

U.S. Environmental Protection Agency Regional Laboratory Network

Annual Report 2014



Cover: Snapshot of environmental laboratory science themes of Protecting Water; Addressing Climate Change; Improving Air Quality, Toxics and Chemical Safety, Communities; State, Tribal, and Local Partnerships; High-Performing Organization; and Sustainable Future. Cover photos were obtained from EPA Office of Multimedia intranet site, except for two images listed below.

Photo: Water Lily

Photographer: Steve Donohue/EPA

Photo: Trees

Photographer: Randy Pomponio//EPA

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Executive Summary

The U.S. Environmental Protection Agency (U.S. EPA) Regional Laboratories are state-of-the-art, full-service environmental laboratories delivering analytical services, field support, expert quality assurance and data review, and innovative technical assistance. Laboratory personnel are an integral part of the science backbone of the Agency. Their skills and expertise allow the development and implementation of solutions to complex issues affecting human health and the environment. Ten Regional Laboratories individually support the 10 regions within the EPA while also collaborating to form a highly effective Regional Laboratory Network (RLN). This report highlights the diversity of support and capabilities, all of which reinforce EPA's mission and ongoing priorities.

In Fiscal Year 2014 (FY2014), Regional Laboratories performed over 143,000 analyses in support towards agency priorities and solving emerging environmental issues. This analytical work supported activities related to over 1,500 sites and projects associated with a wide range of agency programs.

To effectively support the EPA Administrator's priorities and themes, Regional Laboratories demonstrated their responsiveness and flexibility by pioneering citizen science programs to enhance sound science within communities across the nation, researching the effects of toxins on the natural environment and emerging threats to human health, modifying methodologies to meet the demand of lower risk levels or detection of unknown threats, responding to emergencies, and providing defensible data.

Real-time data continued to be an important tool for environmental decision-making. Regional Laboratories have a wide-range of field analytical support services ranging from on-site analysis in mobile laboratories to screening techniques performed directly in the field. In FY2014, Regional Laboratories performed over 4,000 field analyses in support of a combination of 200 projects and sites throughout the country.

Accomplishments presented in this report capture only a few of the overall activities provided by all Regional Laboratories. These accomplishments underscore the commitment of the RLN to be an integral part in protecting human health and the environment.

FY2014 Annual Report Structure

Section I. U.S. EPA Regional Laboratories/ Regional Laboratory Network: An Overview

Provides introduction and overview of the Regional Laboratory System. This section also contains method development/research collaboration information to enhance science.

Section II. Regional Laboratory Network Highlights

Describes accomplishments of the Regional Laboratories as they relate to EPA Administrator's Themes.

Section III. FY2014 Laboratory Accomplishment Results Summary

Summarizes RLN common support services with corresponding charts.

Section IV. Regional Laboratories Capabilities Tables — FY2014

Displays the abilities of Regional Laboratories to conduct certain tests within chemistry, physical and other determinations, and biology.

EPA Agency Themes Meeting the Challenge Ahead

Protecting Water: A Precious, Limited Resource

Addressing Climate Change and Improving Air Quality

Taking Action on Toxics and Chemical Safety

Making a Visible Difference in Communities across the Country

Launching a New Era of State, Tribal, and Local Partnerships

Embracing EPA as a High-Performing Organization

Working toward a Sustainable Future

Section I — U.S. EPA Regional Laboratories/Regional Laboratory Network: An Overview

U.S. EPA Regional Laboratories



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Regional Laboratory Network: An Overview



EPA has 10 regional offices and each region has a laboratory. The Regional Laboratories provide mission-critical support to the Agency, protecting human health and the environment. Service and expertise provided by each Regional Laboratory are tailored to meet the needs of that particular region or program and to address complex and emerging environmental issues. In addition to supporting each region, the 10 Regional Laboratories collaborate to form the Regional Laboratory Network (RLN). Efficiency, effectiveness, and flexibility are maximized by using scientific expertise, implementing and developing methods, and maximizing partnerships within RLN and across the nation.

Services tailored to meet regional needs and to address complex and emerging environmental issues

Environmental decisions and policies provide the RLN with the analytical structure to meet program needs. Regional Laboratories also provide support to national initiatives and research. Each laboratory within the RLN constantly and consistently meets and supports project-specific objectives, achieves quality goals, provides analytical expertise, and produces accurate data within the Agency.

Support special project-specific objectives and goals towards a sustainable future

EPA Regional Laboratories are committed to producing quality data. The laboratories follow EPA organizational directives for a high-performing organization. All 10 laboratories are accredited by National or International Accreditation programs ensuring effective quality systems, improved performance, and defensible data. External assessments are performed regularly at RLN laboratories.

Accreditation following National Environmental Laboratory Accreditation Conference (NELAC) or International Standards Organization (ISO) 17025

Contracting mechanisms are used within the RLN to provide additional procurement of analytical services. The Contract Laboratory Program (CLP) provides standard analytical methods supporting the Superfund Program. Each laboratory uses an Environmental Services Assistance Team (ESAT), which is a contract to support laboratory functions. This organizational structure permits EPA Regional Laboratories to provide quick response to emergencies, while providing timely completion of all projects. During FY2014, 10 Regional Laboratories supported over 143,000 sample analyses and over 1,500 projects.

RLN supports Agency quick responses to emergencies

Regional Laboratory Network: An Overview

Regional Laboratory scientists are a valuable resource. Scientists have expertise in analytical methods, quality assurance and quality control principles, data validation, field analytical techniques, and solving complex analytical projects. During FY2014, the 10 Regional Laboratories supported more than 125 method improvement projects.

Support analytical method improvements



Regional Laboratory scientists are certification officers for the Drinking Water Laboratory Certification Program and participate in state drinking water audit programs. Laboratory scientists also provide management, technical, logistical, and oversight support to EPA, State and tribal programs, operate air monitoring quality assurance programs, and support field sampling functions.

Serve crucial roles in regional drinking water audit programs



EPA Regional Laboratories provided analytical responses to approximately 15 significant emergency response events in FY2014. EPA Regional Laboratories are capable of analyzing samples suspected to contain a variety of chemical and biological compounds, including chemical warfare agents. Also, some Regional Laboratories developed and validated new methods for chemical warfare agent degradation compounds that characterize and remediate contaminated areas.

Respond to Homeland Security events



Within each Regional Laboratory, core capabilities allow support to various EPA programs. Unique capabilities provide the flexibility for each laboratory to meet geographical environmental demands or regional and national initiatives. Three tables (core, unique, and developing) summarize chemical, physical and biological/microbiological capabilities for each region. The Core, Unique, and Developing capabilities tables for each Regional Laboratory are provided in Section IV and are available on the following EPA websites.

Core, Unique, and Developing capabilities span across RLN



Regional Laboratories Core Capabilities — FY2014

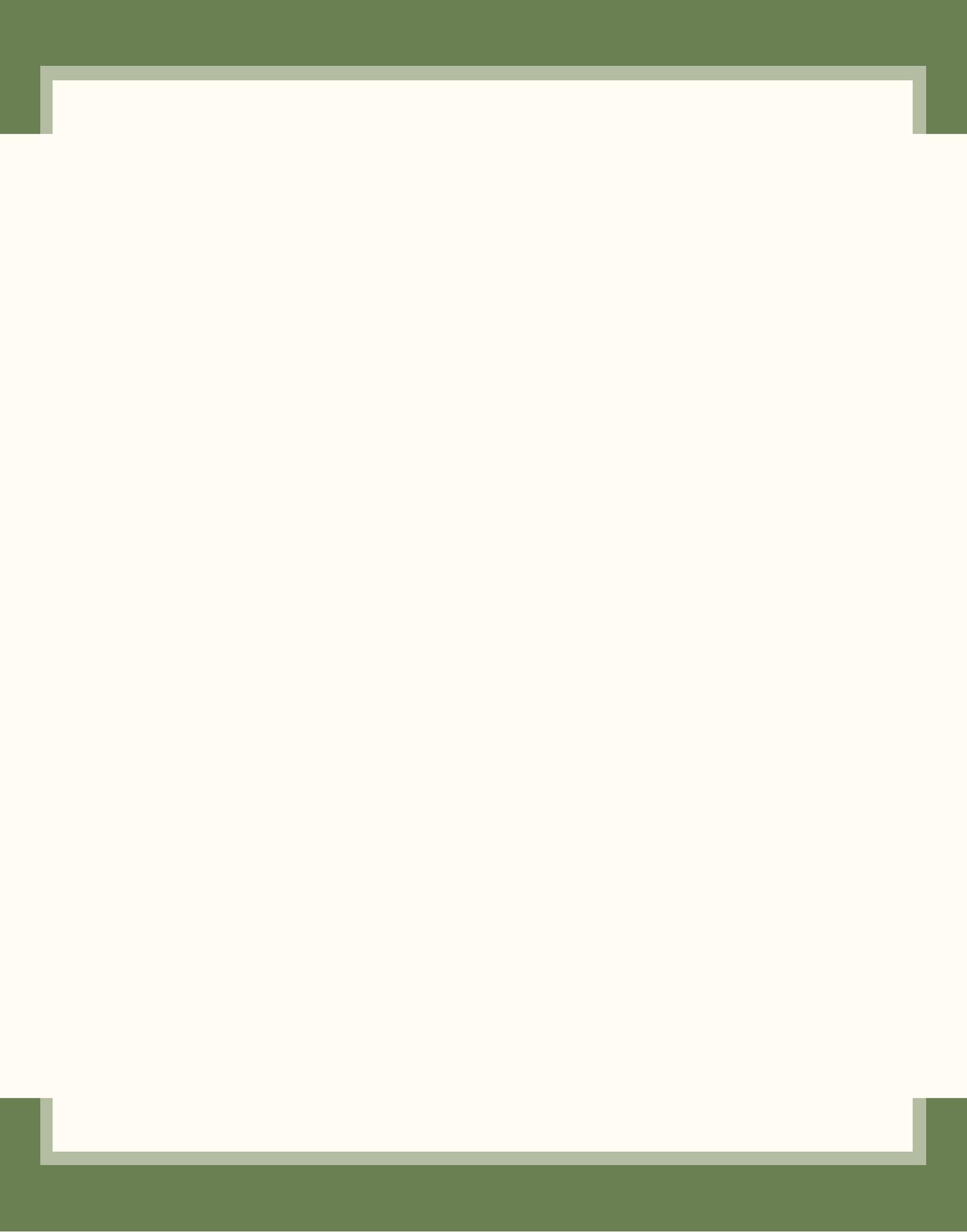
<http://www.epa.gov/aboutepa/regional-science-and-technology-lab-core-capabilities>

Regional Laboratories Unique Capabilities — FY2014

<http://www.epa.gov/regionallabs/epa-regional-laboratories-unique-analytical-capabilities-and-documentation-region>

Regional Laboratories Developing Capabilities — FY2014

<http://www.epa.gov/measurements/collection-methods>



Section II — Regional Laboratory Network Highlights

Protecting Water: A Precious, Limited Resource

Ensure drinking water is safe. Restore and maintain oceans, watersheds, and their aquatic ecosystems to protect human health, support economic and recreational activities, and provide healthy habitat for fish, plants, and wildlife.



Regional Laboratories play an important part in protecting and restoring the nation's water resources by providing:

- key data for regions and their partners and target actions to protect human health and aquatic ecosystems more efficiently
- technical and regulatory support to drinking water laboratories and training and support for water quality monitoring efforts
- analytical support for various projects across the U.S.

Drinking Water Laboratory Certification

Laboratories that analyze drinking water samples are required to be certified by an approved certifying authority. The Environmental Protection Agency (EPA) Regional Laboratory personnel, trained certification officers, conduct on-site evaluation of drinking water laboratories operated by states and tribal communities. Certification Officers also conduct audits of state's certification programs to ensure all laboratories analyzing drinking water samples are following approved methods mandated by EPA's National Primary Drinking Water Regulations. Ultimately, the effort of the laboratory certification program ensures drinking water is free from harmful contaminants. In FY2014, Regional Laboratories performed 31 evaluations and 14 audits.



Regional Laboratories supported

160

water-related projects, including TMDL Studies

Water Quality Assessment and Total Maximum Daily Load (TMDL) Program Support

Crucial for management of our water resources, water quality data are used to characterize waters, identify trends, identify emerging problems, determine whether pollution control programs are working, and help direct pollution control efforts to where they are most needed.

A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that load among the various sources of that pollutant. Regional Laboratories provide substantial analytical support for water quality assessments to, and TMDL development for, water bodies throughout the country.

Methyl Mercury TMDL for San Francisco Bay Delta Watershed

Region 9 Laboratory used its recently-developed capability to support a study of methylmercury in the San Francisco Bay Delta Watershed. As one of the largest and most important estuarine systems on the West Coast, the Bay Delta estuary is supplying drinking water to 25 million people and irrigation water for 4 million acres of farmland. Methylmercury, a potent neurotoxin, poses a unique water management challenge in the Bay Delta. After establishing a TMDL, Region 9 Laboratory, in collaboration with a joint project with the Central Valley Regional Water Quality Control Board, analyzed multiple sets of water samples from agricultural sites. The data provided will be used to develop a more accurate baseline of methylmercury loads associated with irrigated agriculture, thereby refining TMDL levels.

Protecting Water: A Precious, Limited Resource

TMDL Studies in Springfield, Missouri

The Wilson, Jordan, and Pearson Creek TMDLs were established January 2011 after named as impaired waters from multiple-point sources and urban nonpoint sources. The pollutant causing the impairment is listed as unknown; however, toxicity from multiple pollutants and changes in hydrology from increased impervious surfaces are the suspected cause of the impairment. By establishing these TMDLs, EPA met the milestones of the 2001 Consent Decree. However, after a ruling in 2011, EPA was required to further consider impacts based on additional water quality. To meet a settlement agreement, Region 7 conducted monthly water and sediment sampling and diurnal dissolved oxygen monitoring. Water grab samples were analyzed for total phosphorus, total nitrogen, suspended solids, dissolved solids, total solids, dissolved metals, and hardness. Sediment grab samples consisted of metals and polycyclic aromatic hydrocarbons (PAHs). Water and sediment samples from urban streams in Springfield were collected for over 10 different traditional methods, including metals, poly-aromatic hydrocarbons, anions, hardness, semi-volatile organics, and pH. This effort supports EPA's interest in determining what pollutants may be present and whether the creeks meet Missouri water quality standards and effectively restore these streams. The data will be used to write pollutant-specific TMDLs for each creek.

For more information:

(American Canoe Association, et al. v. EPA, No. 98-1195-CV-W in consolidation with No. 98-4282-CV-W, February 27, 2001).

(City of Springfield vs. EPA, et al., (6:11-cv-03383) Wilson, Jordan and Pearson Creeks).

Field Auditing for National Rivers and Streams Assessment

Region 9 Laboratory provided field auditing support for the National Rivers and Streams Assessment (NRSA) 2013-2014. The national survey is designed to estimate the percentage of rivers and streams in good, fair, or poor condition, help citizens and water quality managers evaluate the effectiveness of protection and restoration efforts, and take action to prevent pollution. Trained sampling crews, consisting of representatives from states, tribes, interstate agencies, and private contracts collected samples at 1,800 sites across the country using the same methods at each site. Sampling crews took numerous measurements, including:

- temperature, dissolved oxygen, nutrients, pH, and more
- habitat condition along river or stream banks
- algae and free-floating plants
- benthic macroinvertebrates – small aquatic animals: insects, snails, and crayfish (a source of food for fish)
- bacteria indicators of possible fecal contamination
- type and abundance of fish
- contaminants in fish tissue.

Regional Laboratories supported

115

Oversight- or Enforcement-related activities

Environmental Studies for Ocean-Dredged Material

Management of dredged material and Ocean-Dredged Material Disposal Site (ODMDS) is a shared responsibility of EPA and the U.S. Army Corps of Engineers (USACE) under the Clean Water Act (CWA) and Marine Protection, Research, and Sanctuaries Act (MPRSA). Each year, USACE Portland District (CENWP) dredges 3-to-5 million cubic yards of sediment at the Mouth of the Columbia River (MCR) to maintain the 6-mile long, deep-draft, navigation entrance channel. MCR-dredged material is placed at two EPA-designated ODMDS locations. In 2014, Region 10 Laboratory participated in studies designed to assess the status of the physical, chemical, and biological environment on benthos within previous, current, and future drop zones.

Protecting Water: A Precious, Limited Resource

Effectiveness of Storm Water Best Management Practice (BMP) Evaluated

Since its establishment, EPA made it a goal to adhere to BMPs to protect the quality of water and soil. Following BMP guidelines is particularly important when managing the impacts of nutrient loading that builds within storm water runoff and enters receiving waters. With constantly advancing technology, EPA must respond to changing times and create new ways to continue protecting the environment in the most efficient way possible. To ensure the most current standards, Region 1 Laboratory partnered with the regional water program and two municipalities on a study to evaluate effectiveness of regional storm water BMPs. Partners conducted a project to monitor and evaluate the BMPs that will continue for a minimum of 2 years. The ultimate goal of this project is to determine the most effective and practical set of BMP guidelines to reduce nutrient loads flowing into receiving waters.

For this project, groups worked together to:

1. Identify key water constituents to be analyzed by Region 1 Laboratory and establish general water quality parameters to assess performance of BMPs in treating storm water.
2. Develop a basic Quality Assurance Project Plan (QAPP) for use during BMP construction phases. The QAPP will be used to test sample access methods and storm water content. Afterwards, a second, more-comprehensive QAPP will be implemented to carry sampling and analysis of BMP performances from post-installation through a minimum of 20 rain events and meeting project data quality objectives.
3. Develop performance rating curves for each BMP and create a set of efficient and cost-effective BMP guidelines.

The top BMP arrangements chosen will be extremely valuable in improving EPA's storm water management. The BMPs selected are expected to help with concerns, such as mitigating the costs of development and implementation. The resulting impact of BMP guidelines will be widespread.

Pharmaceuticals and Personal Care Products (PPCP) from Hospital Discharges

Region 2 Laboratory coordinated a 4-month collaborative study to characterize PPCP in hospital effluent and sewage treatment plant (STP) influent/effluent. The study involved six hospitals discharging into four STPs in Suffolk County, New York. Suffolk County field personnel collected the samples from the six hospitals and four STPs. Region 2 Laboratory, in collaboration with Region 8 Laboratory, conducted PPCP analysis of 72 samples, providing results for 206 compounds. Results were used by the Division of Enforcement and Compliance Assistance (DECA) in June 2014.

All **10** Regional Laboratories

provide scientific expertise to support Regional and National Water Programs and Initiatives, which can include analysis, field support, quality assurance and data review, and technical support.



Protecting Water: A Precious, Limited Resource

Cyanobacteria Monitoring & Bloom Watch Pilot Program

Cyanobacteria and their associated toxins are of particular concern to humans and the ecology. Increasing precipitation and land development affects nutrient loads to aquatic systems. Impacted water systems are shut down when cyanotoxins are in the water supply. Ingestion of these algal toxins affects people, animals, wildlife, and pets.

In New England, regional shifts in monitoring efforts highlighted varying cyanobacteria concentrations and toxicity levels. However, different sampling approaches and methodology inconsistencies made it extremely difficult to aggregate data, understand algae characteristics and behavior, and share information across the region.

In 2012, the Region 1 Laboratory convened a region-wide (including New York) cyanobacteria monitoring and “bloom watch” workgroup to ensure uniform consistency with cyanobacteria monitoring methods and protocols. The workgroup consisted of state environmental water quality and beach monitoring programs, departments of public health, tribes, public water suppliers, Non-Governmental Organizations (NGOs), citizen monitoring groups, and academia. In May 2014, the workgroup established a pilot monitoring project, which included an algal taxonomic identification (ID) workshop, methods training, and instrument calibration protocols. Sampling commenced in June 2014 in all New England states.

Three principal monitoring components: were established: in-lake monitoring, shore-side monitoring, and a qualitative “bloom watch” component. In-lake monitoring consisted of a minimum of three sampling sites with collection of an integrated water sample, a cross-section from the surface to 3 meters at each site and a filtrate sample. Shore-side monitoring consisted of a minimum of one sample, a 1-meter integrated sample and one filtrate sample. The site locations remain consistent; additional sites can be added at the discretion of the sampler.

Protocols allow samples to be analyzed on-site using a handheld fluorimeter to measure chlorophyll and

phycocyanin, or frozen to be analyzed at a debriefing session. Fluorimeters were provided to the New England states through the Region 1 Water Monitoring Equipment Loan Program. The “bloom watch” component established protocols to document time and location of a perceived algal bloom and track the frequency and spatial occurrence in the region. Site photos, can be enhanced at microscopic levels for algal identification purposes. A demonstration was provided showing how a smartphone can mimic an inexpensive field microscope.

Smartphone apps have been developed and are being tested. A regional geo-referenced database capable of providing “vulnerability assessment” of a waterbody based on hydro geomorphic characteristics and land use patterns in the watershed is also being tested. Upon project completion, the workgroup will evaluate their progress, refine the approach, make recommendations, and develop a monitoring program.



Capability to analyze
water samples

for over **60** EPA and other

standardized methods

Addressing Climate Change and Improving Air Quality

Protect and improve the air so it is healthy to breathe and risks to human health and the environment are reduced. Reduce greenhouse gas intensity by enhancing partnerships with businesses and other sectors and common-sense regulatory initiatives.



Regional Laboratories actively support the objectives of the Agency's air goals through a variety of activities. These activities include:

- technical support and training
- air monitoring and air monitoring quality assurance
- laboratory support for various air toxics assessments
- laboratory support for numerous other local projects that address specific community risks and method development.

Sorbent Tube Analysis of Routine Air Samples Provide Cost-Effective Alternative

Typically, air samples for volatile organics are collected in Summa™ canisters following Method TO-15 from the EPA Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air. Region 7 developed an enhanced method using sorbent tubes similar to Method TO-17. A three-phased sorbent tube that collects air samples of low to moderate humidity was field-tested at three different sites. Results were comparable to Method TO-15 and met Method TO-17 requirements. Future method development includes validating a single-phase sorbent tube that will also produce good results in high humidity.



Regional Laboratories

**have the capability to analyze for
Organic Compounds in Air**

Vapor Intrusion Study in West Virginia

Vapor intrusion occurs when volatile chemicals migrate from contaminated groundwater or soils into an overlying building in ways similar to that of radon gas seeping into homes. When remediating a contaminated site, analysis of indoor air may be required to assess presence of vapor intrusion. Typically, EPA Method TO-15 using air canisters is employed to measure level of possible contamination.

In 2014, an extensive vapor intrusion sampling event was conducted at a West Virginia remedial site to determine if a new vapor plume emanated from an underlying tetrachloroethylene (PCE) plume. The study was designed to assess impacts to local residents living above the plume and Region 3 Laboratory provided air analysis on these samples.



Pictured above is an air canister used for volatile organic analysis of air samples.

Addressing Climate Change and Improving Air Quality

PM 2.5 Performance Evaluation Program (PEP)

The goal of the PEP is to evaluate total measurement system bias of the particulate matter (PM) 2.5 monitoring network. The laboratory component of the program includes PM filter handling, inspection, equilibration, and weighing; data entry, validation, management, and distribution to client regions; and filter archival and data submittal to the Air Quality System (AQS). The PM filter weighing laboratory is located at Region 4. Other Regional Laboratories also provided support for PEP through performance evaluation audits, quality assurance collocations, and PEP audits. Regional Laboratory staff provided training classes for the PM 2.5 PEP program.



Ambient Air Audits at NCore Stations

NCore is a national multi-pollutant network that integrates several advanced measurement systems for particles, pollutant gases, and meteorology. NCore air monitoring sites operate trace-level instruments that are difficult to audit with conventional through-the-probe air monitoring equipment.

Region 2 developed a standard operating procedure (SOP), used nationally, for conducting these audits, and has identified inaccuracies and potential sources of error. Currently, the region is assessing the scope and magnitude of errors/inaccuracies in existing procedures and methods, and is testing alternative calibration and/or analytical strategies for NCore audits.

Air Quality Monitoring Requires Extensive Analysis

In Pennsylvania, a proposed natural gas production project was identified to measure baseline air quality. The proposed plan outlined locations to conduct ambient air sampling for volatile organic compounds (VOCs). The monitoring project was part of the State and Local Agency Monitoring Stations (SLAMS), which consists of a network of monitoring stations. Size and distribution is determined by the needs of state and local air pollution control agencies to meet their respective state implementation plan (SIP) requirements. The primary purpose of air monitoring is to determine if concentrations of certain VOCs can be shown to statistically correlate to gas exploration and production activities. Air samples were collected for a period of up to 18 months and will continue the following year after gas exploration begins. Sampling began in February 2014 and analysis was conducted by the Region 3 Laboratory using EPA Method TO-15.

515 PM 2.5 audits
conducted in FY2014

Taking Action on Toxics and Chemical Safety

Keeping communities safe and healthy by reducing risks associated with exposure to chemicals in commerce, indoor and outdoor environments, and products and food.



The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or Superfund, and the Resource Conservation and Recovery Act (RCRA) provide the legal basis for EPA's efforts to preserve and restore land using the most effective waste management and cleanup methods available. By supporting these programs, the Regional Laboratories:

- Analyze hazardous and non-hazardous waste
- Implement applied research and method development to meet evolving analytical needs of Superfund and RCRA programs
- Ensure vigilant readiness for emergency response to environmental disasters, hazardous materials releases, time-critical removals, and inland oil spills.

Perfluorinated Chemicals (PFCs) Method Evaluated for Wastewater and Solid Matrices

PFCs are an ongoing concern for EPA. Products manufactured and treated with PFCs include clothing, fabrics, surface treatments, cleansers, and cookware, which enter the environment via down-the-drain disposal. Other PFC products are directly discharged into the environment from fire-fighting foams and surface treatments. Region 5 Laboratory participated in preliminary semi-continuous activated sludge (SCAS) experiments and evaluated other PFC tests. An analytical method to measure PFCs in wastewater and solid matrices was developed and accepted by the American Society for Testing and Materials (ASTM), analyzing PFCs for SCAS study by an approved method.

Trichloroethylene (TCE) Impacts Investigated in Meramec Caverns

The topography of southeastern Missouri is characterized by numerous caves, sinkholes, fissures, and underground streams. Meramec Caverns is one of the largest cave systems in Missouri. Unfortunately, it is impacted by a subsurface plume of TCE that originates from a site approximately 5 miles away.

Concerns were raised about TCE exposures to visitors and employees touring the commercialized portion of Meramec Caverns and the ecological health of cave-dwelling fauna.

Using Region 7 mobile laboratory, on-site TCE concentrations in both commercialized and native portions of Meramec Caverns were analyzed by gas chromatography/mass spectrometry (GC/MS) on samples of cave air using portable bag samplers. The data generated characterized distribution, concentration, and ventilation of TCE throughout the cave complex. This project is continuing into FY2015.

58% of Regional Laboratory analyses support Superfund program



Taking Action on Toxics and Chemical Safety

Ongoing Monitoring at Wyckoff/Eagle Harbor Superfund Site

The Wyckoff/Eagle Harbor Superfund site is located on the east side of Bainbridge Island in Central Puget Sound, Washington. The East Harbor Operable Unit (OU) 01 consists of more than 70 acres of intertidal and subtidal habitats contaminated by releases of creosote and other wood-treating chemicals from a now defunct wood-treating plant. The releases contaminated bottom sediments of Eagle Harbor with PAHs. In 1994-1995, EPA capped more than 50 acres of the harbor, placing a 3-foot thick layer of clean dredged sand on top of the contaminated sediments. Creosote seeps still occur on the beaches. To ensure the capped areas of the site continue to protect human health and the environment, EPA monitors contaminant concentrations in sediments, pore-water, and clam tissue collected from the beaches. Eagle Harbor is within the Suquamish tribe fishing area. The Suquamish tribe retains the right to harvest fish and marine invertebrates and have their fishery resource habitat areas protected.

Region 10 Laboratory provided analytical support for treatment plant and monitoring events for more than 20 years. In 2014 about 20 clam composite samples were collected as part of a monitoring event. Region 10 developed a specialized method for preparing clam tissues for analysis called QuEChERS (Quick, Easy, Cheap, Effective, Rugged, Safe). Lower sensitivity was obtained using GC/MS/secondary ion mass spectrometry (SIMS). Results were used to determine if shellfish are suitable for harvest.

Response to Chemical Spill

A chemical spill occurred on an Ohio River tributary, which led to a Superfund emergency response. The On-Scene Coordinator (OSC) in charge of operations requested Region 5 Laboratory assistance with analysis of the chemical in the water. The chemical, (Tri-n-butyl)-n-tetradecylphosphoniumchloride, abbreviated TTPC, was detectable by liquid chromatography/mass spectrometry (LC/MS). A method was quickly developed and put to use within a month of the spill. Over 100 water samples have been analyzed to date to aid in the response effort.

Over **6,000** analyses conducted by
Regional Laboratories for Emergency Response
activities

Spill Response in West Virginia

In January 2014, the chemical 4-methylcyclohexanemethanol (MCHM) spilled in the Elk River in Charleston, West Virginia. The spilled chemical, used in coal preparation and processing, caused a drinking water advisory affecting approximately 300,000 people in nine counties. Other chemicals, such as polyglycol ethers (PPH), were later identified as part of the release.

Region 3 Laboratory identified analytical techniques for MCHM and PPH in water, striving to meet health advisory levels to ensure the reliability of analytical methods used by public utilities and other organizations. Both GC/MS and high performance liquid chromatography/ultraviolet spectroscopy (HPLC/UV) were used along with other techniques to fully characterize the spilled material.

Quick Analysis and Delivery of Results for Ringwood Mines Superfund Site Removal Response

Region 2 Laboratory provided analytical support to the Ringwood Mines Superfund Site. The site was re-opened due to additional contamination found in residential areas originally deemed safe. The laboratory analyzed over 600 soil samples over a 6-month period, primarily for lead, in support of removal program activities at key residences. The laboratory provided validated results within 20 to 36 hours of each sample delivery.



Making a Visible Difference in Communities across the Country

Align community-based activities to provide seamless assistance to communities, both urban and rural, while maximizing efficiency and results. Expand support of community efforts to build healthy, sustainable, green neighborhoods and reduce and prevent harmful exposures and health risks to children and underserved, overburdened communities.



Environmental and public health impacts affect people most significantly where they live – at the community level. EPA is focused on providing better support to communities, especially in environmentally-overburdened, underserved, and economically-distressed areas where the needs are greatest.

Regional Laboratories coordinate technical assistance and other resources across EPA Programs; with states, tribes, and local governments; and with other federal agencies to support communities as they pursue environmental improvements that enhance economic opportunity and quality of life.

Air Sampling and Analysis from Southeast Chicago

In response to air quality concerns in the Upper Midwest, Region 5 Laboratory actively monitored outdoor air pollutants and toxins. In investigating petroleum coke (petcoke) piles, the source of coal-like dust particles in the air, Region 5 scientists analyzed filters and collected soil and wipe samples from residences in southeast Chicago to determine whether air quality was impacting the health of homes. Petcoke piles have been a major concern in both Detroit and Chicago due to their recent storage in both cities. Samples were taken directly from the petcoke piles, analyzed, and compared with those taken from residential locations. The comparisons indicated a direct correlation to materials stored on-site at the refineries suggesting the piles were the source of contamination found in the residences. The findings resulted in capping and eventual removal of petcoke material from outside storage areas. This victory for human health is expected to protect many individuals from the impacts of poor air quality.

Dye Study near Bridgeport, Connecticut

Region 1 Laboratory scientists conducted two dye dilution studies on the Lower Housatonic River in Connecticut over a 2-week period in May 2014. EPA assisted in designing and conducting a dye study for the Stratford Water Pollution Control Facility and a second study at the Milford Housatonic Wastewater Treatment Plant, with discharges into the Housatonic River. Data have been used to help Connecticut and the U.S. Food and Drug Administration (FDA) to determine the extent to which treatment plants impact the Housatonic River and areas in the Long Island Sound. The study has also helped evaluate existing shellfish closure areas and determine whether they need to be modified.

The Region 1 team designed the monitoring portion of the study and conducted nearfield tracking of dye concentrations around the outfalls. EPA staff also handled boat operations and tracked real-time concentrations of dye at fixed stations in transects throughout the estuary and into Long Island Sound.

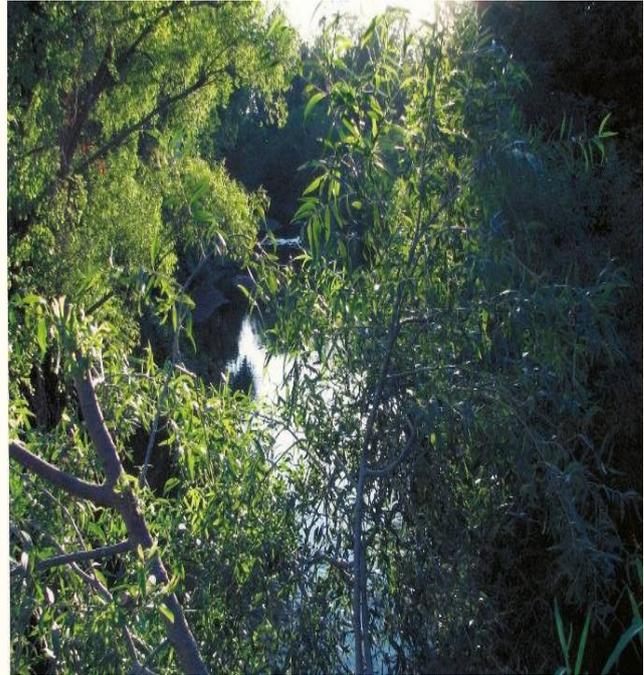
These studies involved long days of tracking dye on EPA boats to coincide with tides requiring staff to be on location in Connecticut for 2 weeks. The complexity of this study was due to the logistics of injecting dye at two plants, the vast extent of the study area, rough seas at times, and substantial media presence.



Making a Visible Difference in Communities across the Country

Achieving Lower Detection Limits of Pesticides in Impaired Waters near City of Birmingham

The city of Birmingham, Alabama and the Alabama Department of Environmental Management (ADEM) sought to remove Village Creek from the State's list of impaired waters. In accordance with Section 303(d) of the Clean Water Act, two sections of Village Creek have previously been identified as impaired due to the presence of the legacy pesticide dieldrin, which has been banned since 1987. Since the existing detection limit was higher than the human health criteria for dieldrin, Region 4 Laboratory improved the method by using a smaller extraction volume yielding a 100-fold decrease in detection limit. Hence, future sample results met the lower human health criteria and will determine potential delisting of the two sections of Village Creek.



Lead in Schools Initiative

Several Regional Laboratories assisted Region 2 with the analysis of water samples from multiple schools and daycare centers for the Lead-in-Schools Initiative. Inductively-coupled plasma/mass spectrometry (ICP/MS) was used for sample analysis. Regions participating included Region 2, Region 5, Region 6, Region 7, Region 9, and Region 10.

Over **706** samples analyzed in FY2014 supporting EPA's Brownfields Program, which is designed to empower states, communities, and other stakeholders to redevelop abandoned industrial and commercial properties with potential contamination.

Launching a New Era of State, Tribal, and Local Partnerships

Strengthen partnerships with states, tribes, local governments, and global communities central to the success of the national environmental protection program through consultation, collaboration, and shared accountability.



By providing support at the regional level, opportunities abound to work in concert with states, tribes, and local entities in providing technical support. Types of activities where Regional Laboratories become involved include:

- Analytical support to states or tribes
- Assisting communities and volunteer monitoring groups with implementation of Citizen Science
- Providing training and technical support, including training in preparation of QAPPs.

River and Stream Assessment for Wisconsin

Region 5 provided assistance to the State of Wisconsin during the statewide river and stream sediment assessment. Region 5 Laboratory analyzed over 100 sediment samples for 10 different chemical tests, including both inorganic and organic analyses over a 3-year period. This effort was initiated to complete an assessment of the health of rivers and streams throughout the state.

Training for New England Tribes

Region 1 Laboratory organized and hosted a 2-day statistics training course in 2014 for about 20 New England environmental tribal staff. The course focused on the use of statistics for analyzing water quality data, with a focus on using "R," an open-source statistical program.

Citizen Science becomes Reality

One of Region 2 program goals is to raise the visibility level of citizen science in the region, support the formation of citizen science groups, and provide technical guidance and assistance to improve data quality of monitoring efforts. The citizen science pilot project in the New York-New Jersey Harbor serves as a blueprint for future citizen science efforts, which connected EPA scientists with citizens trained to collect and analyze water quality data, increasing knowledge about pathogen contamination of the harbor. Region 2 helped develop a "tool kit" for water quality monitoring. The components of the "tool kit" include:

- 1) QAPP template for planning monitoring projects
- 2) Field and laboratory datasheets to record observations/results and method information
- 3) SOPs for common water quality measurements
- 4) YouTube videos on sample collection procedures
- 5) Equipment loan program to provide critical monitoring equipment for collecting environmental data.

Application and use of the region's citizen science "tool kit" was successfully tested during the pilot by four citizen science groups. The tools will be refined and made available on a formal equipment loan program in FY2015 for future citizen science groups, with an emphasis on Environmental Justice areas.



Embracing EPA as a High-Performing Organization

Maintain and attract EPA's diverse and engaged workforce of the future with a more collaborative work environment. Modernize our business practices, taking advantage of new tools and technologies, and improve the way we work as a high-performing Agency.



One of the most important regional and state laboratory partnerships is sharing unique expertise, when needed. In 2014, Regional Laboratories supported various projects. Laboratories relied on the expertise of other Regional Laboratories with unique capability/capacity.

Collaboration with the Office of Research and Development (ORD) provided opportunities for scientists to expand their knowledge and skills through the Regional Research and Partnership Program.

Increased Collaboration Tools

Region 1 Laboratory developed a Regional Monitoring Network (RMN) to determine the condition of, and changes in, high-quality reference streams in New York and New England to climate change and other stressors on water temperature, flow, and macroinvertebrate communities. RMN is being duplicated at other EPA regions in the northeast, in close collaboration with other agencies and groups collecting similar data. Centralized data repositories and protocols are in development, through efforts of the U.S. Geological Survey (USGS), EPA, and others (for example: <http://wim.usgs.gov/NorEaST/>).

Cost Savings for Air Sampling

Using sorbent tubes, Region 7 scientists saved tremendous time and expense. Historically, air samples were collected in Summa™ canisters and followed a procedure delineated in the *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air*, Method TO-15. The Summa™ canisters were, and are currently, in limited supply due to high costs, costing thousands of dollars per canister. To purchase the canisters and manage rotating inventory advance planning is required.

Region 7 developed a three-phased sorbent tube that realizes significant savings since the cost of tubes are significantly lower than canisters and tubes can be reused 100 times. Shipping costs for the tubes are also much lower.

Laboratory Technical Information Group (LTIG): Enhancing Technical Knowledge of Laboratory Scientists

In May 2014, LTIG held their 16th Annual Conference for laboratory scientists. LTIG, organized in 1998, invites laboratory scientists from all EPA Laboratories, communicating regularly through monthly conference calls and conducting annual conferences. LTIG's goal is to create a forum for technical discussion where chemists from all 10 Regional Laboratories and other EPA offices can communicate and exchange ideas on analytical procedures and problems.

7 Regional Scientists worked with ORD under the Regional Research Partnership Program (R2P2) - a program to enhance collaboration and share knowledge between ORD and the Regions

Embracing EPA as a High-Performing Organization

Reduce Solvent Use by Testing New Technology

Region 7 chemists collaborated with multiple partners to provide analytical data on two different solid-phase extraction (SPE) products in response to recent Clean Water Methods update.

Chemists have been working a new sorbent-coated stir bar technology (Twister) in the analysis of urban stream water monitoring for four years. A method for semi-



volatile analytes, which included personal care products and pesticides, was developed and results presented. Chemists also worked with the Office of Water providing comments on method revisions for EPA Methods 608, 624, and 625 resulting in the final publication, which closed May 2015.

Region 7 chemists began working with the Independent Laboratories Institute (ILI) of the American Council of Independent Laboratories (ACIL) and meeting with Horizon Technologies to test the SPE technology with Horizon equipment. ILI was tasked with coordinating large projects to benefit all laboratories and vendors. The first major project, a multi-laboratory study, was determined the feasibility of using SPE techniques using EPA water methods with the Office of Water as the ultimate customer, designed to produce the data quality required by alternate test procedures. Vendors had to identify at least three laboratories, including one of their own, to participate in this study, which included 25 laboratories from industry, government, and academia.



Region 7 chemists participated in two phases of the project, using stir bar technology and Horizon SPE products. Electronic results were provided to an anonymous sample vendor who consolidated the data and performed statistical analysis. The results of the study proved that the SPE technique was a viable candidate to replace the traditional separatory funnel extraction.

The ultimate benefit to the Agency is the flexibility to use newer technology that significantly reduces the use of hazardous solvents and the resulting hazardous waste. Once the method revisions are approved, new extraction methods will be allowed for enforcement of the CWA with an eye on green chemistry.



125

Method Enhancement or Development
Projects
completed in FY2014

Embracing EPA as a High-Performing Organization

Regional Laboratories Support ORD — Hydraulic Fracturing Study

Regional Laboratories coordinated with EPA's ORD on a 2-year research project directed by U.S. Congress to study the relationship between hydraulic fracturing and drinking water resources.

Natural gas plays a key role in the future of our nation's clean energy. Recent advances in drilling technologies—including horizontal drilling and hydraulic fracturing—have made vast reserves of natural gas economically recoverable in the U.S. Responsible development of America's oil and gas resources offers important economic, energy, security and environmental benefits.

Hydraulic fracturing is a well-stimulation technique used to maximize production of oil and natural gas in unconventional reservoirs, such as shale, coal beds, and tight sands. During hydraulic fracturing, specially-engineered fluids containing chemical additives are pumped under high pressure into the well to create and hold open fractures in the formation. These fractures increase the exposed surface area of the rock in the formation and stimulate the flow of natural gas or oil to the wellbore. The use of hydraulic fracturing concerns have increased due to potential environmental and potential risks to drinking water.

Region 3 and Region 7 Laboratories provided chemical analysis and field support for semi-volatiles, diesel-range organics, gasoline-range organics, glycols and other unknown identifications.

Mercury at Trask Forest

Land use is a critical parameter controlling environmental mercury (Hg) cycling. Factors that influence the mobility (for example, water flow, sediment mobilization), bioavailability of inorganic mercury (particulate-versus-filtered fractions), and other variables associated with methyl mercury production (for example, sulfate, organic carbon) are distinctly associated with numerous land-use practices that may allow management actions to influence bioaccumulation in aquatic habitats. Methylmercury (MeHg), which is produced by anoxic bacteria, primarily sulfate-reducing bacteria (SRB), is the more toxic and bioaccumulative form of Hg. Timber harvesting is a widespread land-use activity in the Pacific Northwest (PNW). There are approximately 60,000 square miles of harvestable forestland in PNW, which accounts for nearly 25 percent of the region's total land area. Thus, Hg distribution, cycling, and bioaccumulation in PNW may be strongly influenced by the magnitude and scale of regional timber activities.

Region 10 has been collaborating with USGS since 2013 to study the effects of logging practices on mercury processing and transport in Oregon's Trask River watershed. Region 10 Laboratory supported the research with MeHg and ultra-low-level Hg analyses (519 analyses total) of surface waters collected to study the effects of different harvesting techniques, such as clearcutting and selective harvesting. The analyses were challenging due to complexities of the MeHg method and the need to maintain a pristine laboratory environment to accurately measure to very low levels in samples. One preliminary conclusion is that dissolved mercury transports out of watersheds that were clear-cut is significantly greater than watersheds that have not been harvested. The remaining analysis is to evaluate changes in mercury loading from the watersheds. Once this work is complete, the study will be published in a peer-reviewed journal by USGS and EPA.

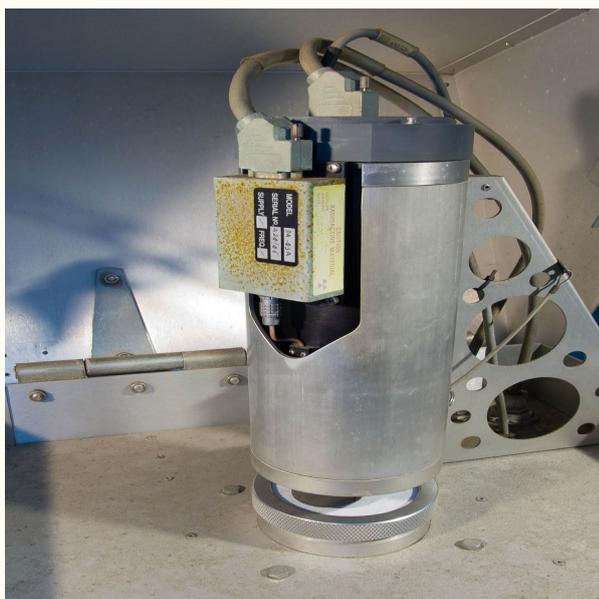
Embracing EPA as a High-Performing Organization

Preserving Land at Longhorn Army Ammunitions Site

To assist with the analysis of related samples at the Longhorn Army Ammunitions site, Region 6 Laboratory developed a method for analyzing all six dinitrotoluene (DNT) isomers. These chemicals were suspected to be breakdown products from munitions stored on base. An analytical procedure using a gas chromatograph-triple quadrupole mass spectrometer (GC/MS/MS) was developed to successfully validate extractions down to 20 parts per trillion.

Development of Dissolved Gases or Light Hydrocarbon Method

Region 6 coordinated a three-laboratory round robin method and analysis study for light hydrocarbons (LHCs) in water by gas chromatography/flame ionization detector (GC/FID). Region 6 Laboratory, an instrument vendor, and a state laboratory exchanged samples and coordinated instrument conditions over a 1-week period. The results were statistically analyzed for precision and accuracy parameters. Currently, no official EPA method for this analysis; however, Regions 5, 6, and the Office of Solid Waste and Emergency Response (OSWER)/Office of Resource Conservation and Recovery (ORCR) have a pending proposal to further develop this effort into an official EPA method.



New Method to Measure Lower Levels of Lead in Soils

The Centers for Disease Control (CDC) observed continued health effects in people due to lead in their blood even though presence of lead at historical remediation sites were well below the action levels needed to protect human health. Socioeconomically disadvantaged children are particularly susceptible to health effects due to the persistence of lead bound to small particulate matter in their environment and the tendency for children to put "dirty" hands to their mouth. Therefore, EPA is reevaluating the action level for lead in soils. In anticipation of the need to detect lead in soils at lower concentrations, Region 4 Laboratory is developing a new method for preparing soil samples. The new method focuses on soils most likely to affect at-risk human subjects. This method comprises sieving the raw sample to a particular particle size and extracting the lead using the human amino acid, glycine, to mimic effects of digestion. Historical studies will be repeated with the new methodology to evaluate site compliance with the new action level for lead.

4,958

Field Analyses conducted in 2014
Almost double from 2013

Working toward a Sustainable Future

Advance sustainable environmental outcomes and optimize economic and social outcomes through Agency decisions and actions, which include expanding conversation on environmentalism and engaging a broad range of stakeholders.



Regional Laboratories continue to explore opportunities to reduce chemical usage or improve processes.

Reducing Solvents for EPA Methods 608 and 625

Region 7 chemists developed several solid-phase extraction methods that reduce solvent usage while maintaining or improving detection limits. In FY2014, extensive method development was culminated as a partnership with two different vendors and the ACIL. Region 7 was one of 25 laboratories participating in a two-phase study, which provided technical response to the comment period for the Code of Federal Regulations (CFR) update of EPA Methods 608 and 625.



Supporting Enforcement Actions related to Ozone-Depleting Compounds

Many people often take for granted the chemical safety of their home appliances. Particularly, chemicals that may come in contact with food or the air we breathe. This year, the Criminal Investigation Division (CID) requested Region 6 Laboratory to assist in an air refrigerant purity investigation, by analyzing samples of pressure cylinders or containers used to hold gases at a pressure greater than that of the atmosphere, containing an air conditioning refrigerant.

R-22, a non-flammable, ozone-depleting compound, was listed as the main refrigerant; however, other chemicals are suspected to be present in these cylinders.

R-22 is currently being phased out in products used for domestic consumption under the Montreal Protocol Provisions of the Clean Air Act (CAA). The limited remaining amounts of R-22 have resulted in replacement refrigerants being sold at lower costs. However, these substitutes may be mixtures containing other flammable and dangerous compounds, such as propane and butane mixtures that can damage the refrigerator's air conditioning system. Explosions and fires have been reported when such alternative refrigerants are used, making them extremely dangerous to both animals and humans.

Region 6 Laboratory developed a new technique for transferring the cylinder contents to the instrument. As suspected, none of the samples analyzed contained R-22 above the reporting limit. However, propane, a hydrocarbon and flammable refrigerant was discovered. Hydrocarbon refrigerants pose a particular hazard, especially when they are stored in containers that are not properly labeled. Analytical support provided by Region 6 Laboratory helped ensure the container contents are used with the necessary precautions; thus, reducing the potential of injury to those that use the refrigerant cylinders.





Section III — FY2014 Laboratory Accomplishment Results Summary

FY2014 Laboratory Accomplishment Results Summary

This section summarizes a number of the common support services provided by the RLN.

Because of the unique nature of the support provided by Regional Laboratories, the ideal Regional Laboratory scientist is one part research scientist and one part production scientist. Regional Laboratory scientists are capable of developing methods (often with short lead times), focusing on quality control, and operating under demanding delivery schedules.

Regional Laboratory staff support diverse and challenging requests. During FY2014, RLN supported more than 143,000 analyses. The distribution of work by the RLN is shown in Figures 1 and 2. These totals exclude Quality Control (QC) samples, which add an additional 20%.

Figure 1. Analytical Support to EPA Programs in FY2014 (143,234 Total Analyses)

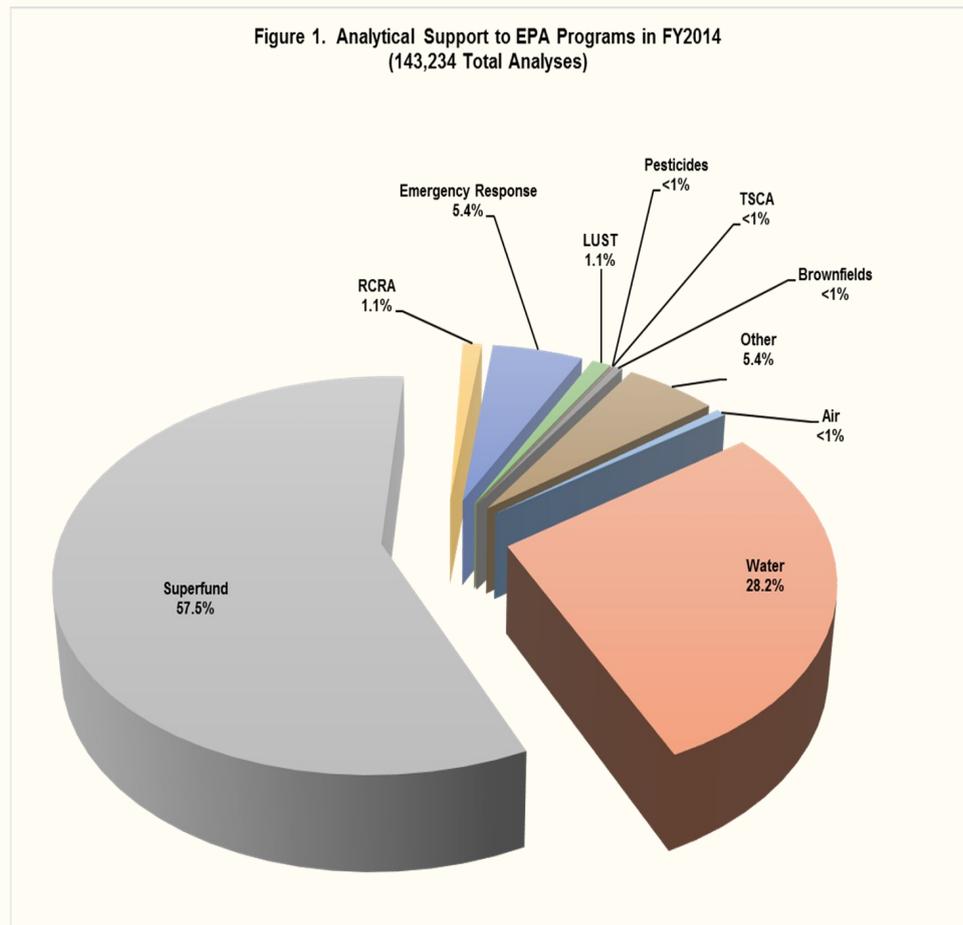
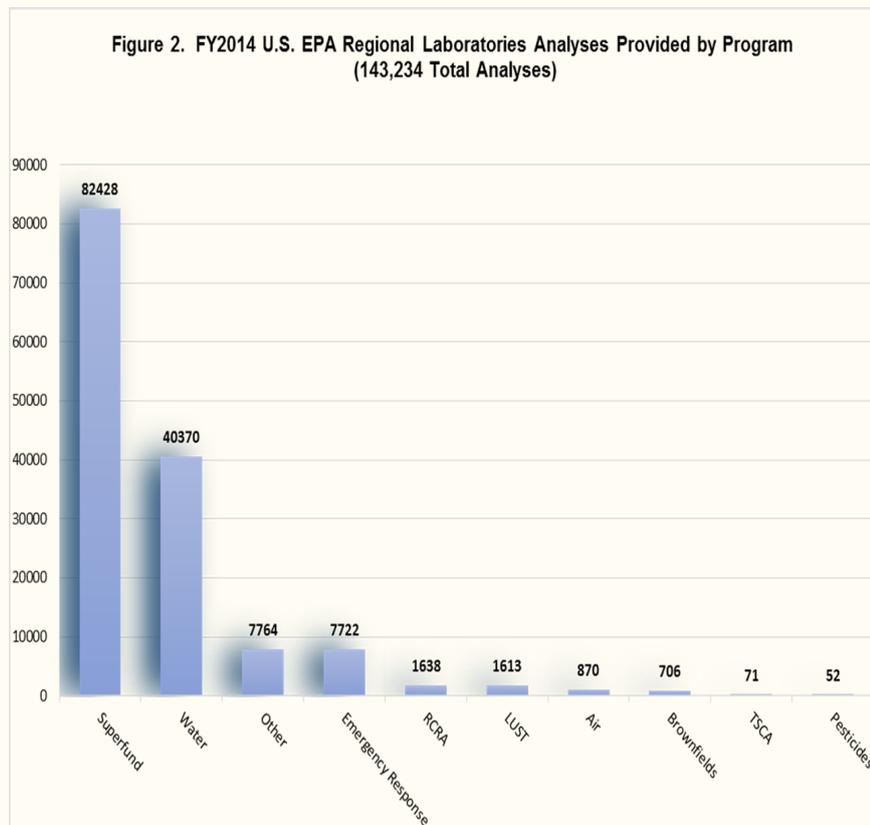


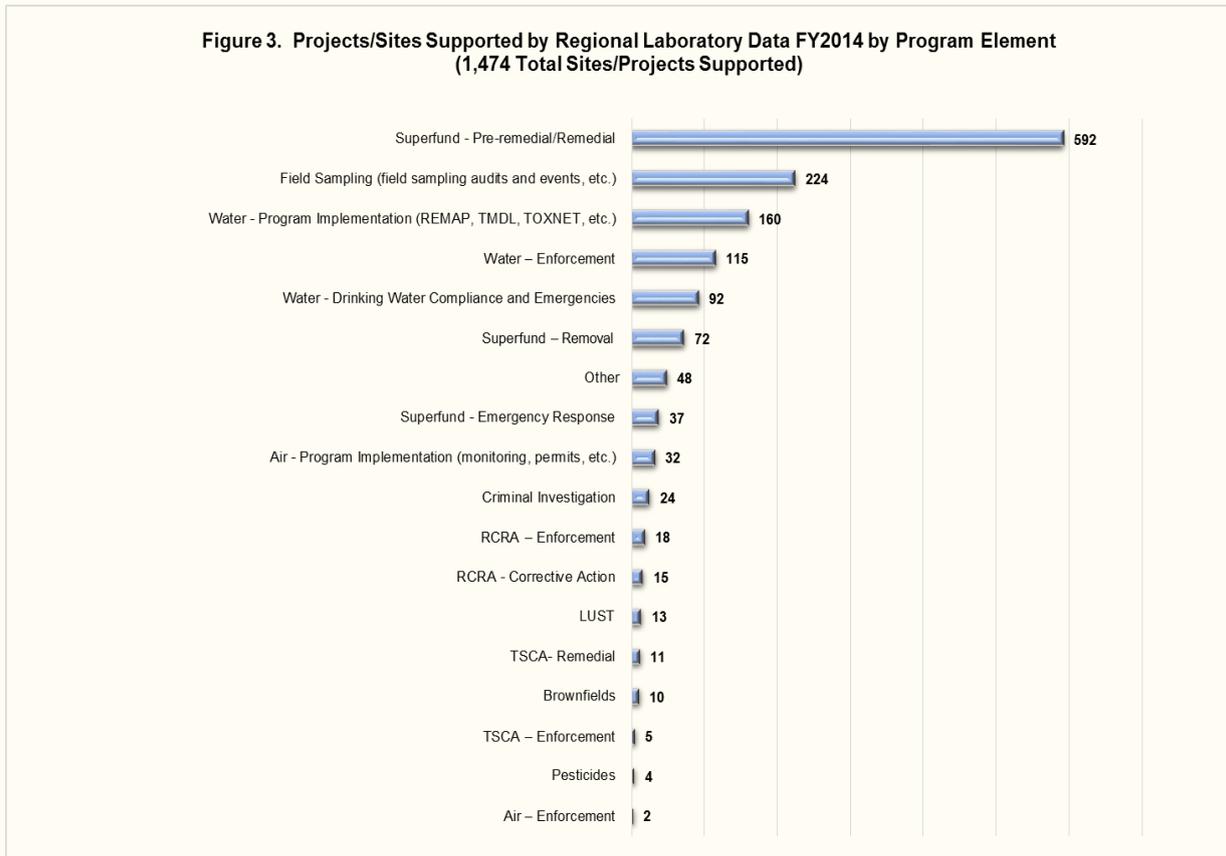
Figure 2. FY2014 U.S. EPA Regional Laboratories Analyses Provided by Program (143,234 Total Analyses)



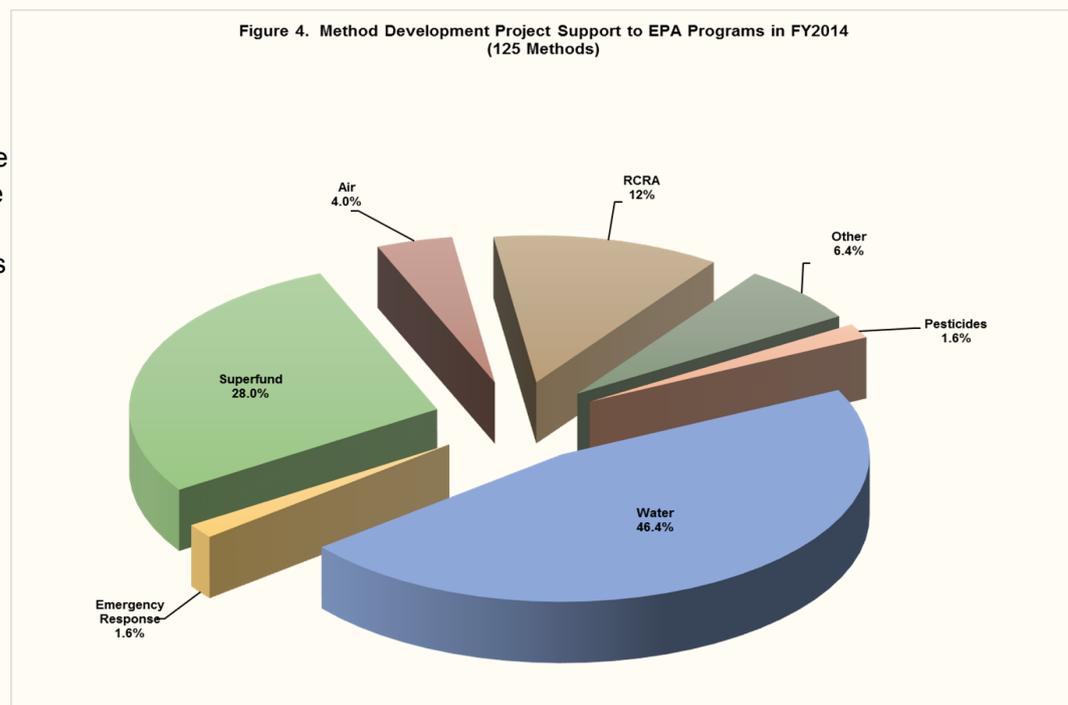
In keeping with prior years, Superfund program continues to be the largest volume requestor of analytical services (57.5%), followed by Water Programs (28.2%). Emergency Response program support continues to be significant at 5.4%, with RLN laboratories analyzing 7,722 samples in conjunction with time-critical responses to environmental disasters, hazardous materials releases, priority contaminant removals, and other threats to human health and/or the environment, which aided in timely and cost-effective decision-making in the field. All 10 Regional Laboratories augmented the National Enforcement Investigations Center's (NEIC's) capacity in support of important criminal cases, analyzing 424 criminal samples during the year.

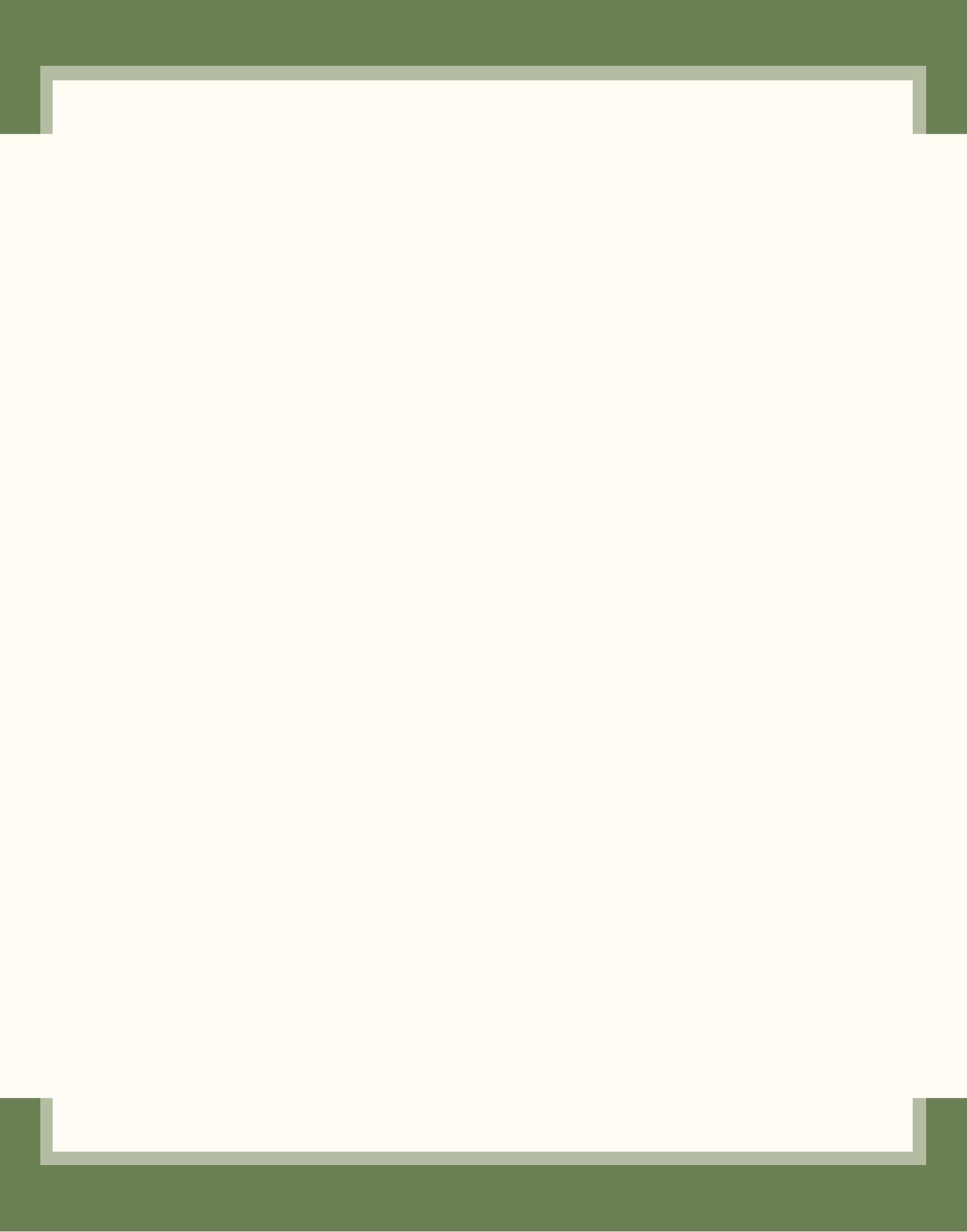
FY2014 Laboratory Accomplishment Results Summary

Figure 3 summarizes the number of analytical projects supported by RLN according to EPA program element. Collectively, RLN supported 1,474 projects.



A significant amount of work supported during the year required methods be developed specifically to address the unique needs of a particular region (Figure 4). Often, methods developed by a region to address a local environmental challenge are mobilized in other regions as their benefit is realized and/or as the need arises.





Section IV — Regional Laboratories Capabilities Tables — FY2014

Regional Laboratories Core Capabilities — FY2014

I. Chemistry												
Analyte/Group Name	Sample Media	Analytical Technique	Regional Capability									
			1	2	3	4	5	6	7	8	9	10
INORGANIC CHEMISTRY												
Acidity	Water	Titrimetric		x	x	x	x		x	x		
Alkalinity	Water	Titrimetric	x	x	x	x	x	x	x	x	x	x
Asbestos	Solids/Bulk material	PLM	x						x	x		x
	Soil/Sediment	PLM	x						x	x		x
Anions	Water	IC	x	x	x	x	x	x	x	x	x	x
	Water	Titrimetric		x	x							
Chromium, Hexavalent (Cr+6)	Water	Colorimetric		x		x		x	x			x
	Soil/Sediment	Colorimetric		x		x						x
	Water	IC			x	x	x	x	x		x	
	Soil/Sediment	IC			x		x					
Cyanide, Amenable	Water	Colorimetric	x	x		x	x	x	x	x	x	x
	Soil/Sediment	Colorimetric	x	x		x		x	x	x		x
Cyanide, Total	Water	Colorimetric	x	x	x	x	x	x	x	x	x	x
	Soil/Sediment	Colorimetric	x	x	x	x	x	x	x	x		x
	Waste	Colorimetric	x	x	x	x	x	x		x		x
Fluoride	Water	ISE	x	x		x	x		x			
	Water	IC	x	x	x	x	x	x	x	x	x	x
Hardness	Water	Colorimetric										
	Water	Titrimetric		x	x				x			x
	Water	ICP/Calculation	x	x	x	x	x	x	x	x	x	x
Mercury, Total	Water	CVAA	x	x	x	x	x	x		x	x	x
	Water	Direct Hg Analysis							x			
	Soil/Sediment	CVAA	x	x	x	x	x	x		x	x	x
	Soil/Sediment	Direct Hg Analysis	x				x		x		x	
	Tissue (fish &/or plant)	CVAA	x	x	x	x		x		x	x	x
	Tissue (fish &/or plant)	Direct Hg Analysis	x					x	x		x	x
	Waste (oil, drum, etc.)	CVAA	x	x	x	x	x	x		x	x	x
	Waste (oil, drum, etc.)	Direct Hg Analysis							x			
Mercury (TCLP)	Soil/Waste (oil, drum, etc.)	CVAA		x	x	x	x	x		x	x	x
	Soil/Waste (oil, drum, etc.)	Direct Hg Analysis					x		x			
Metals, Total	Water	ICP/AES	x	x	x	x	x	x	x	x	x	x
	Soil/Sediment	ICP/AES	x	x	x	x	x	x	x	x	x	x
	Tissue (fish &/or plant)	ICP/AES	x	x	x	x			x	x	x	x
	Waste (oil, drum, etc.)	ICP/AES	x	x	x	x	x	x	x	x	x	x
Metals (TCLP)	Soil/Waste (oil, drum, etc.)	ICP/AES		x	x	x	x	x	x	x	x	x
Metals, Total	Water	GFAA	x									
	Soil/Sediment	GFAA	x									
	Tissue (fish &/or plant)	GFAA	x									
	Waste (oil, drum, etc.)	GFAA	x									
Metals (TCLP)	Soil/Waste (oil, drum, etc.)	GFAA										
Metals, Total	Water	ICP/MS	x	x	x	x	x	x	x	x	x	x
	Soil/Sediment	ICP/MS	x	x	x	x	x	x	x	x		x
	Tissue (fish &/or plant)	ICP/MS		x	x	x			x	x	x	x
	Waste (oil, drum, etc.)	ICP/MS			x	x		x	x	x		
Metals (TCLP)	Soil/Waste (oil, drum, etc.)	ICP/MS				x		x	x	x		
Nitrogen (Ammonia)	Water	Colorimetric		x	x	x	x	x	x	x	x	x
	Soil/Sediment	Colorimetric			x	x	x					
	Water	Electrode		x								

Regional Laboratories Core Capabilities — FY2014

I. Chemistry												
Analyte/Group Name	Sample Media	Analytical Technique	Regional Capability									
			1	2	3	4	5	6	7	8	9	10
INORGANIC CHEMISTRY												
Nitrogen (NO ₃ &/or NO ₂)	Water	Colorimetric		x	x	x	x	x	x	x	x	x
	Soil	Colorimetric				x	x		x			x
	Water	IC	x	x	x	x	x		x	x	x	x
	Soil	IC	x		x	x	x		x		x	x
Nitrogen, Total Kjeldahl	Water	Colorimetric		x	x	x	x	x	x		x	x
	Soil	Colorimetric			x	x	x	x	x			
Perchlorate	Water	IC					x				x	
	Soil	IC									x	
	Water	IC with LC/MS confirmation			x		x					x
	Water, Soil/Sediment	LC/MS			x							x
	Water	LC/MS/MS	x						x		x	x
Phosphorus, Ortho	Water	Colorimetric	x	x		x		x	x	x		x
	Water	IC	x	x	x	x	x		x	x	x	x
Phosphorus, Total	Water	Colorimetric	x	x	x	x	x	x	x	x	x	x
	Soil	Colorimetric	x		x	x	x					x
Sulfate	Water	IC	x	x	x	x	x	x	x	x	x	x
	Soil	IC	x		x	x	x		x	x	x	
	Water	Turbidimetric	x	x					x			
	Soil	Turbidimetric	x									
Sulfide	Water	Colorimetric		x					x			
	Soil	Colorimetric										
	Water	IC, Turbidimetric						x				
	Water	Titrimetric		x								x
ORGANIC CHEMISTRY												
BNA	Water	GC/MS	x	x	x	x	x	x	x	x	x	x
	Soil/Sediment	GC/MS	x	x	x	x	x	x	x	x	x	x
	Waste (oil, drum, etc.)	GC/MS	x	x	x	x	x	x	x	x	x	x
	Tissue (fish &/or plant)	GC/MS				x						
BNA (TCLP)	Solid/Waste	GC/MS		x	x	x	x	x	x	x	x	x
BNA (TPH)	Water	GC/MS or GC				x	x	x	x	x	x	x
	Soil/Sediment	GC/MS or GC				x	x	x	x	x	x	x
BOD	Water	Membrane Electrode		x	x	x	x	x	x	x	x	x
COD	Water	Photometric			x			x				
	Water	Colorimetric		x	x		x		x	x		
EDB & DBCP	Water	GC/ECD	x			x	x	x		x	x	
Herbicides	Water	GC/ECD; GC/NPD				x		x	x			
	Soil/Sediment	GC/ECD; GC/NPD						x	x			
	Waste (oil, drum, etc.)	GC/ECD; GC/NPD							x			
	Tissue (fish &/or plant)	GC/ECD; GC/NPD							x			
Herbicides (TCLP)	Solid/Waste	GC/ECD				x		x	x			
	Solid/Waste	HPLC/UV Detection			x							
Oil & Grease	Water	Gravimetric		x	x	x	x		x			x
	Soil/Sediment	Gravimetric		x					x	x		
Pesticides/PCBs	Water	GC/ECD	x	x	x	x	x	x	x	x	x	x
	Soil/Sediment	GC/ECD	x	x	x	x	x	x	x	x	x	x
	Waste (oil, drum, etc.)	GC/ECD	x	x	x	x	x	x	x	x	x	x
	Tissue (fish &/or plant)	GC/ECD	x	x		x			x	x		x
Pesticides (TCLP)	Solid/Waste	GC/ECD		x	x	x	x	x	x	x	x	
Phenolics	Water	Colorimetric		x	x				x	x		
	Soil/Sediment	Colorimetric			x				x	x		

Regional Laboratories Core Capabilities — FY2014

I. Chemistry												
Analyte/Group Name	Sample Media	Analytical Technique	Regional Capability									
ORGANIC CHEMISTRY			1	2	3	4	5	6	7	8	9	10
PAHs	Water	GC/MS	x	x	x	x	x	x	x	x	x	x
	Soil/Sediment	GC/MS	x	x	x	x	x	x	x	x	x	x
	Air	GC/MS	x						x			
	Tissue (fish &/or plant)	GC/MS	x			x			x			x
	Waste (oil, drum, etc.)	GC/MS	x	x	x	x		x	x	x		x
TOC	Water	Combustion/IR		x	x	x	x		x	x		x
	Soil	Combustion/IR		x	x	x	x		x	x		x
TOC	Water	UV/Persulfate			x			x		x	x	
VOA	Water	GC/MS	x	x	x	x	x	x	x	x	x	x
	Soil/Sediment	GC/MS	x	x	x	x	x	x	x	x	x	x
	Air	GC/MS	x		x	x	x	x	x	x	x	
	Waste (oil, drum, etc.)	GC/MS	x	x	x	x		x	x	x	x	x
VOA	Water	GC				x				x		
	Soil/Sediment	GC				x				x		
	Waste (oil, drum, etc.)	GC	x			x	x			x		
VOA (TCLP)	Solid/Waste	GC/MS		x		x	x	x	x	x		x
	Water	GC/MS or GC				x	x	x	x	x	x	x
VOA (TPH)	Soil/Sediment	GC/MS or GC				x	x	x	x	x	x	x
II. Physical and Other Determinations												
Flash Point	Aqueous/Liquid Waste (oil, drum, etc.)	Pensky-Martens or Seta	x	x	x	x	x	x	x			x
Conductivity	Water	Specific Conductance	x	x	x	x	x	x	x	x	x	x
Ignitability	Soil/Sediment	Ignitability of Solids		x	x	x	x	x	x			
	Waste (oil, drum, etc.)	Pensky-Martens or Seta Closed Cup		x	x	x	x	x	x	x		x
pH	Water	Electrometric	x	x	x	x	x	x	x	x	x	x
	Soil/Sediment	Electrometric	x	x	x	x	x	x	x	x	x	x
	Waste (oil, drum, etc.)	Electrometric	x	x	x	x	x	x	x	x	x	x
Solids, Non-Filterable	Water	Gravimetric	x	x	x	x	x	x	x	x	x	x
Solids, Percent	Soil/Sediment	Gravimetric	x	x	x	x	x	x	x	x	x	x
Solids, Total	Water	Gravimetric	x	x	x	x	x	x	x	x	x	x
Solids, Total Dissolved	Water	Gravimetric	x	x	x	x	x	x	x	x	x	x
Solids, Total Volatile	Water	Gravimetric		x		x	x	x	x	x	x	x
Turbidity	Water	Nephelometric	x	x	x	x	x	x	x	x	x	x
III. Biology/Microbiology												
Coliform, Total	Water, Soil &/or Sludge	Various	x	x	x			x	x	x	x	x
Coliform, Fecal	Water, Soil &/or Sludge	Various	x	x	x			x	x	x	x	x
E. coli	Water, Soil &/or Sludge	Various	x	x	x			x	x	x	x	x
Toxicity (Acute & Chronic)	Water	Fathead, Ceriodaphnia	x		x			x		x		
Heterotrophic PC	Water	Various	x	x	x			x	x	x	x	x

Regional Laboratories Unique Capabilities — FY2014

REGION 1				
Analyte/Group Name	Sample Media	Analytical Technique	Supported Program(s)	Comments
INORGANIC CHEMISTRY				
Inorganic Anions	Water	IC (EPA Method 300.0)	Water	
Mercury	Water, Tissue	Direct Mercury Analyzer (Thermal Decomposition, Amalgamation & Atomic Absorption Spectrophotometry) EPA Method 7473	Superfund, Water	
Metals	Water, Sediment, Soil, Waste (drum), Paint, Dust, Cosmetics	XRF (EPA Method 6200)	Superfund, TSCA (Pb)	Field Screening and Laboratory Testing
Perchlorate	Water	LC/MS/MS (EPA Method 331.0)	Superfund/Water	
ORGANIC CHEMISTRY				
Carbonyls	Air	HPLC (EPA Method TO-11A)	Air	
1,4-Dioxane	Water	GC/MS Purge & Trap (EPA Method 8260)	Superfund	
Ethylene Glycol	Water	GC		
Explosives	Water, Soil	HPLC (EPA Method 8330)	Superfund	
Oil Identification	Water	GC/FID (ASTM D-3415-79)	Superfund	
Organic Compounds	Solid, Liquid	FTIR	Superfund - ERB	Unknown ID
Oxygenated Compounds/Benzene	Fuel	IR (RFG Inspector's Manual)	Air	
PAHs	Soil/Sediment	Immunoassay (EPA Method 4035)	Superfund	
PCBs	Air, Wipes	GC/ECD (EPA Method 3508A)	Air/Superfund	
Pentachlorophenol	Soil, Sediment	Immunoassay (EPA Method 4010)	Superfund	
Pesticides/PCBs	Water, Soil, Sediment, Waste (drum)	GC/ECD (EPA Method 8081A/8082)	Superfund	
	Water, Soil, Sediment, Waste (drum)	GC/ECD (EPA Method 680)	Superfund	
Pharmaceuticals and Personal Care Products (PPCP)	Water	LC/MS/MS	Water	
VOCs	Air (mini-cans)	GC/MS (EPA Method TO-15)	Superfund	
	Water, Soil, Air	GC/ECD/PID	Superfund	
PHYSICAL AND OTHER DETERMINATIONS				
Grain Size	Soil, Sediment	Sieve (Modified ASTM)	Superfund, Water	Region 1 SOP
Loss on Ignition (LOI)	Sediment		Water	
Percent Lipids	Tissue	Gravimetric		
BIOLOGY/MICROBIOLOGY				
Enterococci	Ambient water	Enterolert/EPA Method 1600	Ambient monitoring	
Chlorophyll a	Ambient water	EPA 445.0	Ambient monitoring	
Toxicity (Acute)	Sediment	C. dilutus, H. azteca	Water, Superfund	Bulk sediment

Regional Laboratories Unique Capabilities — FY2014

REGION 2				
Analyte/Group Name	Sample Media	Analytical Technique	Supported Program(s)	Comments
INORGANIC CHEMISTRY				
CO	Air/N2	EPA Reference or Equivalent Method as in 40 CFR Part 58	Air	
NOx	Air/N2	EPA Reference or Equivalent Method as in 40 CFR Part 58	Air	
SO ₂	Air/N2	EPA Reference or Equivalent Method as in 40 CFR Part 58	Air	
Percent Sulfur	Fuel Oil	ASTM D4294	Air	
Vanadium	Fuel Oil	ICP/AES	Air	Dry ashing at 525°C
ORGANIC CHEMISTRY				
Asphaltenes (Hexane Insolubles)	Fuel Oil	ASTM 3279	Air	
Methane, Ethane, Ethene	Water	GC/FID	SF/RCRA	
Ozone Precursors (hydrocarbons)	Air	GC/MS/FID	Air	
Pesticides	Wipes	LC/MS/MS and GC/MS	General	
Total Petroleum Hydrocarbons	Water, Solid	Hexane Extraction (EPA Method 1664)	Water	
PHYSICAL AND OTHER DETERMINATIONS				
Density	Ink, Paint	ASTM D1475	Air	
Grain Size	Solid	Pipet Method	Superfund, Water	
	Solid	Hydrometer Method (based on ASTM D422-63)	Superfund, Water	
Particulates (Fine)	Air	EPA Reference or Equivalent Method as in 40 CFR Part 58	Air	
Percent Volatile Matter		ASTM D2369	Air	
Percent Water	Ink, Paint	ASTM D4017	Air	
Viscosity	Fuel Oil	ASTM D88	Air	
BIOLOGY/MICROBIOLOGY				
Cryptosporidium	Water	Fluorescent Microscopy (EPA Method 1623)	Water	
DNA - qPCR (Enterococcus)	Water (Fresh & Marine)	EPA/Cepheid Methodology	Water	
DNA-qPCR E. coli	Water (Fresh & Marine)	EPA/CDC Protocols	Water	
DNA, Markers, Various	Water (Fresh & Marine)	Geese, Gull, Cow, HF183, Gen Bacteroidales	Water	
Enterococcus Group	Water	Membrane Filtration	Water	
Giardia	Water	Fluorescent Microscopy (EPA Method 1623)	Water	
mColibblue24	Water	MF/Hach	Water	
Enterolert w/Quantitray	Water	Defined Substrate Technology	Water	
Colilert 18/Colilert w/Quantitray	Water	Defined Substrate Technology	Water	

Regional Laboratories Unique Capabilities — FY2014

REGION 3				
Analyte/Group Name	Sample Media	Analytical Technique	Supported Program(s)	Comments
ORGANIC CHEMISTRY				
Nitroaromatics & Nitroamines	Water, Soil/Sediment	HPLC	Water	Method 8330
Nitroglycerine	Water, Soil/Sediment	HPLC	Water	Method 8332
Nitrogen, Total	Water	Colorimetric		
Chemical Warfare Agents	Water/Solid/Wipe	GC/MS	Emergency Response	
PCB Congeners	Water, Soil/Sediment, semi-permeable membrane device (SPMD)	HR GC/MS		Method 1668C
PHYSICAL AND OTHER DETERMINATIONS				
ID Ozone-Depleting Compounds	Propellants/Aerosols	FTIR	Air Enforcement	
ID Unknowns	Bulk Mercury	Density	Superfund, RCRA	
	Water	FTIR	Water	Screening it, identify unknowns
	Soil/Sediment	FTIR		Screening it, identify unknowns
Alcohols	Water, Soil/Sediment	FTIR	RCRA	When necessary for ignitability
ID Unknowns	Wastes	FTIR		Screening it, identify unknowns
BIOLOGY/MICROBIOLOGY				
Benthic Macroinvertebrate	Freshwater	Identification	Water	
Marine/Estuarine Benthic Invertebrate Taxonomy	Invertebrate Specimens or Unsorted Sediment	EPA EMAP Protocols		Organisms identified to species or lowest taxonomy possible
REGION 4				
INORGANIC CHEMISTRY				
Chromium (+6)	Soil/Sediment	Std Method 3500 CrD	DW, Superfund	
Mercury, Total - Ultra-Low Detection Level	Water	CVAF	Water	Method 1631
	Tissue	CVAF	Water, Superfund	Appendix 1631
	Soil/Sediment	CVAF	Water, Superfund	Appendix 1631
Metals, Total	Waste (oil, drum, etc.)	ICP/MS	RCRA	not commonly available
	Air	Hi-Vol Filters	Air	not commonly available
Metals (TCLP)	Soil/Waste (oil, drum)	ICP/MS	RCRA	not commonly available
ORGANIC CHEMISTRY				
Freon Products	Canister & Air	GC/MS	Air, OECA	Special analysis technique developed for criminal investigations of illegal Freon
Natural Attenuation Analytes	Water	GC/FID	Superfund	Methane, ethane, ethene
PCB Congeners	Water	None	Superfund, RCRA	High resolution GC/MS
	Soil/Sediment	None	Superfund, RCRA	High resolution GC/MS
	Tissue	None	Superfund, RCRA	High resolution GC/MS
Toxaphene Congeners	Water/Soil	GC/NIMS (EPA Method 8276)	Water, Superfund	6 parlars, 2 breakdown products
Ultimate BOD	Water	Membrane Electrode (Std Method 5210C)	Water	
BIOLOGY/MICROBIOLOGY				
Chlorophyll	Water		Water	

Regional Laboratories Unique Capabilities — FY2014

REGION 5				
Analyte/Group Name	Sample Media	Analytical Technique	Supported Program(s)	Comments
INORGANIC CHEMISTRY				
Bromide/Chloride Ratio	Brine Samples	IC & related characterization techniques; ion balance	Water, UIC, & SDWA	Difficult analyses
Chloride	Soil/Sediment	IC	Sediment	
Metals	Suspended Particulate Matter	ICP/MS	Air	Analysis of TSP, Pm10, PM2.5 filters for metals
ORGANIC CHEMISTRY				
Nonylphenol (NP), NP-1 and 2-ethoxylate, octyphenol, & bisphenol-A	Water	GC/MS (ASTM D7065-11)	Water	Endocrine disrupter - high concentration method (ppb)
Nonylphenol (AP), AP-1 and 2-ethoxylate, octyphenol, & bisphenol-A	Soil/Sediment	GC/MS (8270 modified/Internal SOP)	Water	Endocrine disrupter
Nonylphenol (NP), NP-1 and 2-ethoxylate, octyphenol	Water	LC/MS/MS (ASTM D7485-09)	Water	Endocrine disrupter low-level method (ppt)
Bisphenol-A	Water	LC/MS/MS (ASTM D7574-09)	Water	Endocrine disrupter low-level method (ppt)
Nonylphenol carboxylates	Water	LC/MS/MS	Water	Endocrine disrupter
Long chain NP, NPEOs (n=3-18)	Water	LC/MS/MS (ASTM D7742-11)	Water	Endocrine disrupter
COD	Soil/Sediment	Colorimetric	Sediment	
PCBs	Water, Oil, Soil, Wipes	8082 (GC/EC)	TSCA	Aroclor-specific TSCA reg. Compliance method & multiple action levels
PCB Congeners	Water, Sludge	GC/MS/MS, GC/NCI/MS	RCRA, SF, TSCA, Water	Compare with HRGC/HRMS method
Purgeable 1,4-Dioxane & Tetrahydrofuran (THF)	Water	Method 624-Dioxane (Wide-Bore Capillary Column GC/MS)	Superfund	Specific analyte analysis method
Various analytes (VOAs, SVOCs, & Pesticides/PCBs)	Water, Soil/Sediment	ESAT FASP Methods GC/EC for VOAs, SVOCs, & Pesticides/PCBs (XRF for metals)	Superfund	Fast TAT onsite; Screening or better data; Fast extraction for organics
129 Toxic Industrial Chemicals (TICs) & CWA degradants (107 validated)	Drinking Water	LC/MS/MS Library Screening	WSD, NHSRC	Library search routine developed under CRADA with Waters Corp. Now use NIST LC/MS/MS Library of over 2,000 analytes
Aldicarb, aldicarb sulfone, aldicarb sulfoxide, carbofuran, oxamyl, methomyl, & thiofanox	Water	LC/MS/MS, ASTM 7645-10	NHSRC	SAP Method
Aldicarb, bromadiolone, carbofuran, oxamyl, & methomyl	Water	LC/MS/MS, ASTM 7600-09	NHSRC	SAP Method
Thiodiglycol	Water	LC/MS/MS, CRL SOP MS015	NHSRC	SAP Method
Thiodiglycol	Soil	LC/MS/MS, ASTM E2787-11	NHSRC	SAP Method
Thiodiglycol	Wipes	LC/MS/MS, ASTM E2838-11	NHSRC	SAP Method
Diethanolamine, triethanolamine, n-methyldiethanolamine, & methyldiethanolamine	Water	LC/MS/MS, ASTM D7599-09	NHSRC	SAP Method

Regional Laboratories Unique Capabilities — FY2014

REGION 5				
Analyte/Group Name	Sample Media	Analytical Technique	Supported Program(s)	Comments
ORGANIC CHEMISTRY				
Diocetyl Sulfosuccinat (DOSS) in seawater	Seawater	LC/MS/MS, ASTM D7730-11	NHSRC/SF	SAP Method
Dipropylene glycol monobutyl ether & ethylene glycol monobutyl ether in seawater	Seawater	LC/MS/MS, ASTM D7731-11	NHSRC/SF	SAP Method
Bromodiolone, brodifacoum, diphacinone, & warfarin in water	Water	LC/MS/MS, ASTM D7644-11	NHSRC	SAP Method
Diisopropyl methylphosphonate, ethyl hydrogendimethylamidophosphate, ethyl methylphosphonic acid, isopropyl methylphosphonic acid, methylphosphonic acid, and pinacolyl methylphosphonic acid	Water	LC/MS/MS, ASTM 7597-09	NHSRC	SAP Method
DIMP, EMPA, IMPA, MPA, PMPA	Soil	LC/MS/MS, ASTM WK34580	NHSRC	SAP Method
PHYSICAL AND OTHER DETERMINATIONS				
Corrosivity by pH	Hazardous Waste	SW846 1110	RCRA	Waste characterization
Particle Size	Soil/Sediment	Particle size analyzer provides continuum of sizes - CRL SOP	GLNPO, Water-Sediment	For modelling and soil migration calcs
Water Content	Hazardous waste	SW846	RCRA, Superfund	Support for flashpoint
Paint Filter Test	Paints and coatings		RCRA, Superfund	
Specific Gravity	Soil/Sediment	Appendix IV of the Corps of Engineers Engineering Manual (F10-F22)	Sediment	
Synthetic Precipitation Leaching Procedure (SPLP)	Solid Waste	SW846 1312	RCRA, Superfund	For all TCLP analytes except herbicides

Regional Laboratories Unique Capabilities — FY2014

REGION 6				
Analyte/Group Name	Sample Media	Analytical Technique	Supported Program(s)	Comments
INORGANIC CHEMISTRY				
Ammonia	Air (passive coated filter)	IC	CAA	Ogawa passive air collection device
Ozone	Air (passive coated filter)	IC	CAA	Ogawa passive air collection device
NOx	Air (passive coated filter)	IC	CAA	Ogawa passive air collection device
SOx	Air (passive coated filter)	IC	CAA	Ogawa passive air collection device
Trace level Hex Chrome	Water	IC/UV	Water	
Perchlorate	Water	IC/MS/MS	Water	
Metals by X-Ray Fluorescence	Soil	portable XRF	Superfund, RCRA	field screening
ORGANIC CHEMISTRY				
Fingerprint (pattern recognition)	High-level waste	GC/MS	RCRA	
	Oil	GC/MS	RCRA	
	Fuel	GC/MS	RCRA	
Incidental PCBs	Water	GC/MS; Method 680 Homologue Series	TSCA, RCRA	grouped by number of chlorine
	Soil/Sediment	GC/MS; Method 680 Homologue Series	TSCA, RCRA	grouped by number of chlorine
	Waste	GC/MS; Method 680 Homologue Series	TSCA, RCRA	grouped by number of chlorine
Chemical Warfare Agents	Water/Solid/Wipe	GC/MS	Emergency Response	
PAMS (C2s and C3s identified)	Air	GC/MS/FID (split)	CAA	C2s and C3s are individually quantitated
PCBs (Aroclor)	Electrical cable	GC; Separation, extraction, analysis of individual components; Mod of program -specific technique	TSCA	Toluene is extraction solvent
PAHs (trace)	Water/Solid/Oil	GC/QQQ	RCRA, Superfund	
Chemical Warfare Agents - degradation products	Water	LC/MS/MS	Emergency Response	
VOCs by OVM	Air	GC/MS	CAA	passive air monitoring
Organophosphorous Pesticides (OPPs)	Water	GC/NPD	CWA, RCRA, Superfund	
	Soil/Sediment	GC/NPD	RCRA, Superfund	
		GC/NPD	RCRA, Superfund	
PHYSICAL AND OTHER DETERMINATIONS				
Corrosivity by pH	Waste	Method 1110 Corrosivity Toward Steel	RCRA	

Regional Laboratories Unique Capabilities — FY2014

REGION 7				
Analyte/Group Name	Sample Media	Analytical Technique	Supported Program(s)	Comments
INORGANIC CHEMISTRY				
CO	Air	40 CFR Part 58	Air	OAQPS Protocol Gas Verification Program
NO _x	Air	40 CFR Part 58	Air	OAQPS Protocol Gas Verification Program
SO ₂	Air	40 CFR Part 58	Air	OAQPS Protocol Gas Verification Program
O ₃	Air	40 CFR Part 58	Air	NIST Standard Reference Photometer
In-vitro Bioassessability Assays for Arsenic & Lead in Soil	Soil	ICP/MS-ICP/AES	Superfund/RCRA	SUPR Exposure/Toxicity Assessment
ORGANIC CHEMISTRY				
Chlordane	Air (PUF)	GC/ECD (EPA Method TO-4A)	Special Project	
Herbicides	Water, Soil/Sediment	GC/ECD	Water	Use Attainability Analysis (UAA)
Pesticides	Water, Soil/Sediment, Tissue	GC/ECD	Water	Use Attainability Analysis (UAA)
VOCs	Air Canister	GC/MS (EPA Method TO-14 & TO-15)	Air/Superfund	Air Toxics
	Air Sorbent Tube	GC/MS (EPA Method TO-17)	Air/Superfund	Air Toxics
	Water	GC/MS	Superfund/ORD	In-situ Chemical Oxidation Site Support
PCBs	Soil/Sediment, Waste	GC/ECD	Superfund/ORD	Rapid Site Screening
Pharmaceuticals and Personal Care Products (PPCPs)	Water	LC/MS/MS	Water	Endocrine disruptors
PAHs, Pesticides, Herbicides	Water	Twister GC/MS Stir Bar Sorbitive Extraction (solventless extraction)	Water	Use Attainability Analysis (UAA)
VOCs	Water, Soil, Air	GC/MS Mobile Laboratory	Superfund	Rapid Site Characterization
VOCs from In-situ Chemical Oxidation Sites	Water	GC/MS	Superfund	Improved Precision of VOC Samples from In-situ Chemical Oxidation Sites
BIOLOGY/MICROBIOLOGY				
E. coli	Water (drinking/waste/ambient)	qPCR	Water	2008 NFWA
Enterococci	Water	qPCR	Water	
Heterotrophic Bacteria	Water	Plate Count - Standard Methods	Water	Heterotrophic Bacteria
Chlorophyll a	Ambient water	EPA 445.0	Ambient monitoring	
Invertebrate Taxonomy	Invertebrates	EPA EMAP Protocols	Water	
Marine/Estuarine Benthic Taxonomy	Benthic Organisms		Water	Organisms identified to species or lowest taxonomy possible

Regional Laboratories Unique Capabilities — FY2014

REGION 8				
Analyte/Group Name	Sample Media	Analytical Technique	Supported Program(s)	Comments
INORGANIC CHEMISTRY				
Silica	Water	Colorimetric	Water/Superfund	
Gadilinium	Water	ICP/MS	Water/Superfund	Wastewater Indicator
ORGANIC CHEMISTRY				
Alcohols	Water	GC/FID	Water/Superfund	
Chlorophyll	Water	HPLC	Water/Superfund	
Endothall	Water	GC/MS	Water/Superfund	
TPH (VOA & BNA)	Water, Soil/Sediment	GC/MS or GC/FID	Water/Superfund	
LC/MS/MS Pesticides	Water	LC/MS/MS	Water/Superfund	Monitoring for States & Tribes
Low-level Pesticides/CLLE	Water	GC/MS	Water/Superfund	Monitoring for States & Tribes
Metals - Arsenic/Selenium speciation	Water, Soil, Tissue	IC/ICP/MS	Water/Superfund	Speciation data needed for risk assessment
Pharmaceuticals and Personal Care Products (PPCPs)	Water	LC/MS/MS	Water/Superfund	Endocrine disruptors
Waste Indicator Compounds	Water	GC/MS	Water/Superfund	Monitoring for States & Tribes
Total Petroleum Hydrocarbons-Diesel Range Organics	Water, Soil	GC/FID	Water/Superfund	Hydro-fracking
VOAs	Water, Soil/Sediment	GC/PID/ELCD	Water/Superfund	
BIOLOGY/MICROBIOLOGY				
Bacteria (Arsenic-Reducing)	Water, Sediment	MPN	Water/Superfund	
Bacteria (Iron-Reducing)	Water, Sediment	MPN	Water/Superfund	
Bacteria (Sulfate-Reducing)	Water, Sediment	MPN	Water/Superfund	
Bacteria (Clostridium perfringens)	Water	Membrane Filtration	Water/Superfund	

Regional Laboratories Unique Capabilities — FY2014

REGION 9				
Analyte/Group Name	Sample Media	Analytical Technique	Supported Program(s)	Comments
INORGANIC CHEMISTRY				
Ferrous Iron	Water	Titration with Dichromate	Superfund	
Mercury, Vapor, Particulate, & Reactive	Ambient Air	Cold Vapor Atomic Fluorescence	Air, Water (TMDL)	
Methyl mercury	Water	CVAF (EPA 1630)	Water	
Metals (with mercury)	Dust wipes, Ghost wipes	ICP, ICPMS, CVAA	Tribal Program	
Metals (SPLP)	Soil, Sediment, Solid, Waste, Tissue	SW846 1312: ICP, GFAA, CVAA, ICP/MS	Superfund, RCRA	
Low-level hexavalent chromium	Drinking Water	IC with post column reaction/UV detection	Water	
Metals	Soil	Portable XRF	Superfund, Criminal Investigation	
Platinum Group Metals	Catalytic converter washcoat	Portable XRF	Enforcement, Air	
Lead (Pb) in Air	TSP high-volume filters	FEM EQL-0710-192, ICP/MS	Air	New Pb NAAQS
Perchlorate	Water, Soil	LC/MS/MS (EPA Method 331.0)	Superfund/Water	
In-vitro bioassessability assays for arsenic & lead in soil	Soil	EPA 9200.1-86	Superfund	
ORGANIC CHEMISTRY				
Diazinon	Water	ELISA	WQM	
1,4-Dioxane	Water, Soil, Sediment	GC/MS	Superfund, RCRA	
EDB/DBCP	Water	GC (EPA 504.1)	Superfund, RCRA	
Methane, Ethane, Ethene	Water	GC/FID (RSK-175)	Superfund, RCRA	
BIOLOGY/MICROBIOLOGY				
Benthic Taxonomic Identification	Sediment (Marine)	Taxonomic Identification	Water, WQM	
Chlorophyll/Pheophytin	Water/Periphyton	Standard Method 10200 H, Procedure 2b	Water, WQM	
Enterococci	Water	Enterolert	Water, NPDES, WQM	
Heterotrophic Bacteria	Water	Plate Count - Standard Methods	Water, NPDES, WQM	
Microcystin	Water	Immunoassay	Water	
Toxicity Test, Red Abalone (<i>Haliotis rufescens</i>) Larval Development	Water	EPA/600/R-95/136	NPDES	
Toxicity Test, Sea Urchin Fertilization (<i>Strongylocentrotus purpuratus</i>)	Water	EPA/600/R-95/136	Water, NPDES	

Regional Laboratories Unique Capabilities — FY2014

REGION 10				
Analyte/Group Name	Sample Media	Analytical Technique	Supported Program(s)	Comments
INORGANIC CHEMISTRY				
Asbestos, Bulk	Solids	EPA 600/R93/116 - XRD	Superfund	
Low-Level Mercury	Water	CVAF, Method 1631E	Water, Superfund	0.2 to 0.5 ng/L reporting limits
Methyl Mercury	Water	GC/CVAFS, Method 1630	Water, Superfund	
Metals	Air filters	ICP/MS, ICP	CAA	
	Blood	ICP/MS	Superfund	
	Soil	Portable XRF	Superfund, Criminal	Screening results for metals
	Paint	Portable XRF	TSCA, Criminal	Lead in paint
	Solid	X-Ray Diffractometer (XRD)	Superfund	Characterizes the form metals exist in sample
Metals - Arsenic speciation	Fish/shellfish/seaweed	IC/ICP/MS	Superfund, Water	Speciation data needed for risk assessment
Metals (TAL) + Total Uranium	Small mammals, invertebrates	Microwave Digestion, ICP/AES, ICP/MS	Superfund, RCRA	Biomonitoring projects
Metals (SPLP)	Soil/Waste	ICP/AES, ICP/MS	Superfund	
Chlorophyll a	Water	SM 1002H	Water	
In-vitro Bioassessability Assays for Lead in Soil	Soil	Leachates by Method 1340, ICP/AES	Superfund	
Percent Water	Liquid Waste	Karl Fischer titration	RCRA	
Perchlorate	Produce (fruits, milk)	IC/MS	Superfund	
ORGANIC CHEMISTRY				
BNA (selected)	Tissue	SW846 Methods	Superfund	
Butyl tins	Soil/Sediment	GC/MS	Superfund, Criminal	WDOE method
1,4-Dioxane	Water	EPA Method 8270D SIM/ Method 522	Superfund	
Explosives (Nitroaromatics & Nitroamines)	Water, Soil, fish/shellfish	EPA Method 8330/HPLC	Superfund	
Hydrocarbon Identification	Water, Soil/Sediment	NWTPH-HCID	Superfund, Criminal	
N-Nitrosodimethylamine	Water, Soil	Method 521	Superfund	
Herbicides	Water, Soil/Sediment	GC/MS	Superfund	
Polybrominated diphenyl ethers (PBDEs)	Water	GC/MS Low Resolution	Water	
	Sediment/bio solids	GC/MS Low Resolution	Superfund, Water	
	Tissue (fish)	GC/MS Low Resolution	Superfund	
Total Petroleum Hydrocarbons-Gasoline Range Organics	Water, Soil	NWTPH-Gx	Superfund, RCRA	
	Water, Soil	NWTPH-Dx	Superfund, RCRA	
VOA & SVOA	Industrial wastes, Solids, Tissues	Vacuum distillation, Method 8261A	Superfund, RCRA	
Low-level Polyaromatic Hydrocarbons and Other Neutral Organics	Soil, Sediments	GC/MS-MS	Superfund, Brownfields, Water	
Low-level Polyaromatic Hydrocarbons	Shellfish, Water	GC/MS-MS	Superfund, Brownfields	
PHYSICAL AND OTHER DETERMINATIONS				
Multi-Increment Sampling (MIS) Preparation of Soil Samples for Organic & Inorganic Analyses	Soil	Described in Method 8330B Appendix	Superfund	
Variety of water quality tests	Water	Various probe-type measurements	Superfund	Flow thru cell system; performed in the field
BIOLOGY/MICROBIOLOGY				
Aeromonas spp	Drinking Water	EPA Method 1605	SDWA - Unregulated Contaminant Monitoring Rule (UCMR)	EPA Approved
Cryptosporidium & Giardia	Water	EPA Method 1623 (Filtration/IMS Staining)	SDWA, Water, Ambient Monitoring Rule - recreational waters	On approval list for LT-2 regulation
Enterococci	Ambient Water	EPA Method 1600	Ambient Monitoring Rule	
Microbial Source Tracking	Water	PCR	Water	
Microscopic testing	Drinking/Source Water	Microscopic particulate analysis	Surface Water Treatment Rule	Microscopic technique used to establish GWUDI characteristics of a drinking water

Regional Laboratories Developing Capabilities — FY2014

REGION 1			
Project Method	Developmental Need	Status	Projected Completion
Enterococcus in Water by qPCR (EPA Method 1611) Capability Development	Water	In progress	FY2014
REGION 2			
SIM Analysis for VOA & Semi-VOA analysis	Drinking & Surface Water	Developing methods on current instrumentation	FY2015
MST Markers, Pig, Cow, Gull	Stormwater	Completed	
PCPP Hospital Waste	Emergency Contamination	Completed	
REGION 3			
Arsenic Speciation for Water, Soil/ Sediment, & Tissue by IC or ICP/MS	Speciation data to be used for Risk Assessments in support of Clean Water Act & Superfund	Identified developmental need; initiated research & evaluation of analytical procedures; project placed on hold due to lack of demand for analysis	On Hold
EPA Method 1694 for Pharmaceuticals & Personal Care Products by LC/MS/MS	Need for capability to identify & quantify pharmaceutical & personal care products	Cancelled due to loss of analyst	On Hold
PCR Quantitation & Source Tracking	Need for capability to determine source of E. coli contamination in support of Water Program	In-progress	FY2013
Glycols in Water	Need for capability to identify glycol compounds in groundwater using LC/MS/MS to achieve lower quantitation limits	Complete	FY2013
ELISA	Need for in-field testing of surface & drinking water for presence of estrogen & estrogen-like compounds	Complete	FY2013
Independent Laboratories Institute Solid-Phase Extraction Study	Office of Water	Continued work	
REGION 4			
EPA Method 8261	VOCs in difficult matrices	Initial investigation	Unknown
Internal Method - GC/MS/MS	Low-level Pesticides w/MS confirm	ITMEs in-process	January 2015
Pesticides by Method 8081, DDT Suite	Superfund	Paper was published 2014	
Pesticides by Method 8270D using GC/MS/MS	Superfund	Continued Work	
Low-level TO-15 using Selective Ion Monitoring simultaneous Full Scan	Superfund, Air	Continued Work	
Hydride ESI Autosampler for high matrix samples and lower reporting limits for arsenic and selenium	ODMDS, Superfund, TMDL	Continued Work	
Release of silica and other metals from nanoparticle study	ORD	Continued Work	
Bioavailability of lead	Superfund	Continued Work	
REGION 5			
PFOA/PFOS in Biosolids & Water	Water Division study - RMI	Initial work done, new instrument installed & standards run to set up instrument.	FY2015
qPCR, Gene Sequencing Guar Gum	HF fluid screening tool - Region 3 support	Some samples sequenced; screening tool in process	FY2015
Methane, Ethane, & Ethene in Water by GC/FID	Water Program request	Method developed; SOP in draft	FY2015
Fluorotelemer Alcohols in Water by LC/MS/MS	Water	Initiated	FY2015
Standard Operating Procedure for Analysis of (Tri-n-butyl)-n tetradecylphosphonium chloride (TTPC) in Soil by Multiple Reaction Monitoring Liquid Chromatography/ Mass Spectrometry (LC/MS/MS)	SF Emergency Response	Initiated and Completed	
PFOA/PFOS in Biosolids	Water	Completed	
PFOA/PFOS in Water	Water	Completed	
Methane, Ethane and Ethene in Water	Water	Continued work	
qPCR Gene Sequencing Guar Gum	Water, HF	Continued work	
Fluorotelemer Alcohols in Water by LC/MS/MS	Water	Continued work	

Regional Laboratories Developing Capabilities — FY2014

REGION 6			
Project Method	Developmental Need	Status	Projected Completion
Anions and Oxyhalides by IC	Remove dependence on State Lab for this test	Method developed, need DOC/MDL; SOPs	September 2014
Asbestos	Superfund/RCRA Enforcement	Training; DOC; SOP preparation	Program-dependent
Alcohols by Headspace GC/MS Analysis	Energy Extraction	Completed during FY2013	December 2013
Dissolved Gasses in Water by GC/FID	Energy Extraction	Completed during FY2013	December 2013
Direct mercury analysis (CVAF - milestone)	Clean Water Act, RCRA, Superfund	DOC/MDL; SOP preparation	December 2014
PAHs by GC/QQQ	RCRA, Superfund	Continued method development	December 2014
Dinitrotoluene minor isomers	Superfund	Continued method development	December 2014
High Dissolved Solids Modified Method/Anion	Clean Water Act, RCRA, Superfund	Method being developed	October 2014
High Dissolved Solids/Modified Method/Cation	Clean Water Act, RCRA, Superfund	Method being developed	October 2014
High Dissolved Solids/Modified Method/OA	Clean Water Act, RCRA, Superfund	Method being developed	October 2014
PPCP analysis	Water	Method being developed	April 2014
Passive Formaldehyde	Clean Air Act	Method being developed	Summer 2014
Induction-Coupled Plasma Axial Method	Superfund; new technique to generate lower reporting limits for metals	Method being developed; performance studies are ongoing	FY2014
Cyanide in Soil Matrix	RCRA & Superfund	Method being developed	FY2014
Sulfide in Water Matrix	RCRA & Superfund	Initiated method development	FY2014
Low Molecular Weight Acids in Resource Extraction Analysis	Drinking Water	Method being developed	Spring 2015
Haloacetic Acids in Resource Extraction Analysis	Drinking Water	Method being developed	FY2014
PAHs by GC/QQQ	Superfund, RCRA	Completed	
Dinitrotoluene minor isomers	Superfund	Completed	
High Dissolved Solids/Modified Method/Anion	Superfund, RCRA, CWA	Continued	
High Dissolved Solids / Modified Method/Cation	Superfund, RCRA, CWA	Continued	
High Dissolved Solids/Modified Method/OA	Superfund, RCRA, CWA	Continued	
PPCP analysis	CWA	Continued	
Passive Formaldehyde	CAA	Continued	
Induction Coupled Plasma Axial Method	Superfund	Continued	
Cyanide in Soil Matrix	Superfund, RCRA	Completed	
Sulfide in Water Matrix	Superfund, RCRA	Completed	
Low Molecular Weight Acids in Resource Extraction Analysis	SDWA	Continued	
Haloacetic Acids in Resource Extraction Analysis	SDWA	Continued	

Regional Laboratories Developing Capabilities — FY2014

REGION 7			
Project Method	Developmental Need	Status	Projected Completion
EPA Method 1694 for Pharmaceuticals & Personal Care Products by HPLC/MS/MS	Speciation data to be used for Risk Assessments in support of Clean Water Act & Superfund	Performing method validation studies on surrogate compounds; developing SOP	FY2015
Pesticides by GC/MS/MS	Confirmational analysis of pesticide analytes previously performed by GC/ECD	Instrument installed, method development & validation pending	FY2016
Microbial Source Tracking Using qPCR	TMDL & Stormwater	Non-human marker test completed; pending additional technical method guidance from ORD	FY2015
Arsenic Speciation for Water, Soil/ Sediment & Tissue by IC or ICP/MS	Speciation data to be used for Risk Assessments in support of Clean Water Act & Superfund	Method development currently underway	FY2015
EPA Method 1694 for Pharmaceuticals & Personal Care Products by HPLC/MS/MS	Water	Continued work	
PAH/SVOC in Water by Stir Bar Sorptive Extraction	Water, SUPR	Continued work	
Airborne VOC by solid sorbent tube (EPA Method TO-17)	Water, SUPR, RCRA	Continued work	
Arsenic Speciation for Water, Soil/ Sediment & Tissue by IC or ICP/MS	Water	continuing	
REGION 8			
Asbestos/Electron Microscope	Need for capabilities to analyze water & soils for asbestos contamination at Superfund sites	Instrument operational & running samples	Ongoing
Endocrine Disrupter Studies/LC/MS/MS	Emerging needs for the Water program & ORD	Performing method validation	Ongoing
Macroinvertebrate - Freshwater Benthic/Manual Enumeration	Redevelop capability for Water program support due to loss of staff	Planning to hire replacement staff	Ongoing
Microbial Source Tracking	Develop capabilities in this technology for use in projects & emerging needs for the Superfund, Water programs, & ORD	Biolog system installed; some staff trained; assessing method	Ongoing
Microbial Source Tracking by PCR	Develop capabilities in this technology for use in projects and emerging needs for the Water, Enforcement programs and ORD.	Instruments & sample processing, ESAT staff training and/or assessing methods	Ongoing
Arsenic Speciation for Water, Soil/ Sediment, & Tissue/IC/ICP/MS	Speciation data to be used for Risk Assessments in support of Clean Water Act & Superfund	Identified developmental need; initiated research & evaluation of analytical procedures; necessary modifications to laboratory in progress	Ongoing
Toxicity - Acute & Chronic in Mobile Lab	Onsite assessment for potential needs by the Water program	Mobile lab available; team lead initiating discussion of projects & team development	Ongoing
Pharmaceuticals by LC/MS/MS	Water & ORD	Progress continuing	Ongoing
Pesticides by LC/MS/MS	Water	Progress continuing	Ongoing
Hormones & Steroids by LC/MS/MS	Water & ORD	Progress continuing	Ongoing
Algal Toxins	Water	continuing	
REGION 9			
Low-level total mercury in water (EPA 1631E)	Address regional priority	Instrumentation installed; method development initiated	FY2015
Analysis of Radiello passive air samplers for VOCs	Address regional priority	Assessing health & safety issues	FY2015
Anatoxin-a analysis using Receptor Binding Assay (RBA)	Water Program monitoring for cyanotoxins	Method development Initiated; no new equipment needed; SOP drafted	Early FY2016
Analysis of lead (Pb) on Teflon PM ^{2.5} Filters	Air	Continued	
Methyl Mercury in Environmental Samples	Water	Completed	

Regional Laboratories Developing Capabilities — FY2014

REGION 10			
Project Method	Developmental Need	Status	Projected Completion
Develop Methyl Mercury Analysis Capability for Sediment Samples	Methyl mercury data needed to support regional mercury strategy toward characterizing levels in the environment & evaluate public health risks	Some initial testing on instrument conducted; based on the effort needed to develop the water method, capability for sediment analyses will likely require much experimentation with the Brooks-Rand instrument to acquire the needed accuracy & sensitivity for sediments	FY2015
EPA Method 8330B Marine Tissue Method Evaluation/Development	Explosive concentration data in marine tissue samples are needed to help evaluate marine areas polluted with military munitions	Method development Completed; multi-laboratory study through the QATS contract is in progress	Completed FY2014
Ultra-trace Concentration Phosphorus Method for Treated Wastewater Effluent & Surface Water	NPDES compliance monitoring at ultra-low phosphorus levels	Ultra-trace standard concentration measurements were achieved on a Lachat colorimetric instrument & an ICP/MS system; testing on actual effluent samples still to be planned	FY2015
Low-level Polynuclear Aromatic Hydrocarbons (PAHs), Phenolics, & Other Neutral Organics in Soils & Sediments	Measure PAHs & other semi-volatile neutral organic compounds at low concentrations in marine sediments to assess against NW states cleanup standards with organic carbon normalization	GC/MS/MS system was setup for extract analyses at very low concentrations	Developed and Completed FY2014
Low-level PAH Analyses of Waters & Clam Tissues	Measure PAHs at low levels in clam tissues to support risk assessment activities	Low-level Polynuclear Aromatic Hydrocarbons Analyses of Waters & Clam Tissues	Developed and Completed FY2014
EPA Method 8330B Marine Tissue Method Evaluation/Development-Multi-Lab Study	Superfund	Completed	
Low Level Polynuclear Aromatic Hydrocarbons, Phenolics and Other Neutral Organics Analyses of Soil and Sediments	Superfund, Brownfields, Water	Completed	
Low Level Polynuclear Aromatic Hydrocarbons Analyses of Waters and Clam Tissues	Superfund, Brownfields, Water	Completed	
Develop Methyl Mercury Analysis Capability for Sediment Samples	Superfund, Water	Continued work	
Ultra-trace Concentration Phosphorus Method for Treated Wastewater Effluent and Surface Water	Water	Continued work	

Appendix A — Acronyms/Abbreviations

Acronyms/Abbreviations

-A-	
ACIL	American Council of Independent Laboratories
ADEM	Alabama Department of Environmental Management
AQS	Air Quality System
ASTM	American Society for Testing and Materials
-B-	
BMP	best management practice
BNA	base/neutrals and acids
BOD	biological oxygen demand
-C-	
CAA	Clean Air Act
CDC	Centers for Disease Control
CENWP	Corps of Engineers' Portland District
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CID	Criminal Investigation Division
CLP	Contract Laboratory Program
COD	chemical oxygen demand
Cr	Chromium
CVAA	cold vapor atomic absorption
CWA	Clean Water Act
-D-	
DBCP	Dibromochloropropane
DECA	Division of Enforcement and Compliance Assistance
DNT	dinitrotoluene
-E-	
EDB	ethylene dibromide
EPA	Environmental Protection Agency
ESAT	Environmental Services Assistance Team
-F-	
FDA	U.S. Food and Drug Administration
FY	Fiscal Year
-G-	
GC	gas chromatography
GC/ECD	gas chromatography/electron capture detector
GC/FID	gas chromatography/flame ionization detector
GC/MS	gas chromatography/mass spectrometry
GC/MS/MS	gas chromatography/mass spectrometry/mass spectrometry
GC/NPD	gas chromatography/nitrogen-phosphorous detector
GFAA	graphic furnace atomic absorption
-H-	
Hg	Mercury
HPLC/UV	high performance liquid chromatography/ultraviolet
-I-	
IC	ion chromatography
ID	identification

Acronyms/Abbreviations

-I-	
ICP	Inductively-coupled plasma
ICP/AES	Inductively-coupled plasma/atomic emission spectrometry
ICP/MS	Inductively-coupled plasma/mass spectrometry
ILI	Independent Laboratories Institute
ISE	ion selective electrode
ISO	International Standards Organization
-J-	
-K-	
-L-	
LC/MS	liquid chromatography/mass spectrometry
LC/MS/MS	liquid chromatography/dual mass spectrometry
LHC	light hydrocarbon
LTIG	Laboratory Technical Information Group
-M-	
MCHM	4-methylcyclohexanemethanol
MCR	Mouth of the Columbia River
MeHg	methylmercury
MPRSA	Marine Protection, Research, and Sanctuaries Act
-N-	
NEIC	National Enforcement Investigations Center
NELAC	National Environmental Laboratory Accreditation Conference
NGO	Non-Governmental Organizations
NO ₂	nitrite
NO ₃	nitrate
NRSA	National Rivers and Streams Assessment
-O-	
ODMDS	Ocean-Dredged Material Disposal Site
ORCR	Office of Resource Conservation and Recovery
ORD	Office of Research and Development
OSC	On-Scene Coordinator
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
-P-	
PAH	polycyclic aromatic hydrocarbon
PC	plate count
PCB	polychlorinated biphenyl
PCE	tetrachloroethylene
PEP	Performance Evaluation Program
PFC	perfluorinated chemical
PM	particulate matter

Acronyms/Abbreviations

-P-	
PNW	Pacific Northwest
PPCP	Pharmaceuticals and Personal Care Product
PPH	polyglycol ethers
-Q-	
QAPP	Quality Assurance Project Plan
QC	Quality Control
QuEChERS	Quick, Easy, Cheap, Effective, Rugged, Safe
-R-	
R2P2	Regional Research Partnership Program
RCRA	Resource Conservation and Recovery Act
RLN	Regional Laboratory Network
RMN	Regional Monitoring Network
-S-	
SCAS	semi-continuous activated sludge
SIMS	secondary ion mass spectrometry
SIP	state implementation plan
SLAMS	State and Local Air Monitoring Station
SOP	standard operating procedure
SPE	solid-phase extraction
SRB	sulfate-reducing bacteria
STP	sewage treatment plant
-T-	
TCE	trichloroethylene
TCLP	toxicity characteristic leaching procedure
TMDL	total maximum daily load
TOC	total organic carbon
TPH	total petroleum hydrocarbon
TTPC	(Tri-n-butyl)-n-tetradecylphosphoniumchloride
-U-	
USACE	U.S. Army Corps of Engineers
U.S. EPA	United States Environmental Protection Agency
USGS	U.S. Geological Survey
-V-	
VOA	volatile organic analysis
VOC	volatile organic compound
-W-	
-X-	
-Y-	
-Z-	

