Five-Year National Biomonitoring Plan: A Conclusion

OCTOBER 2014

APHL ASSOCIATION OF PUBLIC HEALTH LABORATORIES™
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Introduction

Dear Colleagues,

In 2009, APHL convened the National Biomonitoring meeting and compiled a five-year Biomonitoring Plan intended as a guide to developing state-based biomonitoring programs. We envisioned an integrated network of state laboratories that built on the achievements of CDC’s Division of Laboratory Sciences in tracking population exposures to environmental chemicals and provided similar data for individual states, counties or cities.

Today, I invite you to review the summary of activities undertaken by APHL to help advance this goal. The APHL Biomonitoring Subcommittee has worked diligently to make progress on activities comprising the five-year plan.

While our vision of a network of state laboratories performing high-quality biomonitoring measurements integrated into routine public health practice has not yet become reality in most states, we remain hopeful that the work completed thus far has provided tools for public health laboratories to build sound biomonitoring programs and components of the national system.

Ewa King, PhD
Chair, Biomonitoring Subcommittee
(2009-2014)
List of Acronyms

APHL  Association of Public Health Laboratories

APHA  American Public Health Association

ATSDR  Agency for Toxic Substances and Disease Registries

CDC   Centers for Disease Control and Prevention

CSTE  Council of State and Territorial Epidemiologists

EPA   Environmental Protection Agency

FDA   Food and Drug Administration

MMWR  Morbidity and Mortality Weekly Report

NIH   National Institutes of Health

NCEH/DLS  National Center for Environmental Health/Division of Laboratory Sciences

NCSL  National Conference of State Legislatures

USGS  US Geological Survey
The Plan

Background

While biomonitoring debuted on the national stage over three decades ago, public health programs are just now beginning to explore the value of biomonitoring at the state and local level. At the national level, CDC’s National Report on Human Exposures to Environmental Chemicals describes exposures to chemicals in the general US population.

APHL’s National Biomonitoring Plan for Public Health Laboratories aimed to assist biomonitoring programs with the collection of state- or community-specific exposure data. This locality-focused biomonitoring data can then be compared to CDC’s national-level data to evaluate whether the population in question has an unusually high exposure compared to the US population.

With the help of CDC staff, APHL drafted a plan to enhance local, state and national capacity to generate biomonitoring data and to utilize biomonitoring to develop sound public health policy and programs. In 2009, the Association hosted a National Biomonitoring Meeting to vet the plan and discuss ways to move forward as a country. In attendance were laboratorians, epidemiologists, toxicologists, academics, national association representatives and federal partners from CDC, ATSDR and EPA. To read more about this meeting, please see National Biomonitoring Meeting Summary.

The Five-Year Plan

This meeting led to the formal adoption of the five-year plan for building a National Biomonitoring Network of Public Health Laboratories, which outlined the following goals for APHL and CDC.

**GOAL 1:** Develop a National Biomonitoring Network

**GOAL 2:** Foster collaboration among environmental public health programs

**GOAL 3:** Disseminate Biomonitoring Information to Guide Policy and Practice

**GOAL 4:** Advance Biomonitoring Science and Research

**GOAL 5:** Enhance Biomonitoring Workforce and Infrastructure

These goals were created to pave the way to a national biomonitoring system. A national biomonitoring system reflects the integration of the disciplines, technologies and expertise needed to better utilize biomonitoring to answer questions about chemical exposures and potential health effects, respond to community concerns, improve environmental health and public health, and inform policy.

A national biomonitoring system will enable a more coordinated approach in the design and development of biomonitoring studies, more effective use of limited resources, higher quality data and improved practice.
Status Update

Over the past five years, the Division of Laboratory Sciences at the National Center for Environmental Health at CDC and the APHL Biomonitoring Subcommittee accomplished most of the activities outlined below.

1 Develop a national biomonitoring network. Using biomonitoring data from a network of federal, state and local laboratories will better inform public officials as they develop and evaluate effective public health interventions that protect the public’s health from chemicals of concern.

Objective 1.1: Ensure that resources to develop biomonitoring capacity and capability are available to all interested states.

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<tr>
<td><strong>Activity 1.1.1:</strong> Draft guidance for laboratories interested in establishing biomonitoring programs, including how to develop a research agenda. (APHL)</td>
<td>The APHL Biomonitoring Subcommittee published the Guidance for Laboratory Biomonitoring Programs, intended as a reference for public health laboratories interested in building a biomonitoring program in their jurisdiction. The Guidance document remains a critical component to assuring an efficient and effective system among state and national laboratory partners by supporting high-quality, standardized laboratory practice.</td>
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<td><strong>Activity 1.1.2:</strong> Produce a draft plan identifying goals and objectives for building a National Biomonitoring Network. (APHL)</td>
<td>The National Biomonitoring Plan for Public Health Laboratories: A Five-Year Plan includes goals and objectives to create a national biomonitoring network.</td>
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<td><strong>Activity 1.1.3:</strong> Hold a stakeholder meeting to develop recommendations for creating a national biomonitoring system. (APHL)</td>
<td>APHL hosted the 2009 National Biomonitoring Meeting, and assembled a panel presentation at the American Public Health Association’s Annual Meeting in fall 2011.</td>
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Activity 1.1.4: Propose models for a National Biomonitoring Network (e.g., regional labs, LRN-C model, and each state establishing its own program). (APHL)

ASTHO, with funding support from APHL, hosted a Biomonitoring Forum to discuss biomonitoring from a state health agency perspective. Findings from this forum were reported in the Biomonitoring Report: Perspectives from State Health Agencies. Next steps include identifying the best model to follow to establish a National Biomonitoring Network.

Activity 1.1.5: Establish a clearinghouse of:
   a) current biomonitoring methods and capacities;
   b) biomonitoring studies conducted by communities and states; and
   c) relevant state and federal biomonitoring legislation. (APHL)

The Biomonitoring Toolkit and Biomonitoring Capabilities List are two interactive webpages that host resources, including state stories, methods, guidance documents and more. These resources link to the Biomonitoring Discussion board, a platform where public health professionals, academics and federal partners can ask questions about and discuss biomonitoring. Both of these sites are regularly monitored by APHL and the Biomonitoring Subcommittee and are updated as needed.

In July 2012, NCSL published a report titled 2012 Environmental Health Legislation, which includes select state biomonitoring legislation.

Objective 1.2: Build capacity at the state and national level.

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<td>Activity 1.2.1:</td>
<td>Every year at NCSL meetings, APHL presented on biomonitoring. When the meeting occurred near a laboratory and there was sufficient interest, NCSL offered lab tours, including the CDC/NCEH laboratory. In addition, APHL shared a fact sheet about biomonitoring during visits to Capitol Hill.</td>
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<td>Activity 1.2.2:</td>
<td>APHL worked with NCSL to develop the Biomonitoring: A Best Practices Report for State Legislators publication, which defines biomonitoring for state legislatures and discusses the policy elements of biomonitoring.</td>
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Activity 1.2.3: Fund three state-based biomonitoring programs:
• Establish a training program for funded states,
• Develop a quality assurance program for biomonitoring measurements,
• Evaluate experiences and effectiveness of funded programs and states. (CDC)

Activity 1.2.4: Support additional states as funding becomes available. (CDC)

CDC funded California, New York and Washington, including offering training, quality assurance and evaluation. Work under the existing cooperative agreement ends August 31, 2014, at which point the evaluations for all three program will become available.

Funding to support additional states did not become available. However, CDC plans to fund up to six states and consortia through a new five-year cooperative agreement in FY 2014.

MAJOR OUTCOMES: By ensuring all interested states have access to resources to develop biomonitoring capability and capacity, and building capacity at the state and national levels through the accomplishments listed above, we as a nation are a step closer to achieving a national biomonitoring network.

Foster collaboration among environmental public health programs. Agencies, organizations and entities with a vested interest in biomonitoring will accelerate the impact of the network. As such, strengthening these partnerships will enable increased use of biomonitoring data to inform public health decisions.

Objective 2.1: Create opportunities for stakeholders to relay relevant information and challenges for biomonitoring.

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<td>Activity 2.1.1: Coordinate with CSTE and CDC to organize a session on biomonitoring and best practices at the APHL Annual Meeting in June 2010. (APHL)</td>
<td>Every year, there is at least one session on biomonitoring at the APHL Annual Meeting. While CSTE has not been able to attend the APHL Annual Meeting, APHL staff has distributed their guidance document titled Biomonitoring in Public Health: Epidemiologic Guidance for State, Local and Tribal Public Health Agencies.</td>
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Activity 2.1.2: Ensure biomonitoring is a component of the National Conversation on Public Health and Chemical Exposures. (CDC)

APHL participated in the Monitoring Workgroup, ensuring biomonitoring was one of the main recommendations in the resulting Action Agenda for the National Conversation on Public Health and Chemical Exposures. APHL established and led a workgroup on implementing this recommendation.

Objective 2.2: Compile existing, and develop new, resources for laboratorians to learn about basic epidemiology, toxicology study design and protection of human subjects.

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<td><strong>Activity 2.2.1:</strong> Collaborate with CDC and EPA to identify methods for sharing existing toxicology data. (APHL)</td>
<td>Existing toxicological databases can be found in the Biomonitoring Toolkit.</td>
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<td><strong>Activity 2.2.2:</strong> Coordinate with CSTE and ASPH to develop and disseminate basic epidemiology and toxicology training courses that focus on using biomonitoring as a component of studies. (APHL)</td>
<td>APHL hosted an ‘Epidemiology 101’ training with input from CSTE and a ‘Toxicology 101’ webinar with a representative of the American College of Medical Toxicologists. The Epidemiology 101 webinar, hosted in 2011, provided an introduction into epidemiological investigations. A total of 42 sites registered representing 17 states, four cities, three organizations and federal agencies. The Toxicology 101 webinar, hosted in 2013, provided an introduction to toxicology, especially as it relates to public health laboratories. A total of 378 participants attended the webinar from 42 different states.</td>
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**Objective 2.3**: Compile existing and develop new, resources for non-laboratorians to learn about laboratory principles and methods related to biomonitoring.

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<td><strong>Activity 2.3.1:</strong> Collaborate with CSTE, ASTHO and ASPH to develop a “biomonitoring 101” session for non-laboratorians. (APHL)</td>
<td>APHL hosted a ‘Biomonitoring 101’ webinar in 2014 intended to provide an introduction to biomonitoring and explain how it can improve public health practice. A total of 137 participants attended the webinar.</td>
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<td><strong>Activity 2.3.2:</strong> Work with CSTE and ASTHO to present a “biomonitoring 101” session at the CSTE and ASTHO annual meetings. (APHL)</td>
<td>APHL has presented several times to ASTHO’s Environmental Health Directors on biomonitoring. APHL staff also presented to CSTE’s membership on the Biomonitoring Capabilities List and the Linking Laboratorians and Environmental Epidemiologists.</td>
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**Disseminate biomonitoring information to guide policy and practice.** Federal, state and local public health practitioners, healthcare providers, policymakers and others will gain a better understanding of what biomonitoring is, how this tool can be used and what actions can be taken to reduce potentially harmful exposures within populations. Developing and disseminating materials that explain how to interpret, communicate and apply biomonitoring information will raise awareness and increase fundamental understanding of the complex information, especially when findings are uncertain and when information is insufficient.

**Objective 3.1:** Develop information to assist in communicating biomonitoring findings to different audiences.

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<td><strong>Activity 3.1.1:</strong> Conduct formative research on communicating biomonitoring data to different audiences and make findings available through publications and conference presentations. (CDC)</td>
<td>CDC conducted formative research in 2011. The case study results were presented at two conferences in 2011 (CSTE’s Annual Conference and National Environmental Public Health Tracking Conference). A manuscript has been accepted for publication in <em>Journal of Environmental Health</em> in late 2014.</td>
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**Objective 3.2:** Increase understanding of what biomonitoring is to both the public health community and general population.

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<td><strong>Activity 3.2.1:</strong> Publish a summary of biomonitoring efforts within state and local laboratories and disseminate the summary to policymakers at the national and state levels. (APHL)</td>
<td>In 2009, APHL's Biomonitoring Subcommittee published a report titled <em>Moving Forward: Biomonitoring Stories from the States</em>. The report highlights case studies where biomonitoring is effectively being used for the protection of public health at the state and federal levels.</td>
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<td><strong>Activity 3.2.2:</strong> Coordinate with NCSL to organize a “biomonitoring in action” session at an NCSL national meeting highlighting how biomonitoring solves public health problems for states. (APHL)</td>
<td>Examples of Biomonitoring in Public Health showcases biomonitoring examples used in routine public health practice.</td>
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**Activity 3.2.3:** Continue publishing the National Report on Human Exposure to Environmental Chemicals (Exposure Report), and present findings from the Exposure Report at the APHL National Meeting “best practices” session. (CDC)

CDC continues to publish new biomonitoring data *(Updated Tables)* approximately every six months as part of the Exposure Report. CDC released Updated Tables in September 2013 and is planning to release another update in March 2014. CDC presents findings regularly at the APHL National Meeting.

**Activity 3.2.4:** Highlight biomonitoring uses within the workgroups of the National Conversation on Public Health and Chemical Exposures. (CDC)

CDC and APHL representatives participating in the workgroups highlighted the value of biomonitoring as a tool for identifying at-risk population groups and assessing the effectiveness of interventions to reduce harmful environmental exposures.

**Activity 3.2.5:** Disseminate information on the benefits and uses of biomonitoring to internal stakeholders (HHS, OMB) and to sister agencies (EPA, FDA, NIH and USGS). (CDC)

CDC provides information on the benefits and uses of biomonitoring to internal stakeholders upon request (e.g., through laboratory tours or during the budget formulation process). Additionally, CDC alerts sister agencies and other key partners when new biomonitoring data is released. Additionally, APHL made a concerted effort to speak with EPA and NIH about biomonitoring initiatives. EPA’s Office of Research & Development now has a liaison to APHL’s Biomonitoring Subcommittee.

**MAJOR OUTCOMES:** Biomonitoring data remains essential for driving biomonitoring policy and practice at the state and federal levels. CDC and APHL disseminated written information, presented at numerous conferences and maintained a strong web presence in order to share timely information to non-traditional partners, including state legislators and federal agencies (i.e., EPA, FDA, NIH and USGS)
Advance biomonitoring science and research by conducting sound biomonitoring studies critical to the success of a national network. Enhancing the science to meet environmental health, public policy and research needs — particularly for state- and community-based programs — will build on existing body of knowledge and strengthen new and existing programs.

**Objective 4.1:** Support state laboratory efforts to adapt and improve existing testing methods and to develop new methods for emerging contaminants.

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<td><strong>Activity 4.1.1:</strong> Develop a database of available biomonitoring resources at the state laboratory level. (APHL)</td>
<td>APHL developed the <a href="http://www.aphlblog.org/2014/10/biomonitoring-public-health-laboratory/">Biomonitoring Toolkit</a>, a resource for anyone interested in learning more about biomonitoring. While this resource is open to environmental health directors, epidemiologists, toxicologists and academics, the site is password-protected to ensure privacy of conversations on the Discussion Board.</td>
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<tr>
<td><strong>Activity 4.1.2:</strong> Present data at conferences (such as the APHL Annual Meeting) on new methods for emerging contaminants. (CDC)</td>
<td>CDC develops new analytical methods to measure emerging environmental contaminants in people and routinely presents data at conferences and in publications.</td>
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**Objective 4.2:** Develop trainings, guidelines and best practices to ensure biomonitoring studies are appropriately designed and implemented, including the assurance of appropriate levels of human subject protection. (APHL and CDC)

APHL and CDC have worked to host trainings in the form of webinars and blog about special topics. In addition to the [Guidance for Laboratory Biomonitoring Programs](http://www.aphlblog.org/2014/10/biomonitoring-public-health-laboratory/), examples of these trainings and blogs can be found in a summative blog: [http://www.aphlblog.org/2014/10/biomonitoring-public-health-laboratory/](http://www.aphlblog.org/2014/10/biomonitoring-public-health-laboratory/).

**MAJOR OUTCOMES:** By making resources, such as trainings and publications on chemicals and public health, available to scientists looking to conduct their own biomonitoring investigation, APHL and CDC have given more states the tools to begin building (or to enhance current) capabilities for biomonitoring.
Enhance biomonitoring workforce and infrastructure. Improving infrastructure and developing the workforce ensures that essential services are provided to address concerns about existing and emerging environmental chemicals. Sustainability of the network depends on a trained workforce and adequate equipment, data and tools to produce robust results.

**Objective 5.1:** Address informatics needs.

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<td><strong>Activity 5.1.1:</strong> Determine minimal and optimal infrastructure requirements for biomonitoring programs. (APHL/CDC)</td>
<td>APHL and CDC designed the LEI Informatics Self-Assessment (SA) Tool for PHL professionals to be able to identify and plan for their required informatics capabilities, prioritize the use of existing resources, document and communicate these priorities to policy makers and monitor current informatics capabilities on an on-going basis.</td>
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<td><strong>Activity 5.1.2:</strong> Determine minimal laboratory staffing and equipment needs. (APHL/CDC)</td>
<td>Related to staffing needs APHL recently developed draft competencies that include informatics, chemistry, and bioinformatics skills, which will eventually lead to standard competency-based position descriptions and career ladders to empower directors with standard tools for personnel management. Some of these will ultimately be discussed in MMWR.</td>
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| **Activity 5.1.3:** Develop a framework for data exchange. (APHL/CDC) | Several APHL documents laid out steps for exchanging biomonitoring data between states, as well as federal agencies:  
  - Public Health Laboratory Informatics and the LRN-C  
  - Idaho: Ready to Meet Multiple Electronic Reporting Requirements  
  Other resources include:  
  - Environmental Laboratory Electronic Data Management  
  - Requirements for Environmental Electronic Data Delivery Submissions  
  - Environmental Laboratory Information Management System Request for Proposals: A Guide  
  A workgroup will focus on implementing an exchange of environmental data in 2014; while the data is not biomonitoring data we anticipate the issues will be similar and that this exercise will be informative. |
**Objective 5.2:** Build biomonitoring expertise through workforce development.

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| **Activity 5.2.1:** Facilitate, design and distribute training courses and materials. (APHL) | In 2014, APHL hosted a biomonitoring webinar series on the following topics:  
• Toxicology 101 (December 16)  
• Environmental Public Health Tracking Meets Public Health Laboratories, Part 2 (February 12)  
• New Reference Values for Blood Lead Levels (April 3)  
• Biomonitoring 101 (April 24)  
• Policy Implications for Biomonitoring  
To learn more about this webinar series and other biomonitoring resources, see our blog post: [http://www.aphlblog.org/2014/10/biomonitoring-public-health-laboratory/](http://www.aphlblog.org/2014/10/biomonitoring-public-health-laboratory/). |

**Objective 5.3:** Assess implementation of this plan.

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<td><strong>Activity 5.3.1:</strong> Conduct a 50-state survey on progress of biomonitoring. (APHL)</td>
<td>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. Aggregate survey assessment results for all questions are available at <a href="http://bit.ly/159sXvW">http://bit.ly/159sXvW</a>. An issue brief was also created titled <em>Protecting the Public’s Health: Environmental Laboratories.</em></td>
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<td><strong>Activity 5.3.2:</strong> Work with CDC to review and update plan activities on an annual basis. (APHL)</td>
<td>APHL meets with CDC via teleconference once a month, provides a quarterly report and annual report to review progress.</td>
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**MAJOR OUTCOMES:** As each state biomonitoring program possesses individual needs for informatics infrastructure and workforce capacity, APHL and CDC are still in the process of determining the best way to document these needs. Over the past five years, APHL and CDC have developed a strong relationship and understanding of the work each organization and agency performs.
Looking Ahead

Much was accomplished over the past five years under this Plan. It is no coincidence this progress has also helped to improve biomonitoring infrastructure in the states as well as inform future policy decisions. A thoughtful and measurable plan held APHL and CDC accountable for moving the nation in the right direction. Yet, more work remains and new goals have arisen. Under the leadership of the Biomonitoring Subcommittee, APHL aims to work with federal partners, national association representatives, academics and others to develop a new plan to build upon the accomplishments of the first.

If you are interested in learning more, or would like to be a part of the planning process, please contact EH@aphl.org.
Resources List

Interactive Tools:

1. Biomonitoring Toolkit (access required)
2. Biomonitoring Capabilities List (access required)
3. Biomonitoring Webinar Series

Guidance Documents:

4. Guidance for Laboratory Biomonitoring Programs
5. Biomonitoring in Public Health: Epidemiologic Guidance for State, Local, and Tribal Health Agencies

Informatics Resources:

6. Laboratory Efficiencies Initiative: Informatics Self-Assessment Tool
7. Public Health Competencies Project

Stories from the States:

8. Why Biomonitoring is an Integral Component of Public Health Practice
9. Examples of Biomonitoring in Public Health
11. Biomonitoring Blog Series

Other Biomonitoring Resources:

12. National Biomonitoring Meeting Summary
13. Special Report on Biomonitoring: Building a Network of Success was published in the Journal of Environmental Health, which contained an article highlighting progress from CDC-funded states and a Letter to the Editor from APHL.
Acknowledgements

The APHL Biomonitoring Subcommittee members played an important role in the shaping of this document:

Ewa King, Chair
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Minnesota Department of Health

Jyl Madlem
Indiana State Department of Health Laboratories

Blaine Rhodes
Washington Public Health Laboratory

Donald Simmons
University of Iowa Hygienic Laboratory

An honorary mention goes to Julianne Nassif, who spearheaded much of the work from the very first meeting in 2009, and continues to champion biomonitoring in her new role at the State of New Hampshire in Division of Public Health Services, Public Health Laboratories. Also, recognition is owed to Rupali Das, formally at the California Department of Public Health, who contributed while serving on the Subcommittee from 2010-2013.

APHL also thanks our CDC/NCEH/DLS project liaisons whose support helped make our project ideas a reality: Eric Sampson, who first envisioned the five-year plan, Susan McClure and Joy Hugick who served an instrumental role in the first draft of the plan; and Amy Mowbray, Lovisa Romanoff and Whitney Neel for their continued support and partnership.
Association of Public Health Laboratories

The Association of Public Health Laboratories (APHL) is a national nonprofit dedicated to working with members to strengthen laboratories with a public health mandate. By promoting effective programs and public policy, APHL strives to provide public health laboratories with the resources and infrastructure needed to protect the health of US residents and to prevent and control disease globally.