PROTECTING THE PUBLIC'S HEALTH: ENVIRONMENTAL LABORATORIES

ENVIRONMENTAL HEALTH SURVEY RESULTS

On November 30, 2012, a train carrying vinyl chloride—an ingredient in plastics manufacturing that can cause dizziness, drowsiness, and headaches when inhaled—derailed, releasing 23,000 gallons of the gas and requiring evacuations in Paulsboro, New Jersey. As emergency response officials issued evacuation orders for the affected portions of 27 residential blocks[1] nearest the site, one New Jersey Department of Environmental Protection spokesman said, "We are being very conservative in order to ensure the public health."[2] Residents returned to their homes once air tests showed no residual contamination from the vinyl chloride.[3] In addition to Paulsboro residents, health officials surveyed the first responders who participated in emergency efforts.[4]

INTRODUCTION

On occasion, environmental contamination leads to the evacuation of whole communities in order to protect public health. Paulsboro is just one example of environmental contamination impacting everyday life. Advances in science, manufacturing, and consumer products oftentimes pair with concerns of increased groundwater contamination, decreased air quality, and related human health effects.

In order to address these concerns, environmental and public health laboratories analyze our water, soil and air, as well as contaminants in people, through chemical, biological or radiological testing. Regulators, lawyers, policymakers, health officials and the public rely on these tests to understand the environment within our communities, whether laws are being violated, if our health is threatened and when to take action.

This scientific work requires highly-trained staff, sophisticated instrumentation and specially-designed facilities. The Association of Public Health Laboratories (APHL) works with government environmental laboratories to ensure they have the resources, training and information they need to evaluate environmental contamination and its impacts.

On June 19, 2012, APHL fielded the 2012 Environmental Health Survey to assess laboratory capabilities, capacities, training and funding, and to gain a better understanding of environmental health laboratory needs. APHL administered the survey using *Qualtrics*, an online survey platform, and sent it to 121 APHL member and non-member public health, environmental health and toxicology laboratory directors. Each survey respondent received an e-mail with a unique survey link and a copy of the survey. APHL received a 41% response rate, with 88% of states completing the survey. The survey closed on August 17, 2012. Aggregate survey assessment results for all questions are available at http://bit.ly/159sXvW.

Three important themes emerged from the survey:

1. government environmental laboratories continue working every day to ensure the safety of each community's water, air, soil, and people;
2. laboratory services are threatened by funding decreases; and
3. laboratories can do more outreach to communities to increase collaboration.

This report gives three examples of the themes, as well as the data to support them. Other important data that was collected but not used below can be found at http://bit.ly/159sXvW.

Environmental and public health laboratories analyze our water, soil and air, as well as contaminants in people, through chemical, biological or radiological testing.

Public Health and Environmental Laboratories Work Every Day to Ensure the Safety of Each Community's Water, Air, and Other Resources[5]

One December day in North Adams, Massachusetts, "Little Billy" wanted something fun to do at middle school that day. While some kids would play video games under their desks or pull the fire alarm, Billy took the jar of elemental mercury he found at home to school. Thinking he was cool, he purposefully spilled the mercury, encouraging kids to play with it. When teachers realized what had happened, panic ensued and officials evacuated over 300 people.

Because mercury is a neurotoxicant that can affect vision and mental development, the state HazMat team immediately responded for clean-up while the Department of Public Health Laboratory tested air samples. When investigators found mercury in other parts of the school, more and more parents demanded to know if their children were exposed. The health department decided to add biomonitoring to the list of response activities, taking urine samples from almost 30 people.

Through this testing, officials found no elevated mercury levels in people exposed at the school—a relief to all involved. Because the mercury had been in the family home before bringing it to school, Billy and his family endured a second round of sampling and testing. Those affected received specialized medical treatment. The work of the environmental health laboratorians showed scientifically that risk levels were low, allaying fears in the school and wider community. Additionally, early treatment mitigated risks to Billy's family.

This is just one example of the services environmental laboratories provide to their communities every day. In fact, government environmental laboratories test for a wide range of contaminants in a variety of matrices. For example, APHL's survey found that over 80% of responding laboratories test drinking water for chemical, biological, and even radiological contaminants. Over 55% of respondents test soil, blood, and urine for similar types of pollutants. The survey also found an increase in non-traditional testing:

- 32% test consumer products such as toys and lotions,
- 28% test shellfish or other seafood,
- 25% test nutrient levels, such as phosphorus and nitrogen, in water systems,
- 9% conduct dairy monitoring, and
- 6% test for toxic algal blooms in lakes and reservoirs.

Air, soil, toys, milk, seafood, lakes and shorelines—samples from these everyday products, foods, and resources pass through environmental laboratories to check for safety and compliance with the law. **Without these tests, communities would not know if drinking water was safe, whether air was breathable, or if the food in supermarkets was safe to eat.** While most people may not even realize it, government environmental laboratories conduct these tests, and more, every day.

Funding levels are not sufficient to maintain staffing levels for these laboratories. Laboratory funding is down nearly $900,000 per laboratory since 2006.

Despite Funding Decreases, Public Health and Environmental Laboratory Services Remain Critical[6]

Just as Dr. Michael Wichman started his three-day Memorial Day weekend, the Johnson County Fire Department called: seven-and-a-half acres of the county landfill were on fire—a fire that would ultimately be the largest in Johnson County history. Could the State Hygienic Laboratory (where Dr. Wichman is the Associate Director of Environmental Health Programs) collect and test air and water samples for contaminants emanating from the fire?

Despite the holiday weekend and a thinned staff from a recent round of budget cuts, Dr. Wichman mobilized laboratorians to test air and other samples taken as the fire burned. They conducted 24-hour testing, pulling night shifts and forgoing valuable family time, over the holiday to ensure the public was safe from the plumes of black smoke billowing from the landfill.

Because scrap tires lined the landfill, over 100,000 gallons of pyrolytic oil burned, adding benzene, toluene, and styrene to the smoke plume. In the end, laboratory personnel, in concert with other state agencies and emergency responders ultimately determined the level of pollutants released to the surrounding communities was below health limits. However, the community's peace of mind came at a cost. Laboratory personnel, already over-extended due to staffing shortages, worked extra hours over a holiday weekend without compensation—although the staff is proud of what they did to protect their neighbors and would jump into action again if asked. Moreover, the government agencies responding to the fire did not reimburse the laboratory for the work it performed. The laboratory absorbed these costs, potentially at the expense of future work.

The Johnson County landfill fire is another example of government environmental laboratories working every day to analyze air, water and soil for contamination in order to protect communities. However, like all government services, laboratories incur costs and must make difficult decisions on what critical testing can be funded and which tests cannot.

According to the survey, laboratory funding comes from a variety of sources. Total budgets for government environmental laboratories average $2.4 million. On average, environmental laboratories receive nearly $1 million from state general funds, and almost $500,000 each from federal sources, state agency contracts and fees (*See Figure 1*).

But, as the Iowa landfill fire shows, these funding levels are not sufficient to maintain staffing levels for these laboratories. **Laboratory funding is down nearly $900,000 per laboratory since 2006.** Notably, average US EPA funding ($76,000 per laboratory) is one-quarter what it was in 2006 ($285,000 per laboratory), while CDC's average funding ($239,000 per laboratory) decreased by nearly one-third (from $365,536 per laboratory in 2006). (*See Figure 2*)

In addition, the funding received from the US EPA tends to be for specific projects and resulting from an application process. Laboratories reported a wide range of projects funded through US EPA dollars with very little overlap among those facilities reporting such figures.

Through a separate survey, APHL found several government laboratories saw workforce reductions of more than 20% from 2007-2011. Personnel cuts are a natural result of decreased budgets. Fewer laboratorians result in fewer tests, less personnel, increased uncertainty regarding the safety of our environment, and other gaps in public health protection. What future service will the State Hygienic Laboratory cut because of the resources used at the Johnson County landfill fire?

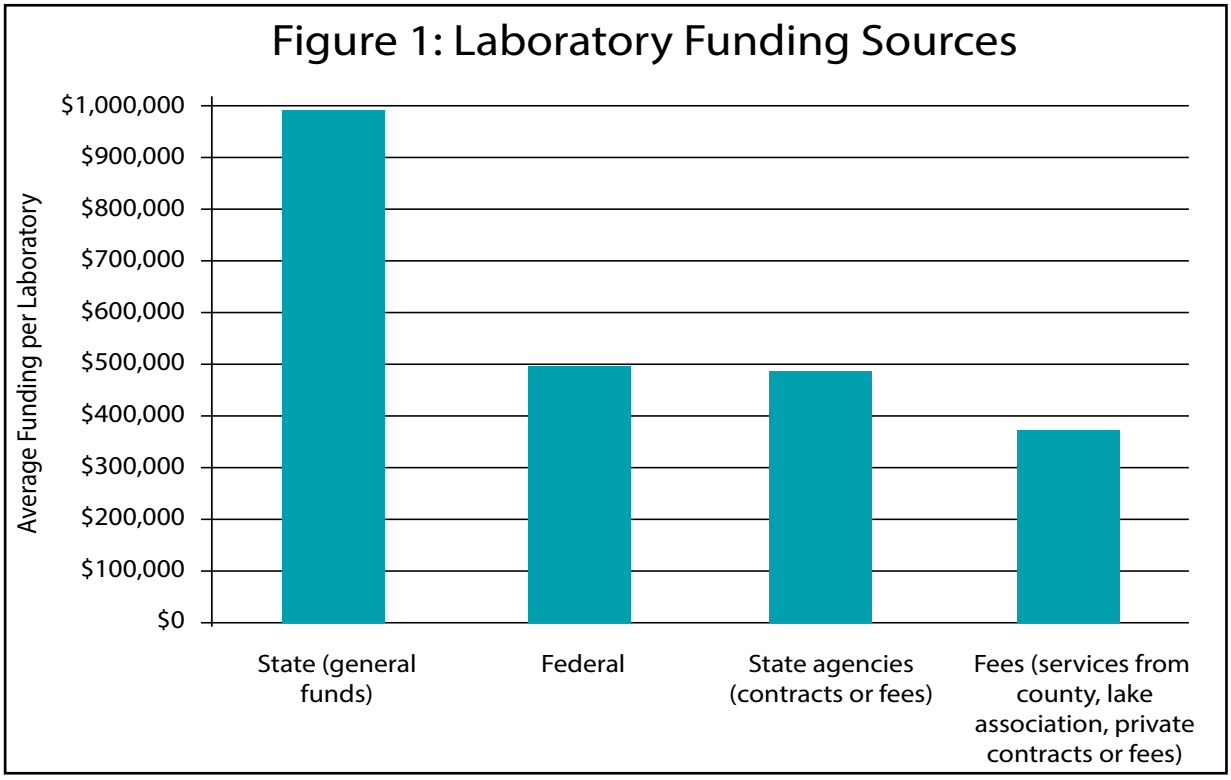
Figure 1: Laboratory Funding Sources
Average Funding per Laboratory
$1,000,000
$900,000
$800,000
$700,000
$600,000
$500,000
$400,000
$300,000
$200,000
$100,000
$0
State (general funds)
Federal
State agencies (contracts or fees)
Fees (services from county, lake association, private contracts or fees)

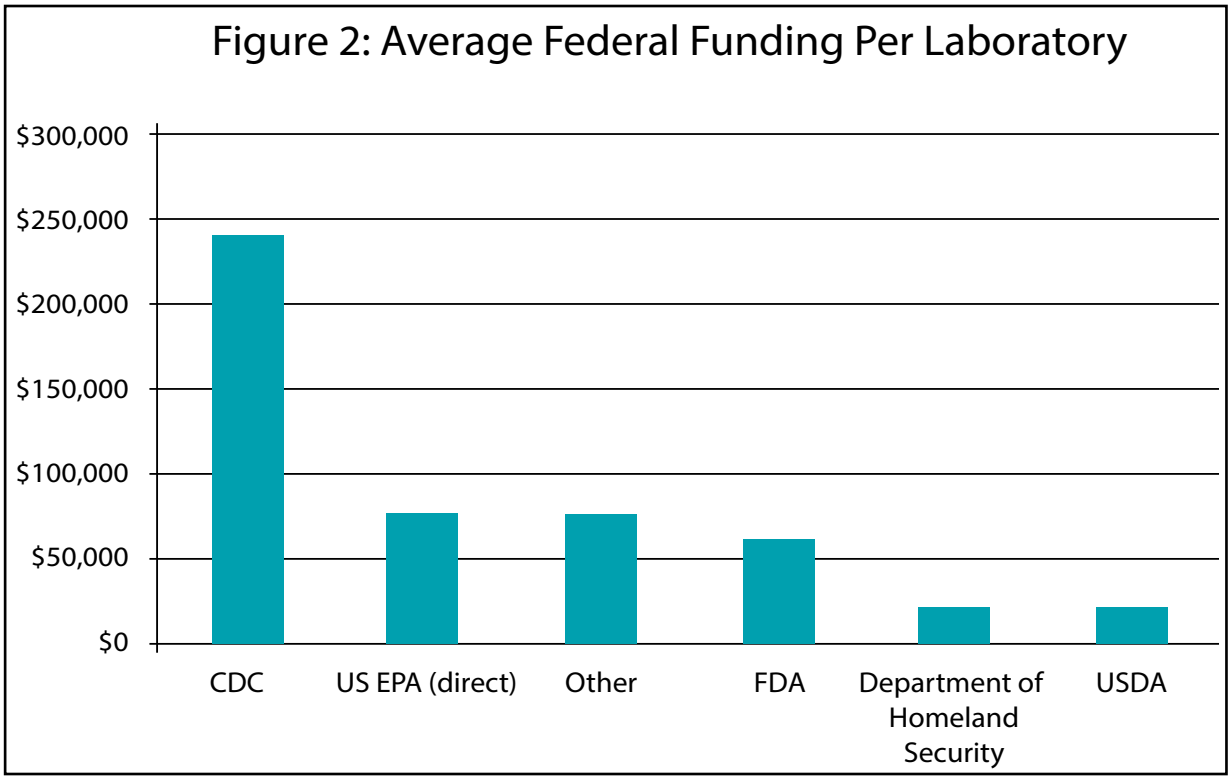
Figure 2: Average Federal Funding Per Laboratory
$300,000
$250,000
$200,000
$150,000
$100,000
$50,000
$0
CDC
US EPA (direct)
Other
FDA
Department of Homeland Security
USDA

Laboratories Can Do More Outreach to Communities to Increase Collaboration

Like many communities living near coal mines, the Kentucky Environmental Federation (KEF) worries about the effects of mining operations on newborns in their state: What contaminants does the mother absorb and pass to a child during pregnancy? What are the health impacts?

KEF recently acquired funding to measure levels of poly-aromatic hydrocarbons (PAHs) in the umbilical cord blood of newborns living in one such mining community. Testing "cord blood" is a specialized laboratory operation, and very few facilities have the necessary capabilities. Given the limitations posed by the unique test, KEF turned to APHL for help. Using APHL's member list and the Biomonitoring Capabilities List, KEF contacted several laboratories about potential opportunities for collaboration.

During this same time period, APHL hosted a forum where representatives of community organizations networked with government environmental laboratorians on a wide range of issues. In many cases, the community groups did not know their state even had an environmental laboratory.

A number of ways exist to obtain information from government laboratories. Many laboratories have publicly available information concerning environmental test results, services offered, and regular publications like annual reports and newsletters:

- 75% provide a website directory of services,
- 30% publish a hardcopy services guide,
- 36% provide an annual report, and
- 13% publish a newsletter.

Many of these resources remain available on the laboratory's website. If your state does not proactively offer these materials, communities can contact their laboratory for information (See http://www.aphl.org/AboutAPHL/memberlabs/Pages/default.aspx). Many laboratories make tours and other visits available to the public interested in learning about the laboratory and its operations.

Additionally, laboratories share information with policymakers and decision-makers in their states to answer questions, communicate messages and explain needs. Among the 57% of laboratories responding to the APHL survey who regularly participate in policy issues, they interact with:

- State health officials (93%),
- Federal agencies (63%),
- State legislatures (50%),
- State environmental commissioners/directors (27%),
- Advocacy groups (23%),
- Governors (10%), and
- Industry (7%).

Many of these outlets are themselves government offices serving the public. By providing information about public health and environmental laboratories to policymakers and regulators, those governing can better understand the important role of public health laboratories.

Government environmental laboratories exist to serve the public and help protect people from environmental contaminants. These laboratories test a wide range of environmental matrices as well as human tissue samples, food sources, consumer products, and other items encountered in daily life. They can be significant resources for communities seeking answers to environmental questions. Through working together, like the KEF testing for PAHs in cord blood, laboratories and their communities can better serve their residents.

CONCLUSION

Public health and environmental laboratories can analyze samples and report data all day, but without engaged and supportive communities, regulators, public health officials, and policymakers, laboratory reports are just numbers on a page. It is probably no coincidence that funding for these laboratories decreased while awareness of their activities among community groups is at a low point.

Many laboratories provide speakers, displays for community events, and other opportunities for public involvement. Others open their doors to test environmental samples of concern by individual citizens. There are many avenues for learning more about public health and environmental laboratories, but they need to provide outreach in the opposite direction as well.

Public health and environmental laboratories exist to serve the residents of their communities. These laboratories conduct daily investigations into the effects of environmental contaminants on people and the environment. Through adequate funding and active community involvement, public health and environmental laboratories can fulfill their responsibilities to keep their communities healthy.

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6. Source: Interview with Dr. Michael Wichman, State Hygienic Laboratory at the University of Iowa

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