmental Health Laboratories

Anyone working in environmental laboratories has likely experienced the shrinkage of available, qualified applicants in the last decade. While this has become a national trend, there are still plenty of qualified graduates for entry-level positions. Due to lack of visibility of environmental laboratories, environmental laboratory leaders need to proactively connect with universities, K–12 schools, the public and local communities to increase awareness of how laboratories not only protect public health and the environment,¹ but may also offer a meaningful career. The following case studies highlight how three environmental laboratories established proactive partnerships with local students to help ensure a steady stream of qualified candidates for open positions.

Oklahoma

Over the last decade, the **Oklahoma Department of Environmental Quality's (DEQ) State Environmental Laboratory** has developed a high school and college student outreach and internship program aimed at connecting students to environmental laboratory careers. The outreach program provides in-school presentations from the DEQ laboratory and other DEQ divisions on topics such as land protection and laboratory testing. About eight staff participate in this activity to help reach students that may want to apply to various DEQ internship programs. In the following week(s), students travel to the DEQ laboratory for a tour and lecture, which includes hands-on and behind-the-scenes information. These tours may allow students to test samples for *Escherichia coli* and/or to perform punch biopsies to get fish specimen samples, then use a direct mercury analyzer to measure mercury concentrations.

During these events, staff inform students of internship and career opportunities, provide staff contact information for



Royce Riessen, APHL specialist, and Camille Danielson, director of Environmental Chemistry Programs at the Wisconsin State Laboratory of Hygiene promote laboratory careers at the University of Wisconsin-Stevens Point career fair. Photo: University of Wisconsin-Stevens Point.

future conversations and accept resumes. Internships typically occur in the summer and the hours are very flexible, ranging from half a day per week to 30 hours per week, depending on the needs of the students, with a maximum of 999 working hours for paid internships. Interns can use the internship for their practical or curriculum-based projects. The internship program is funded through a fully budgeted scientist vacancy. Over the years, DEQ has hired many high-school, undergraduate and graduate students as interns. DEQ also budgets to hire interns as full-time employees if the fit is right. In the past decade, at least six interns have evolved into full-time employees.

California

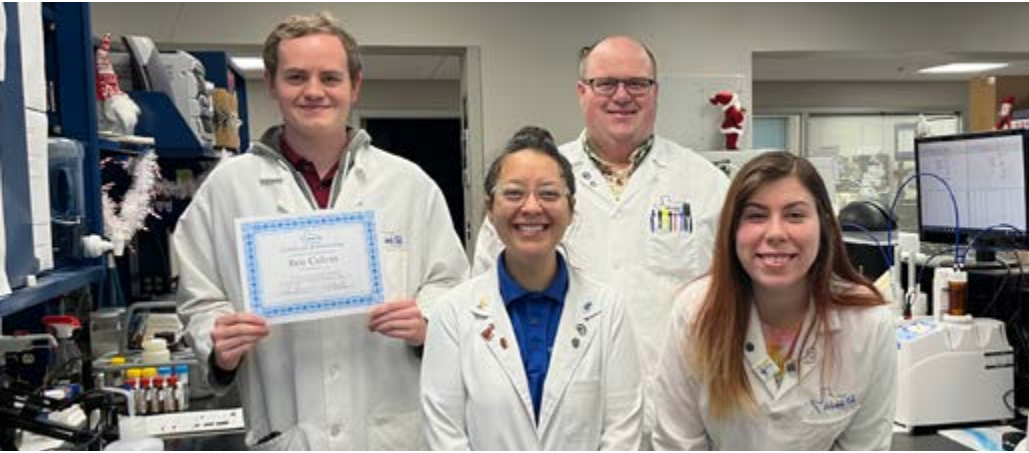
In 2018, the **Environmental Chemistry Laboratory (ECL) of the California Department of Toxic Substances Control (DTSC)** established the **Toxic Crusaders Program** to provide K–12 students with the opportunity to experience the inner workings of a government laboratory. Its goals are to expose students to an applied science in a professional laboratory, help them develop critical

thinking skills with respect to toxic chemicals in consumer products and the environment, and to teach them about DTSC and government careers. Since its inception, 357 students have participated in the annual six-week program. The program consists of five weekly hour-long **virtual workshops** where concepts are introduced to prepare students for laboratory work. In the sixth week, an on-site event gives students the opportunity to work alongside DTSC laboratory scientists to perform testing. For students who wish for more laboratory experience, unpaid internships are available.

Wichita Falls, TX

The **Cypress Environmental Laboratory (CEL)** has developed a multi-faceted partnership with **Midwestern State University (MWSU)** to expose students to laboratory science. Starting in the 1990s, CEL began providing MWSU environmental science degree program internships. In the last decade, offerings have expanded to biology, chemistry and humanities students. To help broaden all students' understanding of laboratory science post-graduation opportunities, annual lectures have been held since 2019 at MWSU's student **American Chemical Society** chapter and/or for the Chemistry Seminar capstone class.

Most recently, CEL staff have worked with MWSU to add a water-related chemistry degree track and an annual regional environmental workshop, both set to start in 2024. The workshop includes several City of Wichita Falls environment-related departments, as well as local employers, such as a hydrogen plant, **Texas Parks and Wildlife**, **US Department of Agriculture** and **Texas Tech University**. Students hear from 12 speakers throughout the day, in addition to brief MWSU professor lunch talks on their environmental research. Costs have been minimal for these different activities, aside from the city of Wichita Falls budgeting around \$25,000



CEL Staff Sam Reeder, Hunter Adams and Emily Appleton recognize Ben Colvin upon completion of his internship. Photo: Cypress Environmental Laboratory

per year for paid interns, with a maximum of 240 hours for undergraduates and graduate students. Connecting with many students through the variety of CEL-MWSU activities has been critical to CEL's staffing. It has proven so successful that all current laboratory technicians are former interns.²

Environmental laboratories protect public health and the environment. To maintain

a steady stream of qualified applicants, they must establish proactive programs to connect their important work to university and high school students to show them that this industry involves exciting and impactful careers from all areas of life and physical sciences.^{3,4} If you have questions, please contact [Hunter Adams](#) or [Sarah Wright](#). ■

References

1. Adams H, Morin E, Rhode S, Turner E, Golden Z, O'Neal T, Olund S, Wangsness K, Friedman D, Sanderson A, Bradshaw R, Randolph R, Robb K, Hansen K. (2022a). The Vital Role of the Environmental Laboratory as Public Health Laboratories. *Water Environment & Technology*. 34(2): 32-37. https://www.researchgate.net/publication/359017071_The_Vital_Role_of_the_Environmental_Laboratory_as_Public_Health_Laboratories
2. Adams H, Reeder S, Appleton E, Thomas D, Southard M. (2022b). Industry Workforce Development: The Value of Internships. *Journal AWWA*. 114(7): 54-61. <https://doi.org/10.1002/awwa.1961>
3. Adams H, Morin E, Holloway N, Cottrell A, Thames B, Gillis L, Wangsness K, Loudon J, Wright S. (2023). The Future Workforce of the Environmental Laboratory. *Journal AWWA*. 115(3): 8-17. <https://doi.org/10.1002/awwa.2067>
4. Adams H, Reyes D, Ganegoda S, Thames B, Gillis L, English Z, Thomas D. (2024). Developing an Effective Environmental Laboratory Workforce. *Journal AWWA*. 116(2): 54-60.

Strategies to Make Connections

Laboratories may consider applying one (or several) of the following methods to connect with science, technology, engineering and math (STEM) students.

- **Social media:** make "A Day in the Life" posts on Instagram, X or TikTok to highlight a typical day in an environmental laboratory.
- **Advertisements:** newsletters, blogs, virtual flyers or posters can help to share the exciting work environmental laboratories do daily.
- **Outreach:** contact local high schools and universities to participate in laboratory tours, post job openings and join career fairs, which are a great place to advertise public health and environmental laboratories and to get to know interested students.

APHL can provide other promotional materials through the [Public Health Laboratory Ambassador Program](#), which gives APHL members access to outreach toolkits, flyers and presentations for career fairs, and a forum to share and discuss resources with other laboratory ambassadors.

- Consider applying to be a mentor to APHL's [internship](#) or [fellowship](#) programs. APHL has funding and resources available to host laboratories involved in this program.
- View [APHL's STEM Recruitment Toolkit](#) for more information and examples on how to connect with students.

APHL Makes an Impact at ASLM 2023

By Britnae Purdy, associate specialist, Global Health; and Lucy Maryogo-Robinson, director, Global Health



APHL country directors with APHL CEO Scott Becker, Global Health Director Lucy Maryogo-Robinson, and Global Health Deputy Director Sherrie Staley.

The African Society for Laboratory Medicine (ASLM) 2023 conference was held in Cape Town, South Africa from December 12–15. Leaders and researchers in laboratory practice from around the world gathered to address

this year's theme, "Shaping Laboratory Systems and Diagnostics Services for the 21st Century: Embracing the Change." APHL was well-represented at the conference, with staff members moderating plenaries, presenting posters and delivering oral presentations. APHL staff also facilitated two pre-conference workshops on data modernization and the [Global Laboratory Leadership Programme \(GLLP\)](#).

As the conference's keynote speaker, John Nkengasong, PhD, MSc, ambassador-at-large, US Global AIDS Coordinator and Senior Bureau Official for Global Health Security and Diplomacy, emphasized the importance of laboratory science in mitigating and managing outbreaks of

the 21st century. Nkengasong spoke of more frequently occurring outbreaks, noting with irony that the last time he spoke to this group at ASLM 2018, he was marking the 100th anniversary of the 1918 flu pandemic. He also addressed the importance of genomics and precision medicine for the future, while also highlighting challenges related to antimicrobial resistance and artificial intelligence.

"The conference provided an important opportunity for APHL to showcase key initiatives that we are supporting as well as for us to learn about the work our colleagues are implementing around the continent," said Lucy Maryogo-Robinson, who also serves as an ASLM board member. "I am proud of how ASLM is contributing to strengthening laboratory systems across Africa." ■

The production of this article was supported by Cooperative Agreement #NU2HGH000080, funded by the US Centers for Disease Control and Prevention (CDC). Its contents are solely the responsibility of the authors and do not necessarily represent the official views of, nor an endorsement by, CDC, HHS or the US Government.

NEW PUBLICATION

Assessing Polysubstance Overdoses: An Expanded Biosurveillance Strategy for Public Health Practice

In response to the evolving nature of the overdose epidemic, this publication expands into polysubstance use, beyond opioid overdoses. This comprehensive guide covers collaboration and outreach, analytical considerations, and data management, dissemination, and interpretation for polysubstance biosurveillance programs.

Assessing Polysubstance Overdoses: An Expanded Biosurveillance Strategy for Public Health Practice is a successor to the *Model Opioids Biosurveillance Strategy*.

Visit www.aphl.org/publications to access this guide and other related resources!



Alabama Hosts In-person *Mycobacterium tuberculosis* Diagnostic Workshop

By Sharon Massingale, PhD, HCLD/CC(ABB), director, Alabama Department of Health, Bureau of Clinical Laboratories; and Erin Estes, MBA, MLS (ASCP)^{CM}, specialist, HIV, Viral Hepatitis, STI and TB

In early December 2023, 19 public health laboratorians from across the United States gathered at the **Alabama Department of Public Health, Bureau of Clinical Laboratories** (ADPH BCL) to attend the *Mycobacterium tuberculosis*: Diagnostic Principles and Procedures Workshop. APHL facilitated this training in collaboration with the **US Centers for Disease Control and Prevention's** (CDC), Division of Tuberculosis Elimination (DTBE) and ADPH BCL. Intended for laboratorians with a minimum of one year of experience in a laboratory that identifies *Mycobacterium tuberculosis* complex (MTBC), this course further educated participants on diagnostic MTBC principles and procedures.

Although the workshop has been held in various iterations, 2023 marked the first workshop held since 2019 and the first, in many years, that it was held outside of CDC's Atlanta campus. When APHL and CDC asked, ADPH BCL Director Sharon Massingale, PhD, HCLD/CC(ABB), and her staff were ready and willing to host the workshop. In 2020, ADPH BCL moved from Montgomery to a newly constructed facility in nearby Prattville. The modern and thoughtfully designed space is a laboratorian's dream, and the workshop showcased the facility's wonderful functionality. The main clinical laboratory building includes a training laboratory that accommodates up to 12 students. Behind the main building, the Training Center and Administrative Annex houses a large conference room where workshop lectures were held.

Returning to Hands-on Training

Lectures focused on specimen processing, nucleic acid amplification testing, identification (ID) of mycobacteria utilizing matrix-assisted laser desorption ionization-time of flight mass spectrometry (MALDI-MOF MS), growth-based and molecular drug susceptibility testing, laboratory safety, next generation sequencing methods, testing method validations and the epidemiology of tuberculosis. Workshop faculty included



Workshop participants get hands-on experience in the ADPH BCL training laboratory. Photo: Erin Estes

Stacey Hall, Emily Dean and Hannah Mims (ADPH program staff); Latricia Lewis (**Houston Health Department, Bureau of Laboratories**); Jolene Vanneste (**Michigan Department of Health and Human Services**); Kathleen Milloy (**Virginia Division of Consolidated Laboratory Services**) and CDC DTBE staff.

In a hands-on session conducted in the training laboratory, participants prepared, tested and analyzed samples using MALDI-TOF MS procedures. Many public health laboratories perform MALDI-TOF MS for bacterial identifications, making this platform a good option for mycobacteria ID. When using MALDI-TOF MS for ID of mycobacteria, additional inactivation and extraction steps are required for safe and accurate testing. Time spent in the training laboratory practicing procedures, with access to public health faculty who currently perform this testing, provided the

opportunity for participant questions to be answered.

Forging Learning Connections

In addition to structured learning, this workshop created an environment that allowed public health laboratorians the opportunity to network and engage with one another. Each participant was asked to prepare a short presentation highlighting a unique case or situation encountered at their laboratory. In a "Speed Algorithms" session, participants met with other participants to discuss their laboratory's MTBC testing algorithm. Collaborative sessions helped to facilitate sharing of knowledge important for participants' learning and for bringing this information back to their respective laboratories.

The hospitality of ADPH was amazing from start to finish, and the facility provided a great location for the workshop. Faculty and participants spent the week learning and building connections that will continue to strengthen public health laboratory diagnostics for years to come. The engagement of participants throughout the course, from questions of faculty to group dinners and networking, establishes how beneficial and important in-person training workshops are for continued strengthening of the public health laboratory workforce. ■



Workshop faculty and participants grab some fresh air during a break. Photo: Erin Estes

The Use of Intermediaries to Facilitate ETOR for Public Health

By Rachel Shepherd, senior specialist, Informatics



The nation depends on public health laboratories to conduct critical and complex tests to keep our country safe from emergent threats, environmental contaminants and food-borne illnesses. Electronic Test Orders and Results reporting (ETOR) allows laboratories and health care providers to exchange information across different facilities and information systems using agreed upon standards. Accurate data and efficient turnaround time for results is crucial. The sooner laboratories receive and process test orders, the faster they return results. This timeliness is essential for surveillance, outbreak and public health emergency response, and early intervention, improving patient care.

The **US Centers for Disease Control and Prevention** (CDC) identified ETOR as a priority for public health laboratories and is facilitating the use of two ETOR intermediaries—**APHL's Informatics Messaging Services** (AIMS) and CDC's ReportStream—to support this effort. The intermediary approach takes the burden off laboratories to develop their own disparate technical solutions and allows them to plug into existing infrastructure—leveraging and sharing

the tools, resources and technical expertise to achieve ETOR nationwide. 2023 marked the first year of initial implementations via an intermediary, establishing ETOR for newborn screening between selected public health laboratories and their healthcare partners.

A Centralized and Shared Solution

The core tenet of the ETOR intermediary approach emphasizes reusability and agility, relying on centralization of infrastructure, technical tools, partner connectivity, accessible knowledge and expertise. This solution reduces the need for data exchange expertise at the laboratory and removes the burden from public health laboratories, with technical architects developing the routes and connections that a laboratory would otherwise have to independently build over time. It allows the provider and laboratory to send and receive orders and results in their preferred or native formats, with the mapping and translation happening in the intermediary. ETOR will shift the burden and cost of hiring and retaining

specialized implementation experts, securing, monitoring and maintaining infrastructure, and 24/7/365 support from each individual public health laboratory to an intermediary for centralized management. The suite of services available to users will greatly reduce manual processes like vocabulary mapping and terminology maintenance.

Public health laboratories have struggled for decades to build IT infrastructure to implement ETOR. Typically, laboratories adopt one-off solutions that must be re-implemented and maintained for each unique partner. Laboratories must independently procure the right tools and services, build and maintain the infrastructure, and engage partners and vendors. Currently, every time a public health laboratory wants to bi-directionally exchange data with another entity they must create a unique connection. This involves setting up transformations and translations to accommodate their partner's specific requirements, essentially recreating the wheel each time.

The ETOR intermediary approach addresses the challenges faced by public health laboratories: limited

workforce capacity and expertise, partner engagement, and long-term operation and maintenance. The issues associated with disjointed ETOR approaches will be mitigated by national and centralized intermediary solutions. Intermediaries improve the technical expertise, infrastructure, and resources available to public health laboratories, while removing the burden of building their own independent workforce, infrastructure and solutions with varying degrees of success.

Newborn Screening: A First Use Case

The first year of implementation for the ETOR intermediaries focused on establishing ETOR for newborn screening (NBS) between selected laboratories and their healthcare partners. Approximately 4 million babies in the United States

are screened every year for several rare conditions. Although the panels vary slightly by state, the overwhelming impact is the same—most of these potentially fatal conditions are treatable when detected early. When delays can be deadly or devastating, the ability for a healthcare provider to seamlessly connect to the public health laboratory responsible for conducting the newborn screening test is paramount. But many healthcare providers still submit NBS orders via mail and receive results by fax; these manual methods require duplicative data entry, increasing the likelihood of human error and inaccuracies. These manual methods are time-consuming, error-prone, and delay the availability of results. When healthcare providers and their public health laboratory partners establish ETOR, they ensure that test orders and the affiliated data will be sent to the

laboratory as soon as it is populated into the patient's chart. The laboratory can begin to schedule, track and prepare for accessioning the sample that they know is on its way. When the test is complete, the results are sent back electronically in near real time, ensuring that potentially life-saving information is in the hands of those who need it to take action as soon as possible. ■



ABSA
INTERNATIONAL
The Association for Biosafety and Biosecurity

67th Annual Biosafety and Biosecurity Conference

JW Marriott Phoenix Desert Ridge • Phoenix, Arizona

November 1-6, 2024

Conference Highlights

- Three full days of intensive professional development courses to educate and inspire
- Three full days of state-of-the-art keynotes, papers, and panels highlighting best practices and hands-on skills crucial for today's biosafety and biosecurity professionals
- Exhibits showcasing the latest in laboratory biosafety and biosecurity products and services
- Invaluable networking opportunities to share and learn from other biosafety and biosecurity professionals

www.absaconference.org



ABSA International is a P.A.C.E.® Authorized Provider

Embracing Evolution: Navigating Changes to the Laboratory Response Network

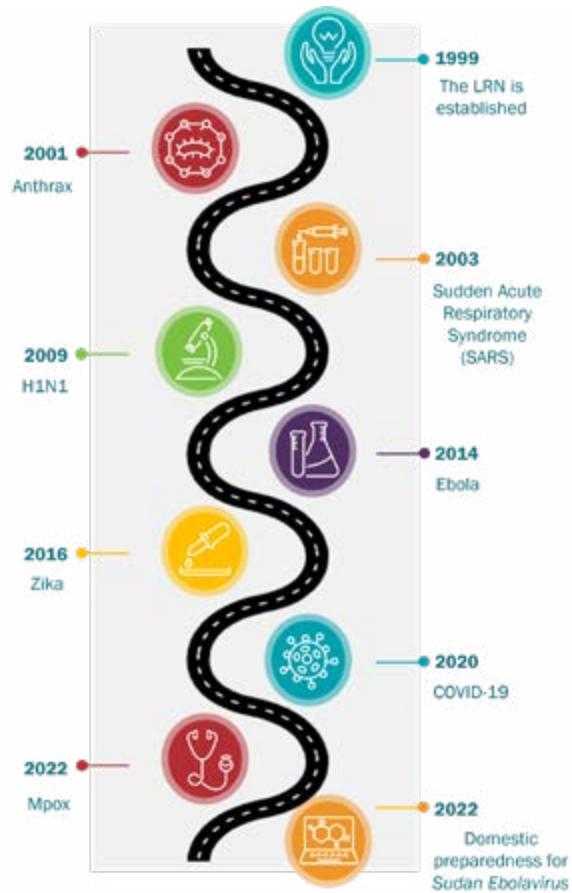
By Rana Rahmat, specialist, Laboratory Response Network

Change is the harbinger of growth. It is the driving force behind innovation, igniting sparks of creativity that give rise to novel ideas and solutions. By embracing change, we not only bolster our resilience but also equip ourselves to adapt to the unforeseen challenges life may present. It is through change that we discover limitless potential. And to embrace change is to promote resilience, to enable adaptation to unforeseen challenges.

In 1999, the **US Centers for Disease Control and Prevention (CDC)**, along with **APHL** and the **Federal Bureau of Investigation (FBI)**, established the **Laboratory Response Network (LRN)** as the nation's response system for biological (LRN-B), chemical (LRN-C) and radiological threats. Since its inception, the network has responded to a variety of threats, such as the anthrax scare in 2001, the Zika outbreak in 2016 and, more recently, the mpox outbreak of 2022.

Embracing Change

Since 1999, significant transformations of the LRN have unfolded, one of the most recent being the comprehensive restructuring of CDC under the **"Moving Forward"** initiative. The restructuring plan aims to transform the agency through refining and modernizing its operations to address longstanding issues. Some core areas of improvement include modernizing data, prioritizing public health communications, promoting results-based partnerships and developing a diverse workforce that is prepared for future emergencies. Amidst this evolution, the LRN-B stands at the forefront of adapting to the changing landscape. As the LRN embarks on its evolution to the next iteration, it is imperative to recognize the vast strides made in testing methodologies and technological innovations over the two decades since its inception. An



opportunity now presents itself for the LRN-B to adapt these cutting-edge tools to tackle emerging infectious diseases and biological threats by anticipating challenges and integrating state-of-the-art resources into the very foundation of the LRN-B.

The profound lessons learned from the challenges posed by the COVID-19 pandemic and mpox responses underscore the critical need for a vigilant and adaptive LRN-B. These experiences have illuminated the reality that emerging infectious threats are an ever-present concern, and that traditional diseases can resurface in unexpected ways. To meet the challenges presented by these responses, the LRN-B

must evolve concurrently: embracing innovation and meticulous preparedness is paramount to its success.

Adapting to New Challenges

The dynamic nature of the LRN-B underscores its adaptability to evolving challenges in the realm of biothreats and emerging infectious diseases. Potential changes to the LRN-B encompass a refined definition of these threats and the responsibilities of the network, and diversifying the array of potential threats the network addresses. Furthermore, the changes may extend to the structure of the LRN-B "pyramid" and how the tiers interact to fortify the network's overall response capabilities. These, along with any other proposed changes, reflect a proactive approach to enhancing the LRN-B's agility and effectiveness in safeguarding against a rapidly changing landscape of biological hazards.

We are presented with a unique opportunity to reshape the LRN-B into a more resilient and advanced network with the capability to respond to more than just its traditional biothreats. By leveraging cutting-edge technologies, fostering collaborations and partnerships, and fortifying current capabilities, a robust defense against future health crises can be created. The proactive restructuring of the LRN serves as a testament to the commitment of safeguarding national and global well-being—ensuring that the network is not just responsive to, but anticipatory of, evolving public health threats. ■

Advancing Biosafety and Emergency Preparedness Through Fellowship Initiatives

By **Stormy Chester**, specialist, Biosafety and Biosecurity; and **Jill Sutton**, specialist, Emergency Preparedness and Response

Public health laboratory fellowships help aspiring professionals bridge the gap between their academic knowledge and real-life experience, preparing them for diverse career opportunities in laboratory science while also contributing to the public health laboratory workforce.

In 2021, APHL received American Rescue Plan funding from the **US Centers for Disease Control and Prevention (CDC)** to expand the **Public Health Laboratory Fellowship Program: an APHL-CDC Initiative**, which educates and trains fellows through a competency-based core curriculum while fostering their skills and scientific knowledge in a specific laboratory science focus area. The Public Health Laboratory Fellowship Program now supports nine laboratory science focus areas, two of which aim to enhance public health preparedness: biosafety and biosecurity, and emergency preparedness and response.

Biosafety and Biosecurity

The Biosafety and Biosecurity Fellowship, formerly known as the Biorisk Management Fellowship, was launched in fall 2022 to support initiatives related to strengthening laboratory safety, biosafety and biosecurity.

Since the fellowship's inception, four fellows have been placed across four state public health laboratories and one of those fellows secured a full-time position. Projects undertaken by the fellows include assisting with the implementation of the **International Organization for Standardization (ISO) 35001:2019** standard, conducting risk assessments and gap analysis of diagnostic testing activities, performing root-cause analysis and mitigation of accidents, collaborating with biosafety officers on annual safety trainings, and creating an instructional video on donning and doffing air purifying

respirators for new public health laboratory employees.

APHL remains committed to expanding the biosafety and biosecurity laboratory workforce by promoting this fellowship opportunity at universities and national conferences, and encouraging additional public health, clinical and academic laboratories to become mentors for future fellows.

Emergency Preparedness and Response

At the start of 2024, APHL added Emergency Preparedness and Response as a new area of focus to the Public Health Laboratory Fellowship Program to grow and prepare the next generation of scientists for careers involving emergency management and public health laboratories, and support initiatives that aim to strengthen laboratory preparedness and response for all-hazard threats.

The new fellowship is an opportunity to not only bolster the public health laboratory workforce, but fellows also undertake a project proposed by their host laboratory, which can help resource laboratory preparedness initiatives, such as making testing more accessible in rural and underserved areas during large scale outbreaks. Recent public health emergencies, like COVID-19 and mpox, demonstrated the impact that the availability of testing has on the public's health, and laboratory preparedness initiatives—like mobile testing—that strengthen how public health responds is invaluable to underrepresented communities, especially during emergencies.

The APHL-CDC Public Health Laboratory Fellowship Program focus areas of biosafety and biosecurity and emergency preparedness and response strive to provide fellows with real-world and experiential learning opportunities and to help recruit, train, educate and retain the public health laboratory workforce. Applications are currently being accepted and reviewed on a rolling basis. We encourage qualified individuals and eligible laboratories that are enthusiastic about enhancing laboratory preparedness in biosafety and biosecurity and emergency preparedness and response to apply now.

For more information on how to apply to become a fellow or mentor, please visit the **APHL-CDC Public Health Laboratory Fellowship Program website**. ■



Association of Public Health Laboratories
7700 Wisconsin Avenue
Suite 1000
Bethesda, MD 20814

APHL Sustaining Member Program

The following corporations partner with APHL to support the nation's public health laboratory system.

Diamond Partners



Platinum Partners



Gold Partners

