MDH Minnesota Department of Health

PUBLIC HEALTH LABORATORY

ANNUAL REPORT

fiscal year 2016

Table of Contents

Newborn Screening 04

Environmental Laboratory 08

Infectious Disease Laboratory 12

Director's Office 16

Emergency Preparedness and Response 18

Laboratory Performance and Budget 22

1

Message from the Director

Dear Reader,

Fiscal Year 2016 (July 1, 2015-June 30, 2016), was an eventful year in the Public Health Laboratory (PHL), but then again, so is pretty much every year. An emerging infectious disease once again dominated the national (and international) news headlines, and much of the activities of the Infectious Disease Laboratory were devoted to responding to the Zika virus outbreak. And though outbreak response is a critical PHL function—and deserves to be in the limelight—many PHL activities are invisible to the public, yet are equally important to protecting the health of the public. The goal of this annual report is to shine a spotlight on a subset of the mission-critical activities of the PHL, such as infectious disease activities (including, but not limited to Zika virus), environmental testing, and newborn screening.

In addition to our Zika response (pg. 14), the Infectious Disease Laboratory embarked on a Herculean quality improvement effort (pg. 13) to catalog their entire specimen collection. This project took many months and involved a large number of volunteers—myself included—to go through our freezers, vial by vial. I can attest to the fact that -80° C is really cold, and even wearing protective gloves, there is a limit to the amount of time that you can handle the frozen vials without incurring bodily damage.

The Environmental Laboratory shares Minnesota's response to perfluorochemical (PFC) contamination in groundwater (pg. 8). The article includes a detailed timeline that begins with the synthesis of PFCs in the 1940s and continues through 2016 and beyond, providing a fascinating glimpse of the time and effort involved in assessing and responding to persistent environmental contamination. Testing conducted by the PHL over a span of many years was critical to defining the extent of the PFC contamination in groundwater, characterizing the exposure in humans, and monitoring the public health interventions that have led to reduced exposures in impacted Minnesota residents.

When it comes down to it, everything we do at the PHL is done in support of MDH's mission of protecting, maintaining, and improving the health of all Minnesotans. And so it makes sense to go to the people to let them tell you about how the PHL has impacted their lives. Newborn Screening did exactly that with their MinneStories initiative (pg. 6). This project involved recording the stories of Minnesota families impacted by the Newborn Screening Program. In FY16, 14 interviews were recorded, some of which are posted to our website with more on the way. I encourage you to listen to these stories. You will hear the emotions, challenges, and triumphs that these families experience after their child was diagnosed with one of the disorders on the Newborn Screening Panel.

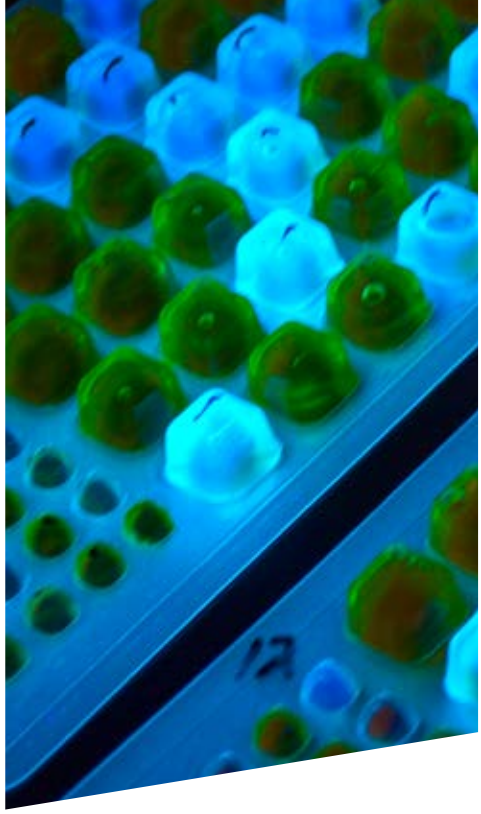
Space precludes me from highlighting the other, equally important activities in this annual report, so I encourage you to explore our additional stories in the following pages.

Joanne M. Bartkus

Joanne Bartkus, Ph.D.
Public Health Laboratory Director

2

At a Glance



385

MINNESOTA NEWBORNS IDENTIFIED WITH A DISORDER THROUGH NEWBORN SCREENING

139,359

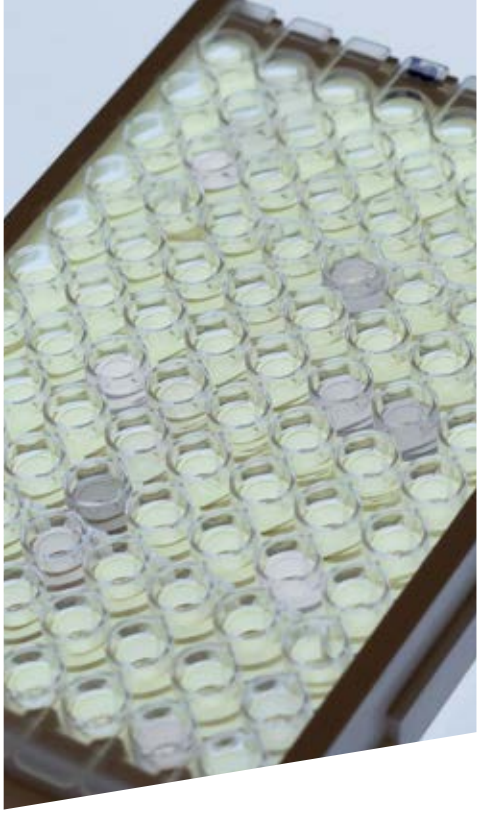
ENVIRONMENTAL AND BIOMONITORING TESTS PERFORMED TO IDENTIFY TOXIC CHEMICALS

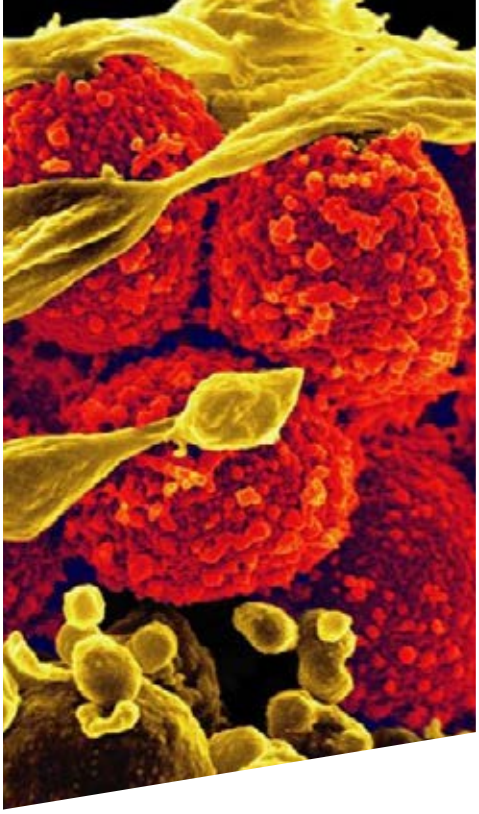
GLOSSARY: Acronyms you may find in this report

Acronym	Meaning
CDC	Centers for Disease Control and Prevention
EPA	Environmental Protection Agency
FDA	Food and Drug Administration
MDH	Minnesota Department of Health
MPCA	Minnesota Pollution Control Agency
PFC	Perfluorochemical
PHL	Public Health Laboratory
TB	Tuberculosis

PHOTO CREDIT

Front cover: Amanda Ellefson, Meghan Pate Photography, Stephanie Peterson
This spread: Meghan Pate Photography, Amanda Ellefson, Chaco Dunbar, Courtney Demontigny, National Insititutes of Health
Back cover: Chaco Dunbar, Stephanie Peterson, Chaco Dunbar





128,750

TESTS PERFORMED TO IDENTIFY INFECTIOUS DISEASE TRENDS AND OUTBREAKS

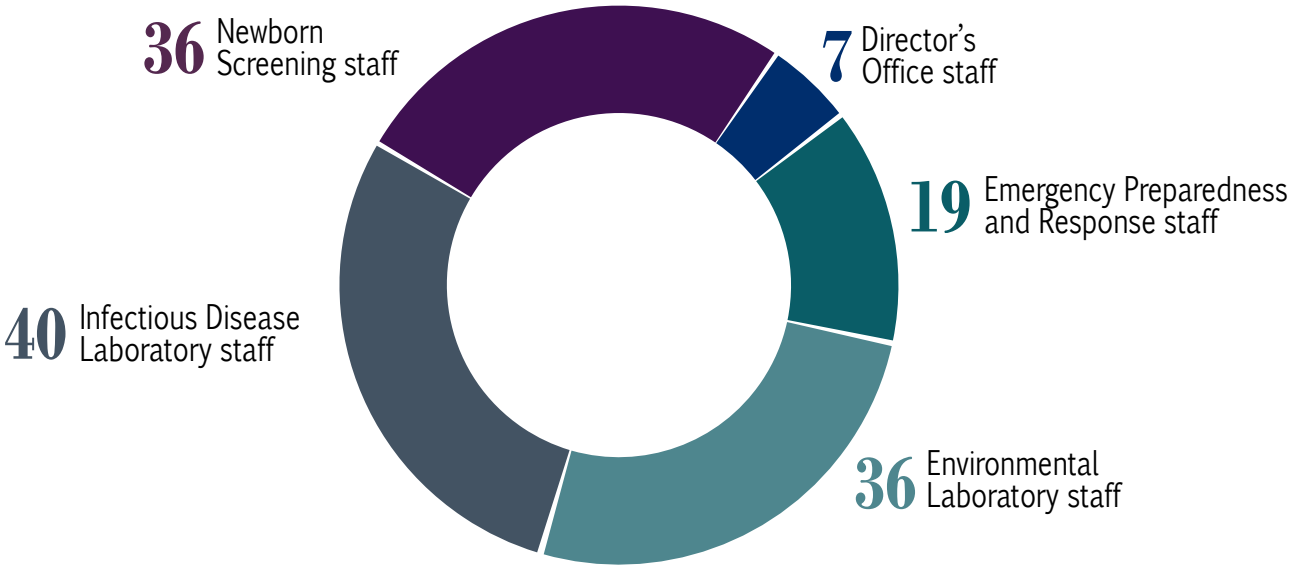
21

TRAININGS PROVIDED BY PHL STAFF TO EXTERNAL STAKEHOLDERS

38

RARE, HIGHLY INFECTIOUS BACTERIA IDENTIFIED WHICH PROMPTED EARLY TREATMENT

PHL staff by program



Does not include contractors

Newborn Screening

Minnesota Newborn Screening screens infants at birth for over 50 serious disorders, including hearing loss and critical congenital heart disease (CCHD). Newborn screening aims to identify disorders before symptoms appear so that affected infants can receive prompt diagnosis and treatment to prevent serious health problems, developmental delay, or death.

Almost every day, our program identifies an infant with one of these health conditions. For a complete list of the disorders on the Minnesota Newborn Screening Panel, visit www.health.state.mn.us/newbornscreening/materials/factsheets/disorderpanel.pdf.

PHOTO CREDIT
Section photo: Meghan Pate Photography
MinneStories story photos: Chaco Dunbar, Sondra Rosendahl
Sickle cell story photo: Chaco Dunbar

Saving Lives: Greater Efficiency Increases Impact of Screening

In August 2015, the Minnesota Newborn Screening lab purchased three Genetic Screening Processor (GSP®) instruments to increase efficiency and reliability and improve the quality of newborn screening in Minnesota. The three GSPs® replaced four older instruments and now run six different assays for five different conditions. GSPs® are fully automated and decrease sample turnaround time, providing faster results for those who need it most—Minnesota newborns.

Time is of the utmost importance for many of our newborn screening conditions. In the case of galactosemia, a condition where milk—including breast milk—is toxic to newborns, an infant can appear completely healthy at birth and slip into a coma a few days later. This is just one example of the many conditions where our new GSPs® provided greater efficiency and decreased turnaround time to save lives.

Not only are GSPs® faster, they use smart technology to increase reliability. GSPs® reduce human error through use of barcodes to track each specimen, plate, reagent, and control. Quality checks are integrated into the GSP® software that monitor the quality of the assay itself, alerting analysts when there might be an unreliable reading from a certain well due to a variety of issues. This allows laboratory staff to repeat specimens and ensure that only the most reliable results are reported. Working in tandem with the GSPs® are our new Panthera™ 9 Punchers (purchased FY15). Panthera™ 9s® use smart technology to guarantee that the best blood spot is taken from each specimen and as it punches the filter paper the Panthera™ 9® simultaneously assigns a barcode from the specimen to each specimen in each plate. This information is coupled with the GSPs® which means from the specimen paper to the end of the assay run on the GSP®, each specimen can be identified that from beginning to end. Because the GSPs® are automated they have increased the efficiency for the lab and have allowed staff time to complete additional lab work.

4 newborns were identified with newborn screening conditions by the GSPs®

Approximately one in 30,000 newborns is born with galactosemia.

MinneStories: Stories of Resilience

During the winter of 2016, the Newborn Screening program began a new initiative called MinneStories. Trained by StoryCorps, Newborn Screening staff record conversations between two people to preserve the stories of Minnesota families impacted by newborn screening. The recording is then edited down to a short 3-5 minute audio clip which is shared on our website. Between January and June of 2016, we recorded 14 interviews. This is an ongoing initiative and we continue to record additional stories.

Every family has a unique story to tell. Conditions that are identified via newborn screening are so rare that it can be difficult for newly identified families to find others with shared experiences. With the help of our external partners, we are identifying families who are willing to share their stories to provide knowledge and understanding to families with a newly diagnosed child.

The goal of MinneStories is to provide families the opportunity to build community and support through common experiences and provide newly identified families with some perspective of the future. Families who may have only recently received a diagnosis can listen to a story in our MinneStories collection and find comfort in a family story with which they can relate or which can project a positive reflection on what may currently be a stressful and confusing time. While many of the conditions on our testing panel are rare and different, there is common ground in the uncertainty faced by families who learn of their newborn's diagnosis. They understand that their child will face some challenges in life, be it diet, activity, learning. These are the everyday aspects of living with a rare condition—a challenge they weren't expecting with the birth of their child. The availability of these individualized stories, these MinneStories, provide these new families with a broader community of strength and resilience.

> **"CF is a part of our life. It's not taking over our life. And we're not going to let that happen."**
> **Ashley**

MinneStories participants are recorded in pairs, and can include a variety of participants, such as parents, children, siblings, caregivers, providers, friends. A non-scripted, free-flowing conversation between participants is the aim of each recording session. If you would like to participate in our MinneStories project, please contact Maggie Dreon at Maggie.Dreon@state.mn.us.

To listen to audio clips in our MinneStories collection, please go to: minnestories.mn.gov.

Isoelectric focusing is used to seperate hemoglobin on a gel to test for sickel cell disease and trait

Successful Sickle Cell Trait Notification Expands to Include Additional Hemoglobin Traits

Following the success of last year's new sickle cell trait notification process, the Minnesota Newborn Screening program expanded the notification process to include the remaining hemoglobin traits that are identified through newborn screening. With the expansion, the parents of over 1,100 Minnesota newborns identified with a hemoglobin trait now have a better opportunity to understand what this trait result means for themselves and their family. This increased educational effort has the potential to reduce the public health burden of hemoglobinopathies (e.g. sickle cell trait), increase parental understanding, and increase health equity in communities of color as hemoglobinopathies are almost exclusively found in communities of color.

Parents who had received notification of their newborn's sickle cell trait status through the newly implemented approach were invited to participate in focus groups to discuss their experience. Their opinions, along with quality metrics, helped us determine that our sickle cell trait notification process was of benefit to parents and providers. This encouraged our program to expand the notification process to include hemoglobin traits E, D, C, and other variants identified via our screening method.

Hemoglobin traits are more likely to occur in individuals descending from areas that historically had high levels of malaria (e.g. West Africa, India, Southeast Asia, etc.) thus many families provided with notification are from ethnic/racial minorities. Hemoglobin trait communication is an important part of responsibly reporting incidental findings on the newborn screen. By providing information directly to these families, they are able to make informed decisions that impact themselves and their families, and further empower their community.

Environmental Laboratory

The Environmental Laboratory protects the environment—and by extension, Minnesotans—by performing chemical, bacteriological, and radiological analyses of environmental samples including drinking water, surface water, waste water, air, soil, and hazardous waste. These testing services, which work to keep Minnesotans healthy and safe, are provided to programs at the county, state, and national level. The laboratory also develops new tests for detecting contaminants of emerging concern and measuring human exposure to environmental hazards throughout the state.

Water filtration plant in Minnesota

Minnesota's Response to Perfluorochemical Contamination in Groundwater

A major responsibility of our lab for the past decade has been the analytical support of programs responding to perfluorochemical (PFC, also known as PFAS[1]) contamination in the East Metro and around Minnesota. We have analyzed over 12,000 water samples since we began analysis in 2004, performed several rounds of biomonitoring, and tested produce and soil samples from East Metro gardens.

Minnesota's work with PFCs began in 2003. Minnesota began testing groundwater for PFC contamination in order to identify sources of exposure as well as ways to reduce or eliminate PFC exposure in our communities. PFC groundwater contamination became a national concern in 2016 following the results of the EPA's Unregulated Contaminant Monitoring Rule 3 (UCMR3), which identified many contaminated sites around the country. Due to Minnesota's well established PFC program, we have been able to provide advice and support to those states that are dealing with this issue for the first time.

1940s
PFCs are a group of synthetic chemicals that have been used since the 1940s to make products that are resistant to heat, oil, stains, grease, and water—examples include nonstick cookware, stain-resistant fabrics and carpets, coating on food packaging, and components of fire-fighting foam

1956 3M begins using East Metro landfills for PFC waste

1974
3M begins using an incinerator to dispose of all PFC waste

2000
3M begins phase out of perfluorooctane sulfonate (PFOS) and perfluorooctanic acid (PFOA)

2002
Minnesota Pollution Control Agency (MPCA) learns of PFC-contaminated drinking water at 3M's production facility and begins an investigation

3M completes its phase out of PFOS

2003
MPCA discovers PFCs in groundwater at and near former waste disposal sites

2004
MPCA and MDH discover PFC contamination of East Metro drinking water sources and begin investigating the extent of the contamination

A municipal water supply tests positive for trace amounts of PFOS and PFOA

2004-Present Ground and Drinking Water Monitoring

In 2004, groundwater analysis from a 3M disposal facility in Washington County indicated PFC contamination in groundwater and private drinking water wells. Additional testing in 2005 revealed PFC contamination in several other municipal wells serving the city of Oakdale. In response, the city of Oakdale began to limit the use of many of the contaminated wells. In 2006, granular activated carbon filters were installed on the Oakdale municipal water system to prevent further exposure to people drinking water from the system. Following municipal well sampling, in 2007, testing began on over 1600 residential well samples from the East Metro and found that PFCs were present in many of the samples. Residents received bottled water and filtration units to provide safe drinking water for their homes.

Through our testing and analysis, the Minnesota Pollution Control Agency (MPCA) was able to use the resulting data to support their initiatives to protect Minnesota citizens from PFC contamination. Our data also aided in mapping the aquifer areas to determine which PFCs were present in water, where, and in what concentration. This can help determine other areas to monitor, as well as how the PFCs have travelled through our aquifer. In collaboration with MPCA and the Minnesota Department of Health's Environmental Health Division, we continue to test over 1000 samples per year from municipal systems, houses, private wells, and source water.

[1] Referring to these compounds as perfluorochemicals (PFCs) is being phased out and replaced by perfluoroalkyl and polyfluoroalkyl substances (PFAS).

2005
MDH begins frequent measurement of PFC levels in the municipal water supply and holds public meetings to update the affected communities on the groundwater investigation and address concerns

2006
3M funds the purchase of a water filtration system and this new operation begins for the affected municipal water supply and hookups for households with contaminated private wells

MDH, MPCA, and local officials hold a public meeting to update residents

The EPA, in collaboration with eight major corporations that develop or use PFCs, launched the 2010/2015 PFOA Stewardship Program to officially put a stop to environmental release of PFCs and related compounds, working towards fully eliminating PFC emissions and product content by 2015

2007
MDH issues revised Health-Based Guidance for drinking water advisories which affects more residents

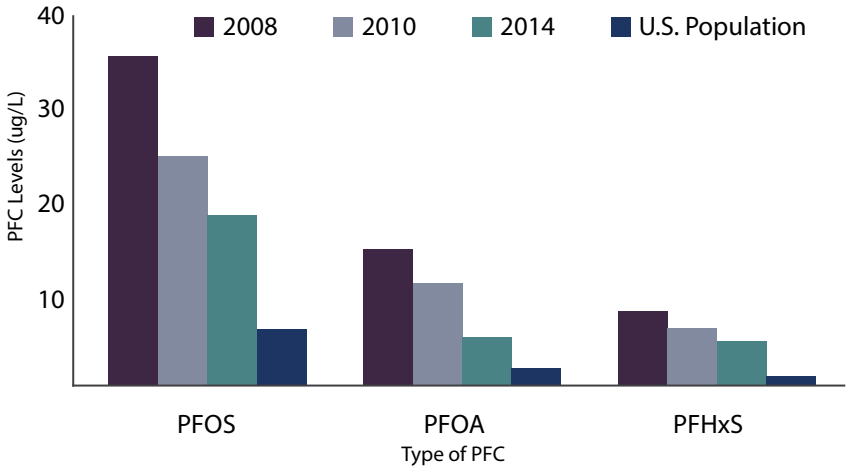
MDH performs point-of-use filtration studies to determine the effectiveness of commercially available point-of-use water treatment devices to remove PFCs from groundwater

MDH reports that cancer rates in the affected communities are comparable or slightly lower than statewide rates

2007-2014 Biomonitoring Study

In 2008, Environmental Health Tracking and Biomonitoring staff successfully recruited 196 adults from East Metro communities to participate in the East Metro PFC Biomonitoring Project. Participants were randomly selected from billing addresses of households receiving municipal water and who were in residence prior to 2005 as well as from private well households that have previously been identified to have PFC contamination. Participants who consented to the study had their blood tested for seven different PFCs.

- Three PFCs (PFOA, PFOS, and PFHxS) were found in all of the blood specimens and the majority had higher concentrations than the general U.S. population
- Older participants and those who had lived in the area for 10-30+ years had higher PFC levels than younger people and those who had lived there for only 4-9 years
- PFOA and PFOS levels correlated to the levels found in drinking water
- 2010 and 2014 projects included a cohort of past participants (164 and 149, respectively). PFC levels in long-term residents were still higher than the U.S. average, but continued to decrease from previous years
- Residents new to the area also participated in 2014. Their levels were similar to the general U.S. population, which further suggests that water filtration has been a successful intervention



Intervention efforts to reduce PFC contamination are working, though residents still have higher PFC levels than the general U.S. population

Established in 2007 by the Minnesota Legislature, the Minnesota Biomonitoring Program measures the levels of chemicals in people and determines whether exposures differ between groups over time. Information gathered from biomonitoring studies is used to promote public health actions to reduce chemical exposures.

2008
MDH introduces the PFC Biomonitoring Project to affected communities to receive community input

Blood sample collection for biomonitoring project begins

2009
EPA releases Health Advisory Levels for PFCs

MDH mails individual biomonitoring results and an informational booklet to biomonitoring participants

The advisory panel reviews the results and recommends further biomonitoring to measure change over time

MDH shares findings from biomonitoring study at public meetings

2010
2nd round of biomonitoring

Perfluorochemicals in Homes and Gardens Study analyzes homegrown produce, garden soil, and outdoor tap water from the East Metro

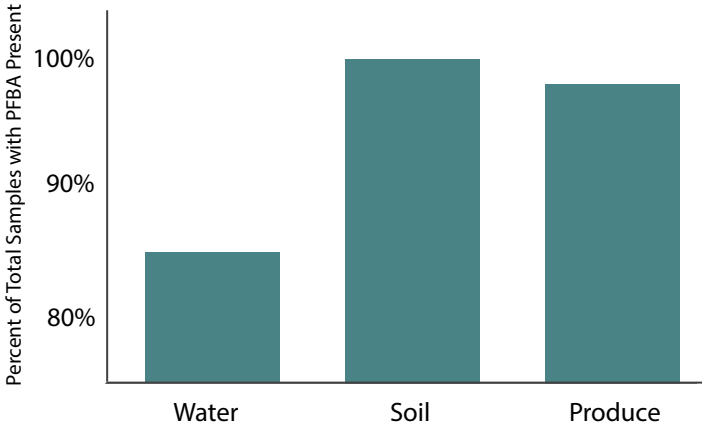
2014
3rd round of biomonitoring

2016
EPA lowers lifetime Health Advisory levels for PFOA, PFOs in drinking water. Has renewed interest in what Minnesota is doing

2010 Home and Garden Study

After the successful introduction of water filters, it remained possible that residents continued to be exposed to PFCs. Because PFCs stay in the environment long after they have been introduced, it's possible that they are also in the soil and vegetation, introduced by watering with PFC-contaminated water. It is also possible that PFCs continue to be introduced into gardens through the use of unfiltered outdoor taps of homes with private wells. The Perfluorochemicals in Homes and Gardens Study (PIHGS) was developed for this very purpose. In 2010, we analyzed outdoor spigot water, soil, home-grown produce, and house dust from twenty residential homes in Oakdale, Lake Elmo, and Cottage Grove to determine if these could be sources of human exposure to PFCs. Three control sites outside of the East Metro were also included in the study.

The PIHGS study concluded that the health benefits provided by growing and eating homegrown produce greatly outweigh any potential risk from low levels of PFBA or other PFCs in produce



- Perfluorobutanoic acid (PFBA) was found in 85% of outdoor tap water samples and at higher levels than the other PFCs, but levels did not exceed the Health Risk Limit (HRL)
- Amount of PFBA in water or amount of garden watering significantly contributed to the soil and produce concentration of PFBA
- Results suggest that water contamination from the outdoor spigot lead to PFC contaminated vegetables

Infectious Disease Laboratory

The Infectious Disease Laboratory is composed of four laboratory units: emergency preparedness and response, microbiology, molecular epidemiology, and virology. Throughout the year, we detect and identify a variety of bacteria, viruses, parasites, and fungi that make Minnesotans sick. Clinical laboratories throughout the state are required to submit specific organisms for our lab to provide diagnostic, characterization, and surveillance services that are not otherwise available in Minnesota.

PHOTO CREDIT
Agar plates: Courtney Demontigny
Inventory story photo: Sara Vetter
Tuberculosis story image: National Insitutes of Health

Long-term Specimen Storage Inventory Increases Efficiency

From May through December 2015, a team in the Infectious Disease Laboratory initiated and completed an inventory of our entire isolate collection. After decades of collecting isolates for public health purposes, our freezer storage had reached its capacity, as we didn't have the resources to purchase additional freezers. We were running out of space. Furthermore, there was no way to maintain the collection and there wasn't a system in place to discard isolates that were no longer of value.

The team developed a lab-wide standard for racks, shelves, and boxes in all 32 freezers. We created a database that included what information should be collected in the inventory process and organized this for each box and rack in the freezers. We then engaged around 50 people to help inventory the 274,780 isolates.

We take our isolate collection very seriously; it helps us and our partners compare infectious disease patterns and trends, implement prevention and control measures, and conduct other activities that are necessary to improve the health of individuals and populations. For example, if a new gene is detected that makes a specific bacteria antibiotic resistant or pathogenic, we can use our collection to see how many past samples have that gene. This helps us understand how long that gene has been around and how the bacteria is changing. The isolate collection includes samples from other states because of our role in the Laboratory Response Network. Additionally, because we have the case information as well as the isolate, our collection is in some ways more complete than the collection at the Center for Disease Control (CDC), allowing us to connect outbreaks or assess new testing methods for isolate identification.

Our new isolate inventory system allows easier and quicker location of isolates, whether it be for a study, to compare past and present outbreaks, or to help other organizations like the World Health Organization (WHO) and the CDC.

The oldest viral isolate in our inventory was an echovirus from 1959

PHL Responds to Zika Outbreak

With increasing reports of Zika infection in areas where many Minnesotans travel during winter, we requested materials from the CDC in January 2016 to begin preparations for Zika testing in the Infectious Disease Laboratory. While waiting for the testing materials, we began developing and writing protocols in preparation for our response to a potential Zika outbreak. There were no commercial assays available for Zika testing in early 2016, and our primary role was to coordinate specimen shipments to the CDC. Once testing resources were received from the CDC, we began testing Minnesota specimens—allowing for more rapid results for Minnesotans and relieving the testing burden placed on the CDC. Because we have an ongoing arbovirus surveillance program in our state, we are fortunate to have staff with the appropriate skills to perform the testing needed to quickly respond to this outbreak.

483 Minnesota specimens were forwarded to the CDC for testing between January 19 and April 10, 2016.

210 specimens received and tested by MDH for Zika between April 11 and June 30, 2016.

19 cases of Zika were confirmed in Minnesota residents between January 19 and June 30, 2016. Testing also confirmed 5 cases of dengue virus and 2 cases of Chikungunya in Minnesotans.

May 2015, first cases of Zika virus infection are reported in Brazil

December 2015, reports of increased cases of microcephaly in infants born in Brazil raises concerns between Zika infections and the birth defect

January 2016, the Infectious Disease Laboratory requests testing materials from the CDC and begins developing its response to the Zika outbreak

January 20, the first suspected Zika specimen from Minnesota resident is received by MDH and forwarded to the CDC

January 22, CDC activates its Emergency Operations Center in response to the ongoing outbreak in the Americas

February, the first case of Zika virus infection in Minnesota is reported

February 1, the World Health Organization declares a Public Health Emergency of International Concern because of clusters of microcephaly and other neurological disorders in some areas affected by Zika

February 26, an Emergency Use Authorization is released by the FDA for the serology test for Zika

March 17, an Emergency Use Authorization is released by the FDA for a RT-PCR assay for Zika virus which can detect the virus during the first 1-2 weeks after onset of symptoms or possible Zika exposure

April 11, MDH begins testing serum for Zika. Serology tests can detect infection from the Zika virus up to 90 days after the initial infection by testing for antibodies specific to the virus

April 13, CDC announces that Zika is the cause of microcephaly and other severe fetal brain defects

April 25, MDH begins testing serum and urine samples for Zika virus using RT-PCR, which can detect the virus during the first 1-2 weeks of infection

Illustration of Zika virus

Scanning electron micrograph of *Mycobacterium tuberculosis* bacteria

Working Every Day to Prevent Tuberculosis Outbreaks

Many people relegate tuberculosis (TB) to a disease of the past; but in Minnesota, approximately 200 cases of TB are reported each year. The Infectious Disease Laboratory performs most of the TB testing in Minnesota, and while it is not widely known, it remains a very important aspect of daily work for our lab.

Tuberculosis is considered a low incidence, high consequence disease and because of this, Minnesota state law mandates that every case of TB must be reported to MDH and every isolate submitted to IDL. Tuberculosis outbreaks progress slowly, which can make them harder to identify and contain. Imagine being contagious and not knowing it for weeks or months. Attempt to recall how many places you had gone and how many people with whom you had come into contact. This is why TB testing is so important.

Mycobacterium tuberculosis, the bacteria that causes TB is very difficult to culture because it grows so slowly, as such, most hospital or clinic-based labs no longer culture for it. *M. tuberculosis* can take 2-3 weeks to grow, requiring 42 days of incubation to determine a negative result. In comparison, most common bacteria (e.g. *E. coli*) grow overnight. We utilize different methods to identify *M. tuberculosis*, ranging from classic culture techniques to more modern molecular methods. Additionally, our lab performs susceptibility testing on the cultures to determine which drugs are best for patient treatment. In the past few years we've seen increasing numbers of drug resistant TB—making it more difficult to treat.

All *M. tuberculosis* isolates are referred to a national genotyping public health lab in Michigan for "fingerprinting," providing a valuable tool to TB Controllers at MDH to better investigate outbreaks. We are fortunate to have a close partnership with MDH's TB Prevention and Control Unit (TB Control) and local public health agencies throughout the state. While we perform testing necessary to confirm and identify *M. tuberculosis*, as well as facilitate the identification of clusters belonging to the same TB strain, TB Control and Local Public Health have specially trained TB nurses and other caregivers who are responsible for going into the community and working with TB patients. These TB specialists go to the patient's home, talk with them and their family, make sure they are taking their medication (which can be several different medications a day for as long as a year), and educate them about TB and the importance of staying isolated while they are contagious. We rely on these caregivers to intervene in the community; their work can stop outbreaks from growing or even occurring. Partnerships like these help keep Minnesota citizens safe and healthy.

Director's Office

The Director's Office provides documentation, training, and analytic support for division projects. The goals of the office are to align our division work with strategic goals, support collaboration among division sections and programs, and streamline division processes and procedures. Staff are also responsible for general administration and reporting, records management, audits, training, and the website for the division.

PHOTO CREDIT
Chaco Dunbar

Quality Improvement Processes Increase Efficiency and Quality

This past year, PHL staff have implemented quality improvement initiatives to increase efficiency and quality across sections. While putting procedures into MasterControl (our electronic document managing system) we noticed that different units had similar procedures. In an effort to streamline and standardize our procedures among the units, these duplicate procedures where combined into a single document allowing for more efficient updating. Combining resources and creating systems and procedures that can be used by all sections is a more cost-effective use of staff time. This process will also help identify areas that could be enhanced through quality improvement initiatives and ensure laboratory compliance with state and federal regulations.

This concept was put into action this past year when we completed part of a project to streamline and document our processes for acquiring, maintaining, and disposing of equipment. In May 2016, we completed a comprehensive inventory of all testing and support equipment in PHL, and located the equipment manuals for each model of equipment. Prior to this, an internal audit of our equipment preventative maintenance logs turned up many inconsistencies regarding required maintenance. In one unit, 37 of 95 pieces of equipment were overdue for maintenance. The next steps of this project include developing more robust systems for recording equipment maintenance, reviewing equipment manuals to ensure all manufacturer cleaning and maintenance requirements are being met, and document equipment acquisition and disposal procedures.

Enhancing Biosafety

Last year, PHL was awarded a three-year Epidemiology and Laboratory Capacity for Infectious Diseases (ELC) grant from the CDC to enhance biosafety in the laboratory, specifically when it comes to risk assessments. We have focused on developing a risk assessment process to identify hazards and mitigation strategies for high profile pathogens and new testing in the Infectious Disease Laboratory (IDL). This included strengthening and enhancing our safety management system for consistency across all sections as well as streamlining safety standard operating procedures. We plan to expand this to include all IDL procedures in FY17 and eventually all of PHL.

E-Learning Fellowship Increases Educational Outreach Opportunities

One of our staff members, Kim Sandrock, was selected in early 2016 to participate in a selective E-Learning Institute Fellowship (ELI) organized by the CDC and the Public Health Foundation. The fellowship included online coursework, bi-weekly webinars, in-person training, and working with an e-learning mentor. Kim developed a course with the Newborn Screening Program to educate medical providers about their role and responsibilities in discussing newborn screening with new/expectant parents. The course includes interactive elements, narration, educational videos, and knowledge checks. It was presented to the other fellows, mentors, and ELI program staff in a final showcase this past June. The final e-learning course will be published and available online to providers. Kim will continue to develop e-learning courses targeting our external clients and partners in an effort to continue bringing education and outreach to larger audiences around the state.

Emergency Preparedness and Response

As an active member of the CDC Laboratory Response Network, the Emergency Preparedness and Response Unit trains clinical microbiology laboratories on identification, notification, and referral of potential agents of bioterrorism. Our staff members perform analytical testing and provide training to sentinel laboratories—clinical laboratories on the front lines of disease detection—and first responders.

PHOTO CREDIT
Scientists and microscopes: Courtney Demontigny
Anthrax story photo: Courtney Demontigny
Respond story photo: Chaco Dunbar

BioWatch Program Detects Anthrax

Every day a member of the Emergency Preparedness and Response (EPR) group tests air collection filters from around the metro area for potential bioterror agents as part of the BioWatch program. On May 25, 2016, a filter from our BioWatch program tested positive for anthrax. After the positive result emergency protocols were activated and after additional testing, it was determined that the positive result was a naturally occurring phenomenon.

EPR notified MDH leadership and external partners including the FBI, Homeland Security, and Civil Support Team of the positive result and continued with further testing of the filter and additional samples from around the site of concern. Local healthcare providers and emergency rooms were contacted to see if any patients had come in exhibiting symptoms linked to anthrax. That evening and the following day, all tests following the initial positive result came back negative. This experience provided staff and external partners the opportunity to engage in a live scenario, and demonstrated the successful teamwork between laboratory staff, epidemiologists, and MDH leadership.

BioWatch is a state partnership with the Department of Homeland Security in which air filters located throughout the metro are use to detect pathogens that could be linked to bioterrorism. Air filters are collected every morning and brought to PHL for testing.

Anthrax (*Bacillus anthracis*) is a naturally occurring bacteria that causes severe disease in sheep and cattle and can be transmitted to humans. Anthrax has been used as a bioterrorism agent in the past.

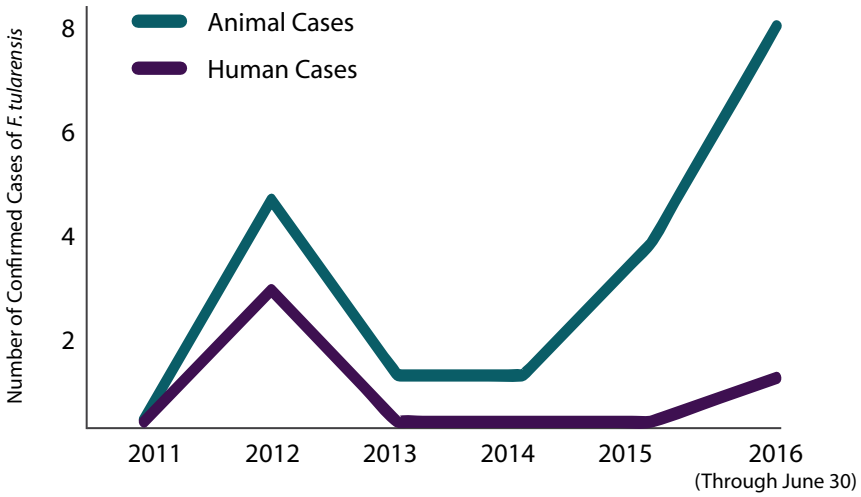
The Twin Cities is

1 of 30

U.S. metropolitan areas participating in the BioWatch federal early warning system

Record Year for *Francisella tularensis* in Minnesota

The EPR unit provides diagnostic and conformational testing of *Francisella tularensis*, a rare and sometimes fatal bacteria found in nature. This spring, we tested a record number of specimens for *F. tularensis.* We confirmed eight animal cases, and one human case of *F. tularensis* between April and June 2016, compared to eight animal cases and four human cases total between 2011 and 2015. Our ability to rapidly confirm rare diseases in humans and animals leads to swift treatment and can prevent a larger outbreak.



When our Minnesota Laboratory System (MLS) sentinel labs send us samples to confirm or identify a pathogen we must report the results to MDH's Epidemiology unit to investigate the cases, as well as to the CDC's Select Agent Program. *F. tularensis* is a bacteria that can survive for several weeks in hay, water, soil, or animal carcasses. Humans can become infected by *F. tularensis* through ticks and biting flies, by handling infected animals, or by consuming contaminated food or water. It is considered a bio-threat agent and can be fatal if not treated with antibiotics.

Collaboration with our sentinel labs provides rapid testing and diagnosis of rare diseases which leads to timely treatment for Minnesotans

Ready to Respond at Any Time

Responding to public health emergencies is one of the many important roles that PHL fulfills. In order to maintain our readiness, our Chemical Laboratory Response Network (LRN-C) program participates in yearly surge capacity exercises to test our ability to process a large number of specimens as quickly as possible. Each year the agent and scenario is different. In August 2015, we participated in a surge capacity exercise in which we were responsible for receiving, testing, analyzing, and reporting results for 500 patient specimens for arsenic following a fictional drinking water contamination.

The CDC coordinated the exercise that included multiple state health departments from around the country. All ten members of our Biomonitoring and Emerging Contaminants (BEC) Unit participated in the exercise working extended shifts, including four members who worked through the night. We completed the exercise in 19 hours, reporting no false positives or false negatives and all results within acceptable limits, making us the first lab to finish without errors.

If there is ever a chemical release in Minnesota, capabilities exist to help protect the people of this state

The CDC manages a network for laboratories around the country with standardized methods to respond to chemical emergencies that affect the public. Minnesota is one of ten Level 1 laboratories in the nation that have the additional responsibility to serve as a surge capacity lab to the CDC. In addition to developing methods for other LRN-C labs, Level 1 labs may be called on to help with the testing of specimens from anywhere around the country and potentially the world.

Laboratory Performance and Budget

Every year, we strive for excellence through improved quality assurance, cutting-edge research and analysis, and public impact. This section highlights a few of our recognized achievements this year as well as our division budget.

In fiscal year 2016, our division operated on a budget of $21.97 million. For more information about our budget this year, please contact our Director's Office staff. Our contact information is located on the back of this report.

PHOTO CREDIT
Chaco Dunbar

Awards

MDH Team Galaxy Award—Recognizes the accomplishments made by MDH staff members working collaboratively in the spirit of continuous quality improvement.

IDL Specimen Inventory Team: (from left) Jaime Christensen, Selina Jawahir, Elizabeth Cebelinski, Jackie Mahon, Scott Fisher, Angie Jacobsen, Gerry Salo, Ginny Dobbins, Kelly Pung
Photo by Courtney Demontigny

PHL Staff Star Honors Award:

James Durbin

Heather Brand

Kirsten Coverstone

Shane Olund

Diana Wegener

The MDH Star Honors Program allows staff members to formally recognize colleagues at all levels for their exceptional accomplishments and outstanding contributions which are models of public service. A limited number of Star Honors are awarded each year.

Maggie Dreon and Amy Gaviglio were recognized at the APHL Newborn Screening and Genetic Testing Symposium for Best Posters

Laboratory Response Network (LRN) group was presented with the Award for Innovative Collaborations with First Responder Communities by the Association of Public Health Laboratories (APHL)

Led by **Jill Simonetti, Newborn Screening** was awarded a NewSTEPS 360 grant by APHL. This three year grant will be used to improve timeliness in newborn screening, focusing on health information technology initiatives

Biomonitoring and Emerging Contaminants (BEC) group completed their surge capacity exercise in 19 hours without error, the first lab of 15 participating in the exercise across the country

MN-ELAP Moves to Environmental Health

On July 1, 2015, MN-ELAP moved from PHL (where it had been since its inception in 1989) to Environmental Health. MN-ELAP certifies private environmental labs throughout Minnesota to ensure that they are producing reliable data. An important aspect of MN-ELAP is to enforce standards at private labs. If a lab isn't providing reliable data it can put Minnesota communities at risk. Division management saw the need for additional support for the MN-ELAP group and determined that Environmental Health—which has more enforcement experience and staff—would be an ideal fit.

PHL Budgets

For past annual reports and budgets, visit: www.health.state.mn.us/divs/phl/pastreports.html
For a description of fund categories, visit: www.health.state.mn.us/divs/phl/funds.html

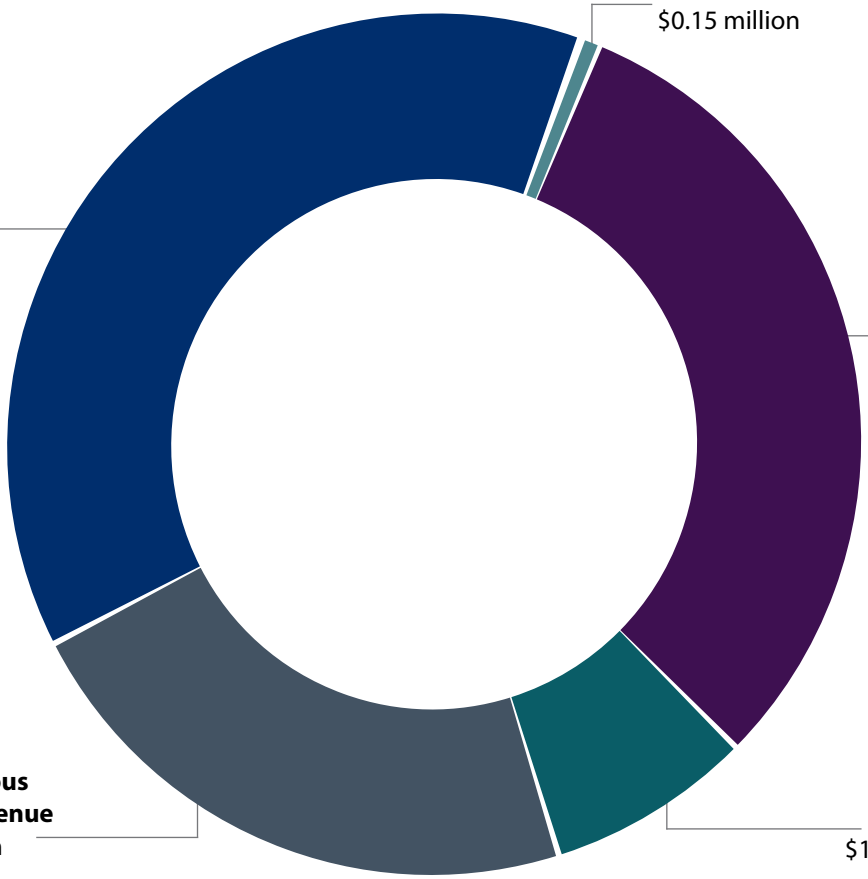
Budget Breakdown by Fund Categories

2013

2014

2015

2016



Protecting, maintaining, and improving the health of all Minnesotans

MINNESOTA DEPARTMENT OF HEALTH
PUBLIC HEALTH LABORATORY

mail PO Box 64899
St. Paul, MN 55164-0899

visitor 601 Robert Street North
St. Paul, MN 55155-2531

phone 651.201.5200

SCIENCE · RESPECT · COLLABORATION · INTEGRITY · ACCOUNTABILITY