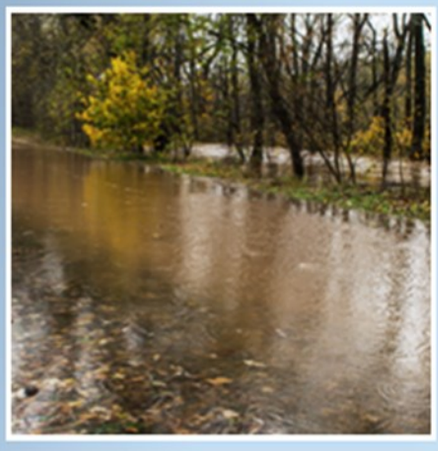
EPA United States Environmental Protection Agency

EPA 910-R-17-001

U.S. Environmental Protection Agency Regional Laboratory Network






Annual Report 2015

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Table of Contents

	Page
Executive Summary	**ii**
Section I — U.S. EPA Regional Laboratories/Regional Laboratory Network: An Overview	**1**
U.S. EPA Regional Laboratories	2
Regional Laboratory Network: An Overview	4
Section II — Regional Laboratory Network Highlights	**7**
Protecting Water: A Precious, Limited Resource	8
Addressing Climate Change and Improving Air Quality	13
Taking Action on Toxics and Chemical Safety	15
Making a Visible Difference in Communities across the Country	18
Launching a New Era of State, Tribal, and Local Partnerships	20
Embracing EPA as a High-Performing Organization	22
Working toward a Sustainable Future	25
Section III — FY2015 Laboratory Accomplishment Results Summary	**27**
Section IV— Regional Laboratories Capabilities Tables — FY2015	**31**
Regional Laboratories Core Capabilities — FY2015	32
Regional Laboratories Unique Capabilities — FY2015	35
Regional Laboratories Developing Capabilities — FY2015	45
Appendix A — Acronyms/Abbreviations	**A-1**

List of Illustrations

Figure		Page
1.	Analytical Support to EPA Programs in FY2015	28
2.	FY2015 U.S. EPA Regional Laboratories Analyses Provided by Program	28
3.	Projects/Sites Supported by Regional Laboratory Data FY2015 by Program Element	29
4.	Method Development Project Support to EPA Programs in FY2015	29

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, quality assurance and data review, and expert technical assistance. Ten Regional Laboratories individually support the 10 EPA regions 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 2015 (FY2015), Regional Laboratories performed over **150,000** analyses to support agency priorities and to solve emerging environmental issues. This analytical work supported activities related to over **1,700** sites and projects associated with a wide range of agency programs.

One particular environmental challenge, **Gold King Mine**, became a multi-regional response where mine drainage from Silverton, Colorado caused mine water to discharge to Cement Creek, a tributary to Animas River. Region 6, Region 8 and Region 9 were all involved in the response and Regional Laboratories were critical in providing analysis, data review and quality assurance support.

To enhance collaboration between regional, program and research and development laboratories, the **Laboratory Enterprise Forum** was formed in FY2015 to provide a mechanism to work across the agency laboratory system, to identify approaches to enhance the efficient use of facilities, and to evaluate tools promoting high-performance organizations.

Emerging contaminants continue to be a concern for the agency and Regional Laboratories continue to evaluate methods and analytical technologies to develop approaches to meet the demands for detection. For FY2015, analyzing for perfluorinated compounds **(PFCs)** and new testing tools for **cyanotoxins** were of significant interest.

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

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

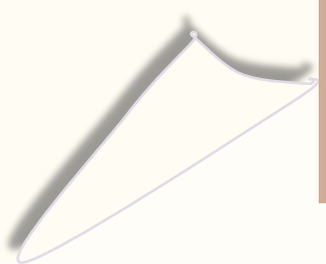
Making a Visible Difference in Communities across the Country

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



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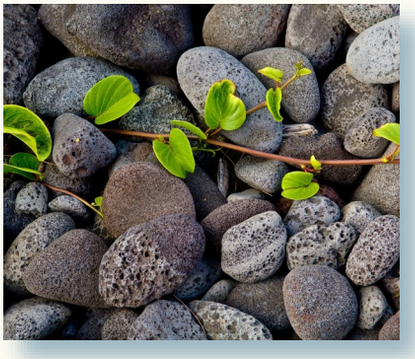
EPA's Regional Laboratory Network: An Overview

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 the network 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.

RLN supports Agency quick responses to emergencies

This organizational structure permits EPA Regional Laboratories to provide quick response to emergencies, while providing timely completion of all projects. During FY2015, 10 Regional Laboratories supported over 150,000 sample analyses and over 1,700 projects.

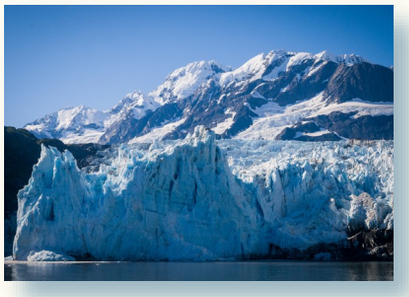
EPA's Regional Laboratory Network: An Overview

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 problems. During FY2015, 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 FY2015 including the Gold King Mine response. 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 perfluorinated organic compounds, Cyanotoxins and other 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.

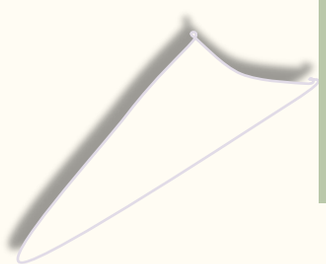
Core, Unique, and Developing capabilities span across RLN

Regional Laboratories Core Capabilities — FY2015
https://www.epa.gov/regionallabs

Regional Laboratories Unique Capabilities — FY2015
http://www.epa.gov/regionallabs/epa-regional-laboratories-unique-analytical-capabilities-and-documentation-region

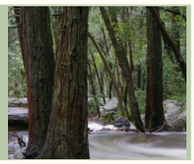
Regional Laboratories Developing Capabilities — FY2015
http://www.epa.gov/measurements/collection-methods

Section II — Regional Laboratory Network Highlights



Protecting Water: A Precious, Limited Resource

Regional Laboratories play an important role to ensure drinking water is safe, to restore and maintain oceans, watersheds, and their aquatic ecosystems to protect human health, to support economic and recreational activities, and to provide healthy habitat for fish, plants, and wildlife.



FY2015 HIGHLIGHTS

- ENSURE SAFE DRINKING WATER
- GOLD KING MINE RESPONSE
- MEASURING CYANOTOXINS

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.

Ensuring Safe Drinking Water

Laboratories that analyze drinking water samples are required to be certified by an approved certifying authority. The EPA Regional Laboratory personnel and trained certification officers conduct on-site evaluations of drinking water laboratories operated by states and tribal communities. Certification Officers also conduct audits of state 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.

Regional Laboratories Supported

223

Compliance Reinforcement related Drinking Water Projects

Protecting Water: A Precious, Limited Resource

Gold King Mine Response

In August 2015, a plug in the Gold King Mine breached sending yellow-orange colored water into Cement Creek, a tributary of the Animas River in Colorado, which then ran into the San Juan River in northwestern New Mexico. Overall response coordination was implemented with Region 8, Region 6, and Region 9. EPA Region 6 emergency response crews began collecting samples for drinking water to assess possible mine waste leaching into local groundwater wells near the river.

Region 6 and Region 8 Laboratories provided analytical support to confirm results obtained from commercial laboratories. Analysis required expedited turnaround time, with final reports submitted within 48 hours. Analysis included metals, mercury, and calculated hardness. Based on Region 6 and Region 8 Laboratories, confirmation results provided focused resampling, which yielded usable metal results that previously indicated abnormalities.

Updates on continued efforts are provided on EPA's website at: www.epa.gov/goldkingmine

District of Columbia (DC) Drinking Water Emergency

Mid-December 2015, after a "Do Not Drink" advisory was issued for portions of the District of Columbia's neighborhoods when petroleum was detected in tap water, Region 3 Laboratory was called upon to provide screening and confirmatory analysis for a "petroleum or tar-like" substance. Based on the Region 3 Laboratory results DC Aqueduct was able to lift the "do not drink" restriction.

Protecting Water: A Precious, Limited Resource

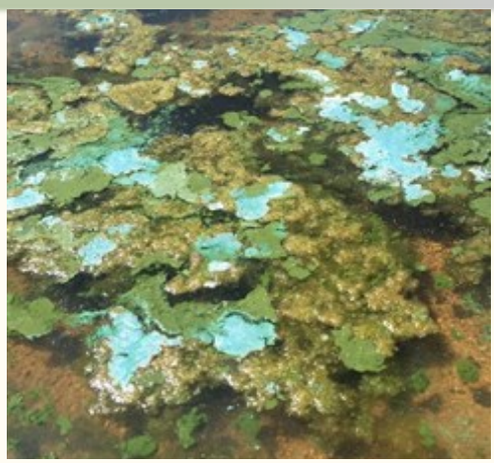
New Detection Methods for Cyanotoxins and Algal Blooms

Cyanobacteria or blue-green algae occur around the world in nutrient-rich water environments. Some of these cyanobacteria produce toxins that are harmful to humans and animals. Humans and animals can be exposed to these harmful toxins by several pathways, including ingestion, inhalation, and contact with the skin (bathing and/or recreation) in the effected waters. These toxins impacted over 500,000 people in Toledo, Ohio when citizens were ordered to not drink their water. Some of these toxins are being detected in surface waters in Region 8 and elsewhere in the United States (U.S.). Low-level chronic exposure to mixtures of these chemicals can have adverse ecological or human health effects. For example, new (2015) United States Environmental Protection Agency (USEPA) Health Advisories (HAs) have recommended at, or below 0.3 micrograms per liter for microcystins and 0.7 micrograms per liter for cylindrospermopsin in drinking water for children of pre-school age and younger (less than 6 years old). For school-age children through adults, the recommended HA levels for drinking water are at, or below 1.6 micrograms per liter for microcystins and 3.0 micrograms per liter for cylindrospermopsin.

Data from both the Assessment and Management Strategic Plan for Drinking Water and the Harmful Algal Bloom and Hypoxia Research and Control Act are used in the Regions, States, and Municipalities to assess their drinking water and recreational water facilities. This coordination improves our scientific understanding of the fate, transport, and affects from algal toxin exposure, and regional and national water quality initiatives. The analysis of waters affected by algal blooms also provided timely data for making local public health risk decisions. This teamwork-based effort is improving and maintaining improvements in water quality as well as fostering partnerships within the agency, between the regional states and other federal agencies.

The Drinking Water Unit from the Office of Partnerships & Regulatory Assistance (OPRA), the Water Quality Unit from the Office of Ecosystems, Protection and Remediation (EPR), and the Laboratory Services Program from the Office of Technical and Management Services worked together to identify and develop the algal toxin analysis methods. This coordination resulted in the development of two analytical methods to monitor for four individual toxins, and one field screening method. Data collected from three regional states and one municipality were shared with National Oceanic and Atmospheric Administration (NOAA), as well as, EPA's Office of Research and Development (ORD). Expansion of the analytical methods (new analytes) and laboratory sample analysis capacity are planned for 2016.

Regional Laboratories provide cyanotoxin testing and develop methods for improved detection



Protecting Water: A Precious, Limited Resource

Microbial Source Tracking

Of the 138 watersheds in Island County, Washington, 67 have been tested and 60% exceed Washington's water quality standards for fecal coliform. Exceeding fecal coliform standards requires beach closures and fishing restrictions. These exceedances negatively affect shellfish harvesting areas, public beaches, lakes, and streams bearing salmon listed as endangered under the Endangered Species Act (ESA). This impact on commercial and recreational shellfish opportunities has significantly affected economic resources to Island County.

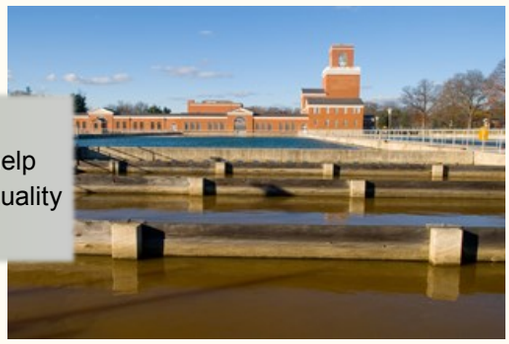
Since the summer of 2014, Region 10 Laboratory, in coordination with local county health officials, has supported studies to identify sources of this pollution using microbial source tracking (MST) analyses on surface waters. MST is capable of differentiating ruminant from human fecal contamination. The goal of these studies is to help improve water quality by identifying the source of contamination in the three identified watersheds, reopen shellfish harvest areas, improve beaches for water recreation, and improve the habitat for native aquatic species. Once the contamination source is identified, Island County will move forward with corrective actions.

Cherokee Water Quality and Biological Assessment

Region 4 Laboratory, in collaboration with the Eastern Band Cherokee Indians (EBCI), conducted stream assessments to provide updates on the condition of the environmental, recreational, and cultural quality, and the significance of the Hiawassee and Valley River Watershed streams. Many recreational activities, such as maintaining native trout species and supporting trout hatchery fishing, are supported in these streams. Existing biological data records date back to 1988, attesting to excellent water quality conditions. The last assessment of these streams was conducted in 2005, with data indicating sustainable water quality conditions and possibly improvement. The EBCI Tribe requested assistance from Region 4 in conducting similar assessments.

Proctor Creek Watershed

Proctor Creek, a 9-mile stream that flows from downtown Atlanta, Georgia, to the Chattahoochee River, is listed for impairment due to fecal coliform bacteria. Collaboration between the Region 4 Laboratory, Region 4 Water Protection Division (WPD), and community groups led to the development of the monitoring plan, which addresses data gaps for Proctor Creek. The planned monitoring event data will allow identification of contaminant sources in the watershed and potential exceedances of water quality standards. Each sampling event will provide EPA scientists opportunities to demonstrate sampling methods in the field, train citizen researchers, and interact with members of community.



Regional Laboratories provide the data to help protect food sources and assess watershed quality

Protecting Water: A Precious, Limited Resource

Water Quality Assessment and TMDL Program Support

Crucial for management about 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.

Total Maximum Daily Load (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 criteria. To meet 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 were analyzed for 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, PAHs, 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 to effectively restore those streams. The Region 7 laboratory and field staff collected water and air samples and performed field analysis using the mobile laboratory, while traditional analysis was conducted by the Region 7 Laboratory. The results will be used to confirm the conditions in the Springfield urban streams for the TMDL Program.

All 10 Regional Laboratories provide scientific expertise to support Regional and National Water Programs and Initiatives, which can include:

- analysis
- field support
- quality assurance
- data review
- technical support

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.

FY2015 HIGHLIGHTS

- AIR QUALITY
- INDOOR AIR
- PM 2.5

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.

Fuel Oil Terminal Air Emissions

In the summer of 2015, the Region 6 Compliance Assurance and Enforcement Division's Air/Toxics Enforcement Section conducted an inspection at a fuel oil storage terminal located near the Houston, Texas Ship Channel. The terminal's operations and associated processes are subject to Clean Air Act (CAA) requirements, including the Texas State Implementation Plan.

At the on-site inspection, Region 6 performed a number of activities to evaluate the site's ambient air emissions using different instruments, including photoionization detectors (PIDs) and special infrared (IR) cameras. Air samples were taken based on PID screening and IR results using SUMMA™ canisters. The stainless steel evacuated canisters are widely used for sampling volatile organic compounds (VOCs). Grab sampling using SUMMA™ canisters was representative of the ambient air at the facility, because the samples were taken on the downwind side of the oil storage tanks for the No. 6 fuel oil, and samples were taken in background air for comparison purposes.

Region 6 Laboratory provided analysis of the SUMMA™ air samples taken at the fuel oil storage site. Extensive dilutions of many samples were required to keep instrument saturation to a minimum. High concentrations of VOCs, and hydrocarbons (HCs), were identified by the combined gas chromatography/ mass spectrometry (GC/MS) instrument used to analyze the canisters for HCs, including benzene, toluene, ethylbenzene, and xylenes (BTEXs). BTEXs are usually considered among the worst of the HC ambient air pollutants due to associated breathing difficulties of long-term exposures and possible cancer risks. Region 6 Laboratory sample results were provided to the Enforcement Division and will aid future actions for this site.

Addressing Climate Change and Improving Air Quality

Air Monitoring in Pennsylvania

CONSOL Energy Inc. and the Allegheny County Pennsylvania Airport Authority unveiled a proposed Marcellus Shale natural gas production project on Pittsburgh International Airport (Imperial Pointe) property. The proposed plan outlines six well-pad locations and three centralized water impoundments. Allegheny County Health Department (ACHD) Air Quality Program, Monitoring section, will conduct ambient air sampling for VOCs in the Imperial Pointe residential neighborhood in Findlay Township. This air monitoring program is part of a larger national network designed by EPA to monitor ambient air pollution concentrations nationwide.

The ACHD monitoring program is part of the State and Local Agency Monitoring Station (SLAMS). SLAMS consists of a network of monitoring stations whose 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 are being collected for a period of up to 18 months, which began in April 2014 and will continue for a year after gas exploration begins. The samples are being analyzed by Region 3 Laboratory air chemists.

682

PM 2.5 AUDITS CONDUCTED IN FY2015

Sorbent Tube Analysis of High Humidity Samples

An increase in understanding the high concentrations of trichloroethylene (TCE) in homes sitting above contaminated groundwater plumes has caused the agency to investigate the gas vapors under the homes and the ground surrounding the homes. The sample type is vapor intrusion and is accomplished by drilling holes through the foundation and collecting air samples using TO-15, air canisters. Because of the cost and limited resources, sorbent tubes were being investigated for these high-humidity air samples. If the target list is limited to chlorinated VOCs, a single sorbent tube using tenax can capture the sample and analyze it for TCE. This method is anticipated to produce reliable data. The sorbent was identified and tests began in FY2015. The method should be finalized in FY2016. Once this method is completed, this technique could be used for testing air samples in caves and other high-humidity situations.

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.

8

Regional Laboratories have the capability to analyze for Organic Compounds in Air

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.

FY2015 HIGHLIGHTS

- BROWNFIELDS SUPPORT
- DIESEL SPILL RESPONSE
- PESTICIDES & ASBESTOS

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:

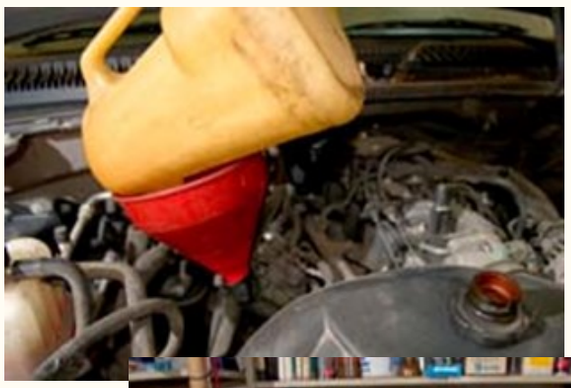
- Analyze hazardous and non-hazardous waste
- Implement applied research and method development to meet evolving analytical needs of Superfund and RCRA programs
- Ensure vigilant readiness for emergency response to environmental disasters, hazardous materials releases, time-critical removals, and inland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

Incremental Sampling Technique Used at Oregon Brownfields Site

The Heritage Square site is located in a primarily commercial area of downtown Astoria, Oregon. Historical activities at this site, including an automobile repair garage and paint shop, dry cleaner, and printer are potential sources of contamination that warranted further investigation. An Environmental Site Assessment (ESA) also identified indications of underground storage tanks.

To support site remediation, Region 10 Laboratory applied the incremental sampling methodology (ISM) to process samples from excavated soil piles. SM processing (or homogenization procedure) consists of many small increments of soil materials over a wide area and requires the use of unique grinding and mixing equipment with procedure-specific Quality Control (QC) samples (process blanks). The ISM application results yield the need for fewer samples to be analyzed and better statistical assessment of soil contamination.

Region 10 Laboratory analyzed the processed soil samples for polychlorinated biphenyls (PCBs), PAHs and petroleum hydrocarbons. Site support is continuing through FY2016.



Taking Action on Toxics and Chemical Safety

West Virginia Diesel Spill

A tractor trailer accident resulted in a spill of approximately 4,000 gallons of diesel fuel in Greenbrier County, West Virginia. Two drinking water intakes, within 50 miles of the spill, were shut down. Region 3 Laboratory analyzed drinking water samples for semi-volatile organic analysis (SVOA), polycyclic aromatic hydrocarbons (PAHs) by selected ion monitoring (SIM), and volatile organic analysis (VOA) under an expedited turnaround time (less than 7 days).

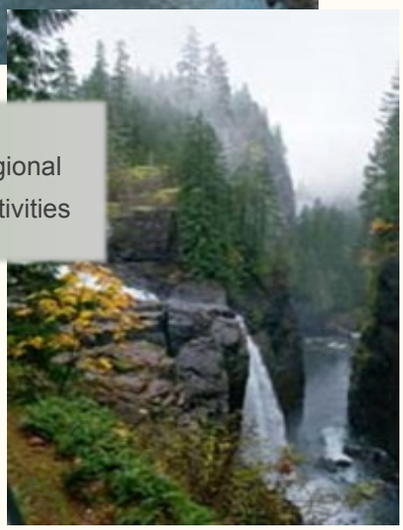
Sumas Mountain Asbestos

Region 10 has been investigating the release of asbestos from an earth-flow landslide on the west side of the Sumas Mountain near Bellingham, Washington, since 2006. The landslide initiated around 1940, resulting in significant deposition of asbestos-bearing sediments into Swift Creek and the Sumas River, especially during periods of rain and snow melt.

Sampling and analysis conducted by EPA over the past several years has confirmed relatively high concentrations of chrysotile asbestos and lower concentrations of actinolite asbestos in water and sediments that settle in Swift Creek and the Sumas River. Historically, when the deposition of sediments impaired the flow of Swift Creek, it would flood onto farmland and surrounding residential properties. The sediments were dredged and placed along the banks of the creek and offered to the community as fill. Recognizing the potential health risk to the community, EPA worked with local government to restrict the dredging of Swift Creek sediments.

However, during significant rain events like what occurred in the winter of 2009, the Sumas River flooded and deposited asbestos-bearing sediments over a much larger area. Appropriate disposal of these sediments is not feasible due to the extraordinarily high costs associated with transport and disposal. Over last year, Region 10 Laboratory continued supporting assessment efforts at the Sumas River site using a variety of analytical tools, including polarized light microscopy (PLM), powder X-ray diffraction (XRD), and scanning electron microscopy (SEM) with energy-dispersive x-ray analysis (EDXA) to determine the mineralogy of sediments with emphasis on the identification and quantitation of asbestos.

In addition, an experimental device called a fluidized bed asbestos segregator (FBAS) has been used to process samples from the site. The FBAS uses air elutriation to separate fibrous mineral structures from heavier matrix particles and deposits them onto a filter that is analyzed by transmission electron microscopy (TEM), which is contracted out to commercial laboratories. This unique approach allows measurement of low-level concentrations of asbestos structures that may become airborne when soil and sediments are disturbed. The sensitivity of this technique far exceeds traditional methods, such as PLM and XRD.



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

Taking Action on Toxics and Chemical Safety

Village Creek Dieldrin Study Achieves Lower Detection Limits to Prevent Health Impacts

Village Creek has been classified as impaired on the Alabama Department of Environmental Management (ADEM) 303(d) list for the legacy pesticide dieldrin. Dieldrin is an organochlorine pesticide and is no longer produced in the U.S. due to harmful bioaccumulative effects on humans, fish, and wildlife.

Previous ADEM data collected showed no detection of dieldrin, leading to consideration of removal of Village Creek from 303(d). However, the reporting level of ADEM data was above the 0.03 ng/l human health criteria making an impairment decision uncertain.

By using modified methods and cutting-edge analytical technology, Region 4 Laboratory was able to achieve detection limits almost 300 times lower than the routine detection limits previously achieved by the State where dieldrin was not detected. Results of the analysis showed concentrations of dieldrin in Village Creek roughly 40 times higher than the human health criteria. The State of Alabama reconsidered delisting and is planning further stream assessments. Had delisting occurred, efforts to remediate the stream segment would have ceased and undetected amounts of dieldrin remaining in the stream could biomagnify through the food chain and contribute to severe health effects.

58% of Regional Laboratory analyses support Superfund Program

Trichloroethylene (TCE) Investigated at 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 also 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 or working in 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 the commercialized and native portions of Meramec Caverns were analyzed by 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 is a multi-year project and continues into FY2016.

Pesticide Residue Tested

The Office of Pesticide Programs' (OPP) Environmental Fate and Effects Division (EFED) requested assistance from the Region 3 Laboratory for total organic carbon (TOC) analysis, which was part of a study on pesticide residues. OPP analyzed 50 pesticide soil samples and needed TOC results to use in risk assessment calculations for bioavailability. Region 3 Laboratory was able to analyze all 50 samples within a very short timeframe.

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.

FY2015 HIGHLIGHTS

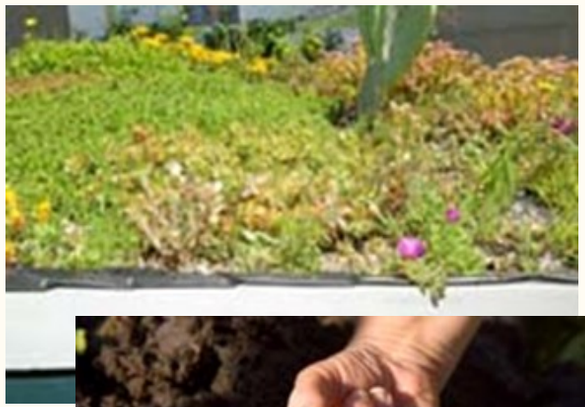
- HEALTHY GARDENS
- LEAD IN SCHOOLS
- COMMUNITY SUPPORT

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.

Assessing Soil Quality Impacts to Gardening

Soil safety is of particular interest to Austin, Texas and its citizens due to the city's food-to-table ordinance allowing any garden to provide food to local restaurants. Garden soils may harbor contaminants, such as heavy metals and organic chemicals. Because of Austin's food-to-table ordinance, Austin's Brownfields Revitalization Program requested assistance from Region 6 in conducting a Soil Kitchen, an event that provides home, school, and community gardeners with the opportunity to test garden soil samples. Since soil safety testing can be quite costly, free testing is a valuable service.



Region 6 collaborated with Austin's Brownfields Revitalization Program to provide testing of garden samples during the Soil Kitchen. Region 6 Laboratory deployed its mobile lab and provided on-site X-ray fluorescence (XRF) testing of soil samples for the presence of heavy metals during the event. Additional garden samples were analyzed for legacy pesticides and semi-volatile compounds.

Region 6 Laboratory, Houston, analyzed over 150 garden soil samples.
There were no significant amount of metals; small amounts of lead and arsenic were present in some soil samples. Gardeners were provided test results through a private online process, along with best and safe gardening practices and recommendations for gardening in contaminated soils. The Soil Kitchen raised awareness about soil health and safety.

Making a Visible Difference in Communities across the Country

Lead in Schools Project

Lead in drinking water can have adverse health effects, especially for children who can experience impaired mental development, IQ deficits, shorter attention span, and lower birth weight. Testing for lead in schools and daycare is important since children spend a large portion of their day in these types of facilities. The 1988 Lead Contamination Control Act (LCCA) is aimed at identifying and reducing lead in drinking water in schools and child care facilities.

In 2013, the Office of Water (OW) established a 3-year pilot study to promote awareness of the potential sources of lead in schools and child care facilities. The primary objective is to reduce children's exposure to lead from drinking water. The pilot study was in collaboration with the Kellogg Foundation and the Calhoun County Public Health Department located in Calhoun County, Michigan. The OW pilot study was a first step in a nationwide effort to promote awareness of the potential exposure to lead in schools and day care facilities with a focus on testing and remediation options.

Based on its active involvement in the Lead-in-Schools Program, OW reached out to Region 2 for analytical support for this study. Due to the large-scale nature of this study, Region 2 Laboratory coordinated the analytical support for this study, using RLN resources. Regions 2, 3, 5, 6, 7, 9, and 10 Laboratories participated in the study, providing over 4,000 analyses of over 100 schools and child care facilities in Calhoun County, Michigan, over a 3-year period between 2013 and 2015. The use of regional laboratories yielded significant cost savings compared to use of commercial laboratories, allowing precious funds to go toward the sampling of many more schools and day care facilities. The analytical results and field data were directly used to make a determination as to whether drinking water distributed from outlets were contaminated with lead above the 20 ug/L standard and, where applicable, provided guidance to the school/facility on how to remediate.

The Kellogg Foundation, the grantee for this project, plans to publish a guide that synthesizes lessons learned and best practices regarding lead sampling and analysis in schools and childcare facilities across the country. The aim of this guide is to help staff and other stakeholders (for example, parents and students) from schools and childcare facilities develop their own affordable, voluntary program. In addition, other groups (for example, public health partners, community members, and researchers) may choose to use this as a guide to support the implementation and evaluation of these efforts among schools and childcare facilities in their area.

Former Kil-Tone Superfund Site

Region 2 Laboratory provided analytical support to the former Kil-Tone Superfund site. The Former Kil-Tone Company Site is located within the City of Vineland, Cumberland County, New Jersey. As part of a two-phase, extensive evaluation to assess contamination found in residential and surrounding areas, including flood plains, the Region 2 Laboratory analyzed over 2,000 soil samples, primarily for metals analysis, in support of removal and remedial program activities at the site. The results were used to calculate the Hazard Ranking System (HRS) score and propose that the former Kil-Tone Superfund Site be listed on the National Priorities List (NPL).

The laboratory provided validated results within 4 weeks of each sample delivery. Internal staff performed these tasks, which resulted in an overall cost savings, keeping site cleanup activities on track.

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.

FY2015 HIGHLIGHTS

- CARIBBEAN SCIENCE CONSORTIUM
- MUCKLESHOOT TRIBE
- STATE AND TRIBE SUPPORT

By providing support at the regional level, opportunities abound to work in concert with states, tribes, and local entities 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 the Quality Assurance Project Plans (QAPPs).

Caribbean Science Consortium

A common problem in the Caribbean is that individual territories and academic research institutions lack adequate resources (in terms of capability or capacity) to conduct environmental science programs in any systematic, comprehensive way.

Representatives from Region 2 have addressed this issue by establishing a collaborative partnership with government and academic scientific institutions in the U.S. Virgin Islands and Puerto Rico: EPA Region 2 Caribbean Science Consortium. The Consortium comprises members of Region 2, government and university organizations (including minority academic institutions) in Puerto Rico and the U.S. Virgin Islands and is managed by Region 2 Laboratory.

The Consortium's main objective is to expand science collaboration on mutual environmental science programs, including the leveraging of resources, technical assistance, education, and outreach. The Consortium established a Charter and an annual work plan. The Consortium focused on addressing "signature" research issues on the islands, including water quality of rural communities not served by public drinking water.

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

Lower Duwamish Waterway Arsenic Study

Region 10 Laboratory developed a method for detecting arsenic speciation along with assessing the effectiveness of a new sampling technology for the Lower Duwamish Waterway (LDW) Superfund Site.

This site is a 5 -mile stretch of the Duwamish River that flows into Elliott Bay in Seattle, Washington. A century of heavy industrial use has left the waterway contaminated with toxic chemicals from many sources – industries along its banks, storm water pipes, and runoff from upland activities, streets, and roads. Pollution in the river sediments includes PCBs, dioxins/furans, carcinogenic PAHs, and arsenic. Many of these chemicals are persistent in the environment and tissue concentrations are unsafe in some resident fish and shellfish.

The LDW is part of the Muckleshoot Tribe's Usual and Accustomed tribal fishing areas. The Muckleshoot Tribe expressed interest in harvesting clams in the waterway, but currently does not because of chemical contamination. Consumption of inorganic arsenic in clams, chiefly Mya arenaria (Mya), contributes 40-50% of the total risk in the Reasonable Maximum Exposure (RME) seafood consumption scenario for tribal fishers. Understanding how and from which media Mya bioaccumulates arsenic is critical to make science-based decisions on whether and how to remediate arsenic-contaminated sediments so that clam consumption-based risks to Tribal members is minimized. Although, reducing sediment arsenic concentrations is expected to decrease inorganic arsenic (the most toxic form) concentrations in tissues, it is not currently possible to reliably predict this decrease. The relationship between sediment and Mya tissue concentrations has considerable variability.

Mya, as a filter feeder, likely consumes suspended solids-associated arsenic (seston) and the importance of this pathway has not been quantified. Mya retains approximately 50% of bioaccumulated arsenic in inorganic form rather than transforming it to less toxic organometallic form, as occurs in other clam species.

Region 10 Laboratory supported a Regional Applied Research Effort (RARE) study conducted along the LDW that may help predict the fate of inorganic arsenic in Mya. Mya samples collected from the LDW experimental area were analyzed for arsenic species using a method developed at Region 10 Laboratory that uses liquid chromatography (LC) and inductively coupled plasma/mass spectrometry (ICP/MS). Region 10 Laboratory also developed the use and analysis method capability of diffusive thin-film gradient (DGT) samplers that were included in the study. The DGT sampler technology was studied to determine if it was as a suitable substitute for actual Mya in exposure studies. This work is continuing into FY2016.

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.

FY2015 HIGHLIGHTS

- QA & FIELD ACTIVITIES
- CROSS-AGENCY COLLABORATION
- LEAN GOVERNMENT

One of the most important regional and state laboratory partnerships is sharing unique expertise, when needed. In 2015, 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.

Quality Assurance Field Activities Procedures (formerly FOG)

Under the leadership of Region 4, the Field Operations Group (FOG) develop operational guidelines for managing and ensuring adequate quality of the Agency's field activities.

FOG's main goals:

- Promote greater consistency in field measurement and sampling activities that are performed by EPA
- Produce reliable and legally-defensible data from field measurement and sampling activities
- Participate in training of other regions and programs to assure the implementation of the program

In 2013, by direction from EPA's Acting Deputy Administrator, all EPA organizations conducting field activities were required to implement the FOG Guidelines by February 2016. The Office of Environmental Information (OEI), with the help of Region 4 personnel, authored the EPA QA Field Activities Procedure (QAFAP), which incorporates all 10 FOG Guidelines, adopted in September of 2014 by OEI as QAFAP (CIO 2105-P-02.0) under the Agency's Quality Policy. To facilitate the Agency's implementation of the QAFAP, EPA Senior Leadership organized the FOG Implementation Team (FIT) with Region 4 having a pivotal role as national leaders. Region 4 provided seven members to FIT, including four QAFAP subject matter experts (SMEs) and the leadership of two high-level managers and the Deputy Regional Administrator as a champion to support this national initiative.

Region 4 SMEs developed and provided training on QAFAP requirements across the Agency, drafted procedural templates for other EPA organizations to use, as needed, and conducted gap assessments at ten regions and five Offices to assess the Agency's progress toward implementing the QAFAP by February 2016. The Region 4 FIT management team provided the necessary leadership across the Agency that has made this initiative so successful.

Embracing EPA as a High-Performing Organization

Collaborating within Regional Lab Network

Region 10 provided specialized incremental sampling methodology (ISM) to assist Region 3 on a Superfund Site.

The Clearview Landfill Superfund Site, located near Philadelphia, PA, was privately owned and operated without a permit from the 1950s to 1970s, and was used for the disposal of municipal and industrial waste collected from the City of Philadelphia and portions of Delaware County. In 1973, the owners were ordered to cease all waste disposal activities at the landfill and follow a prescribed closure plan, but the property continued to be used for other waste disposal operations for many years after the cease order.

EPA conducted a Human Health Risk Assessment (HHRA) to estimate the risks from the presence of contamination, which included polychlorinated PCBs, PAHs, and heavy metals. The outcome of HHRA indicated unacceptable risks related to soils (for applicable areas and receptors), shallow groundwater, and modeled fish tissue concentrations that exceeded EPA target levels.

In partnership with Region 3, Region 10 Laboratory supported a remediation project for the site by preparing samples collected using the incremental sampling methodology (ISM). This ISM processing (or homogenization procedure) of soil materials consists of many small increments over a wide area, and requires the use of unique grinding and mixing equipment with procedure-specific Quality Control (QC) samples (process blanks). The ISM application yields fewer samples requiring analysis and better statistical assessment of soil contamination.

Region 10 Laboratory analyzed the processed soil samples for PCBs and PAHs. The analysis results were used to develop final design plans and specifications for the remedial action phase of the project. This support is ongoing through FY2016.

ORD Collaboration using RARE

The Regional Applied Research Effort (RARE) is an Office of Research and Development (ORD) program that responds to high-priority research needs of EPA Regions. Region 3 identified a research need to investigate the impact of highly brominated source water into drinking water treatment plants. The “RARE Bromide” project was a multi-year project conducted by the Region 3 Water Protection Division (WPD). WPD looked at the effect of bromide on the formation of brominated trihalomethanes (THMs) in the surface-water intake at public water system treatment plants. Region 3 Laboratory provided support by analyzing thousands of samples for total trihalomethanes (TTHMs), alkalinity, ammonia, pH, and conductivity. RARE Bromide research is ongoing.

Regional Laboratories routinely conduct studies under the RARE program sponsored by Office of Research and Development (ORD) with

152

projects in 2015

Embracing EPA as a High-Performing Organization

Laboratory LEAN Events

Regional Laboratories use LEAN to improve processes and eliminate unnecessary steps. One example is the outcome of the Region 7 Laboratory LEAN events that began in FY2015 with a goal to make routine laboratory processes more efficient. Two events were held in FY2015 with more events scheduling in FY2016.

The first FY2015 event dealt with a problem related to completion of documentation for Demonstrations of Capability (DOCs) in Laboratory Information Management System (LIMS). Historically, documentation showing the completion of DOCs took 3-6 months after completion of the analysis. Even though the DOC packages were similar to actual data packages, the DOC packages were not seen as a priority. A team of chemists, quality staff, and computer staff met for two 4-hour sessions for a mini-Kaizen event. At these sessions, the team learned that a 5-day turnaround (comparable to real data) was possible. The team identified and eliminated wasted steps and duplicate steps. Ultimately, the team recommended a routine turnaround of 10 working days as the goal for streamlining the process and recommended revisiting the process in FY2017.

The second FY2015 event addressed a problem with sample cubitainers. The manufacturer of cubitainers sold its business and the production was moved to China. Obtaining shipments of cubitainers in a timely manner, and receiving properly-cleaned cubitainers became a significant challenge. A team, including purchasing, sample receipt, inspectors, field staff, disposal staff, and a facilitator met and discussed the history and problems. They mapped the major steps and methods of the process that used the cubitainers.

Specifications of the substitute bottle that would work at all stages of the sample collection and analysis were identified. Finally, catalog options of possible substitutes and next steps to ensure that new bottles would perform well and meet laboratory specifications were reviewed. After the meeting, the solution was identified and implemented immediately. The unexpected benefit of this event was a cost savings of $30,000 a year, using the substitute, pre-cleaned bottle.

LEAN—a set of principles and methods used to identify and eliminate waste in any process, helps organizations improve speed and quality of their processes. Kaizen events are used to map out the process and find ways to streamline or eliminate unnecessary steps.

Region 7 Laboratory used Lean Process yielding

$30,000

a year cost savings

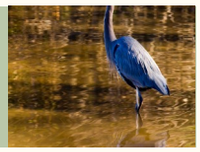
Efficacy of Disinfection — Support to Office of Pesticides and Pollutants

The Office of Pesticide Programs-Antimicrobial Division (OPP-AD) recently requested assistance from the Region 3 Laboratory in analyzing one of their disinfectant products for silver content. The mission of OPP-AD is to confirm, by analysis, the active ingredients in current disinfectant products. This confirmation is normally run using organic methodologies. But in this case, silver was the active ingredient and OPP does not have any metals instrumentation.

Following the supplied manufacturer method (with minor changes) Region 3 analyzed the disinfectant for silver. Matrix issues caused the silver to fall out of solution; therefore, the manufacturer's stated formulation did not meet required specifications.

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.



FY2015 HIGHLIGHTS

- IMPROVING ANALYTICAL METHODS
- LABORATORY ENTERPRISE FORUM
- REDUCING CHEMICAL USE IN LABS

Solid-Phase Extraction (SPE)

Method Development and Partnership

Region 7 chemists have been developing several SPE extraction methods, which reduce the solvent usage while maintaining or improving detection limits. This year is the culmination of extensive method development in partnership with two different vendors and the American Council of Independent Laboratories (ACIL). EPA Region 7 was one of 25 laboratories participating in a two-phase study that provided a technical response to the comment period for the Code of Federal Regulations (CFR) update of EPA Methods 608 and 625.

Laboratory Enterprise Forum Established

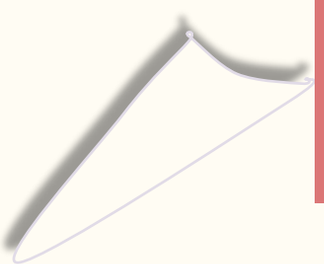
EPA established the Laboratory Enterprise Forum (LEF) in July 2015 to increase efficiency and impact of Agency laboratory functions. The primary purpose is to strengthen communication, coordination, and collaboration among the laboratory enterprise; strengthen efficient and effective management processes and strengthen overall interactions with external lab organizations.

Perfluorinated compounds (PFCs)

Region 5 Laboratory completed development of two methods for the determination of Perfluorinated chemicals (PFCs). The method for non-potable waters was adopted by the American Society for Testing and Materials (ASTM) as Method D7979 and the method for soils and biosolids was adopted as D7968 in FY2015. Both methods are being used to analyze samples by Region 5 for the Office of Research and Development (ORD), Cincinnati National Risk Management Research Laboratory (NRMRL) study of PFCs from sewage plant operations and land application of biosolids.

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

Section III — FY2015 Laboratory Accomplishment Results Summary



FY2015 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 FY2015, RLN supported more than 150,000 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 FY2015 (150,587 Total Analyses)

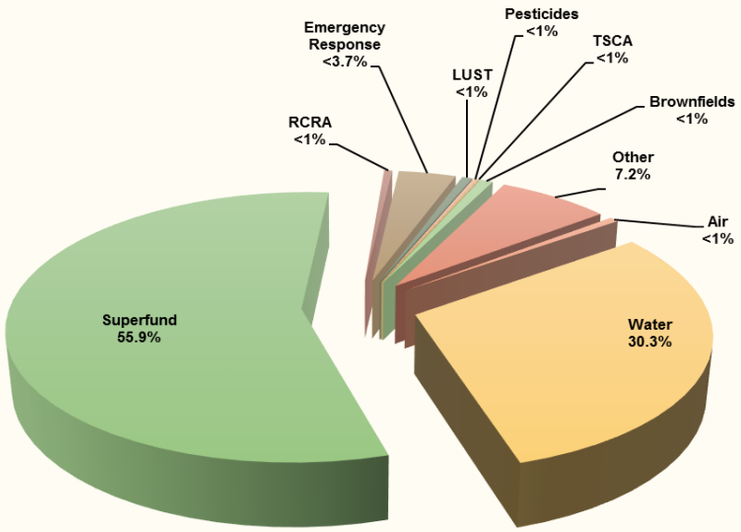
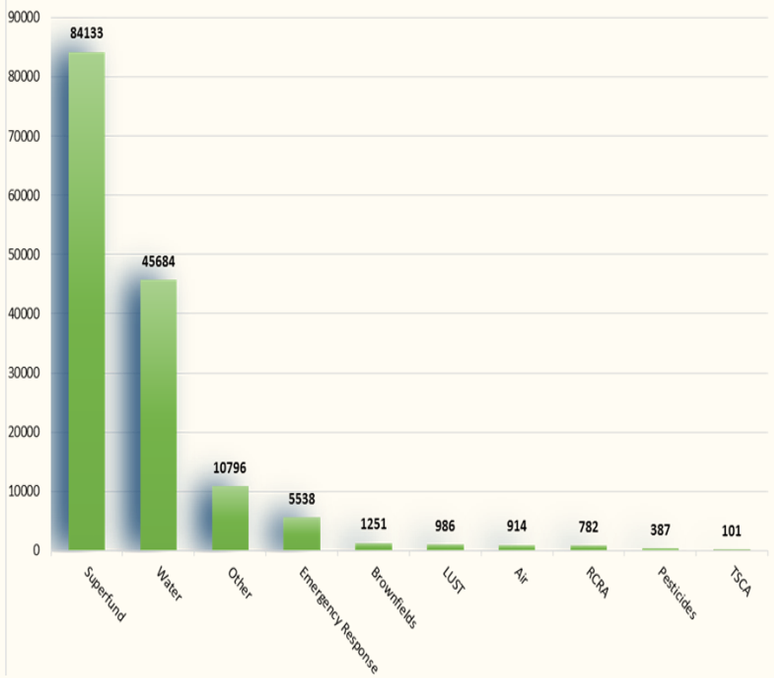


Figure 2. FY2015 U.S. EPA Regional Laboratories Analyses Provided by Program (150,572 Total Analyses)

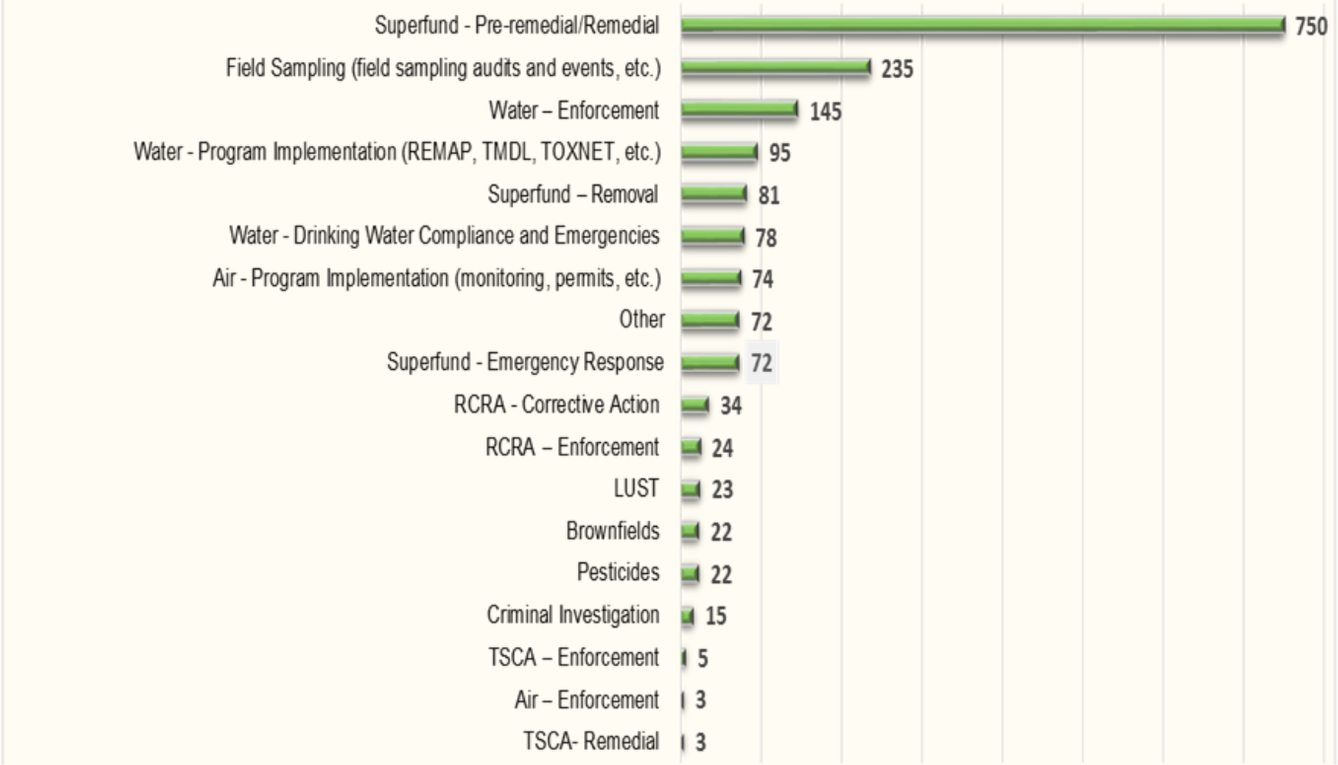


In keeping with prior years, the Superfund program continues to be the largest volume requestor of analytical services (55.9%), followed by Water Programs (30.3%). Emergency Response program support continues to be significant at 3.7%, with RLN laboratories analyzing 5,538 samples in conjunction with 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 196 criminal samples during the year.

FY2015 Laboratory Accomplishment Results Summary

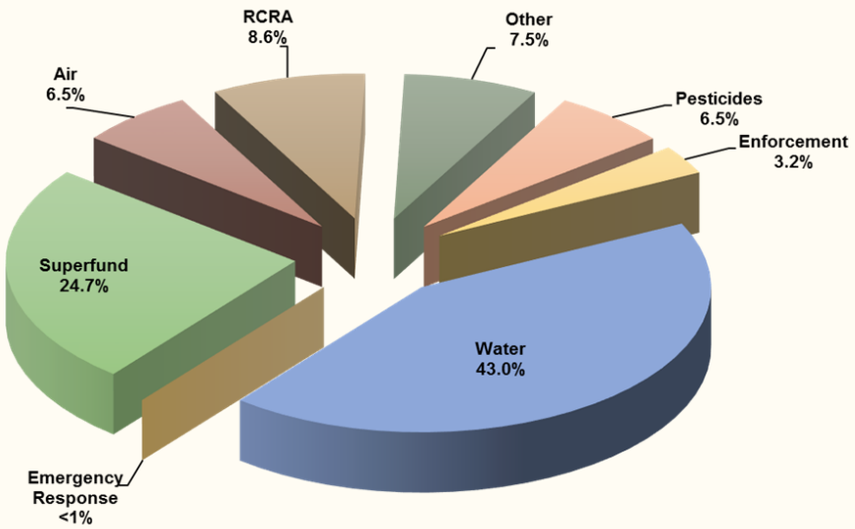
Figure 3 summarizes the number of analytical projects supported by RLN according to EPA program element. Collectively, RLN supported 1,753 projects.

Figure 3. Projects/Sites Supported by Regional Laboratory Data FY2015 by Program Element (1,753 Total Sites/Projects Supported)

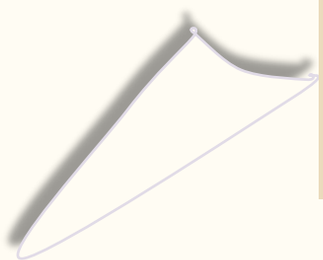


A significant amount of work supported during the year required methods be developed specifically to address the unique needs of a particular region (Figure 4). Often, methods developed by a region to address a local environmental challenge are mobilized in other regions as their benefit is realized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

Figure 4. Method Development Project Support to EPA Programs in FY2015 (93 Methods)



Section IV — Regional Laboratories Capabilities Tables — FY2015



Regional Laboratories Core Capabilities — FY2015

I. Chemistry											
Analyte/Group Name	**Sample Media**	**Analytical Technique**	**Regional Capability**								
INORGANIC CHEMISTRY			**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
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
	Soil/Sediment	Colorimetric				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
	Soil/Sediment	Colorimetric	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					
	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	X
	Tissue (fish &/or plant)	Direct Hg Analysis							X			
	Waste (oil, drum, etc.)	CVAA		X	X	X	X	X		X	X	X
	Waste (oil, drum,(etc.)	Direct Hg Analysis				X		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
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	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		X
Nitrogen (Ammonia)	Water	Colorimetric		X	X	X	X	X	X	X	X	X
	Soil/Sediment	Colorimetric			X	X	X		X			
	Water	Electrode		X								

Regional Laboratories Core Capabilities — FY2015

I. Chemistry											
Analyte/Group Name	**Sample Media**	**Analytical Technique**	**Regional Capability**								
INORGANIC CHEMISTRY			**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
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		X	
	Soil	IC							X		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
	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								
	Soil	Turbidimetric	X									
Sulfide	Water	Colorimetric		X					X			
	Soil	Colorimetric										
	Water	IC, Turbidimetric						X				
	Soil	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						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	X
	Soil/Sediment	GC/MS or GC			X	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	Gravimetric		X	X				X	X		
	Soil/Sediment	Gravimetric			X				X	X		

Regional Laboratories Core Capabilities — FY2015

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
	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
	Water	GC				X				X		
	Soil/Sediment	GC				X				X		
	Waste (oil, drum, etc..)	GC		X		X	X	X	X	X		X
VOA (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
II. Physical and Other Determinations												
Flash Point	Aqueous/Liquid Waste (oil, drum, etc..)	Pensky-Martens or Setaflash	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	X		X
	Waste (oil, drum, etc..)	Pensky-Martens or Setaflash 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
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 — FY2015

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 (PPCPs)	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	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 — FY2015

REGION 2				
Analyte/Group Name	**Sample Media**	**Analytical Technique**	**Supported Program(s)**	**Comments**
INORGANIC CHEMISTRY				
CO	Air/N2	EPA Reference or Equiv. Method as in 40 CFR Part 58	Air	
NOx	Air/N2	EPA Reference or Equiv. Method as in 40 CFR Part 58	Air	
SO_2	Air/N2	EPA Reference or Equiv. 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 Equiv. 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	
mColiblue24	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 — FY2015

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	Emergency Response	
Chemical Warfare Agents	Water/Solid/Wipe	GC/MS		
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	HR GC/MS (EPA Method 1668A)	Superfund	Methane, ethane, ethene
PCB Congeners	Water	HR GC/MS (EPA Method 1668A)	Superfund	High resolution GC/MS
	Soil/Sediment	HR GC/MS (EPA Method	Superfund, RCRA	High resolution GC/MS
	Tissue	HR GC/MS (EPA Method	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 — FY2015

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, octylphenol & bisphenol-A	Water	GC/MS (ASTM D7065-11)	Water	Endocrine disruptor - High Concentration method (ppb)
Nonylphenol (AP), AP-1 and 2-ethoxylate, octylphenol & bisphenol-A	Soil/Sediment	GC/MS (8270 modified / Internal SOP)	Water	Endocrine disruptor
Nonylphenol (NP), NP-1 and 2-ethoxylate, octylphenol	Water	LC/MS/MS (ASTM D7485-09)	Water	Endocrine disruptor Low level method (ppt)
Bisphenol-A	Water	LC/MS/MS (ASTM D7574-09)	Water	Endocrine disruptor Low level method (ppt)
Nonylphenol carboxylates	Water	LC/MS/MS	Water	Endocrine disruptor
Long chain NP, NPEOs (n=3-18)	Water	LC/MS/MS (ASTM D7742-11)	Water	Endocrine disruptor
COD	Soil/Sediment	Colorimetric		
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
Chlorthalonil	Water	GC/MS	FIFRA	Stream Survey
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 on-site; Screening or better data; Fast extraction for organics
Toxic Industrial Chemicals (TICs) & CWA degradants	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 and thiofanox	Water	LC/MS/MS, ASTM7645-10	NHSRC	SAP Method
Aldicarb, bromadiolone, carbofuran, oxamyl, and methomyl	Water	LC/MS/MS, ASTM7600-09	NHSRC	SAP Method
Thiodiglycol	Water	LC/MS/MS, CRL SOP MS015	NHSRC	SAP Method
	Soil	LC/MS/MS, ASTM E2787-11	NHSRC	SAP Method
	Wipes	LC/MS/MS, ASTM E2838-11	NHSRC	SAP Method

Regional Laboratories Unique Capabilities — FY2015

REGION 5 - continued				
Analyte/Group Name	**Sample Media**	**Analytical Technique**	**Supported Program(s)**	**Comments**
INORGANIC CHEMISTRY				
Diethanolamine, triethanolamine, n-methyldiethanolamine and methyldiethanolamine	Water	LC/MS/MS, ASTM D7599-09	NHSRC	SAP Method
Dioctyl Sulfosuccinate (DOSS) in Seawater	Stormwater	LC/MS/MS, ASTM D7730-11	NHSRC/SF	SAP Method
Dipropylene glycol monobutyl ether and ethylene glycol monobutyl ether in seawater	Stormwater	LC/MS/MS, ASTM D7731-11	NHSRC/SF	SAP Method
Bromodiolone, brodifacoum, diphacinone and warfarin in water	Water	LC/MS/MS, ASTM D7644-11	NHSRC	SAP Method
Diisopropyl methylphosphonate, ethyl hydrogen dimethylamidophosphate, 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 -9000	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	

Regional Laboratories Unique Capabilities — FY2015

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 Chrom	Water	IC/UV	Water	
Perchlorate	Water	IC/MS/MS	Water	
Metals by X-Ray Fluorescence	Soil	portable XRF	Superfund, RCRA	field screening
ORGANIC CHEMISTRY				
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/Wipes	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
Alcohols by headspace	Water	GC/MS	RCRA, Superfund	
Light Hydrocarbons (dissolved gases)	Water	GC/MS	RCRA, Superfund	
Organophosphorous Pesticides (OPPs)	Water	GC/NPD	RCRA, Superfund	
	Soil/Sediment	GC/NPD	RCRA, Superfund	
	Waste	GC/NPD	RCRA, Superfund	
PHYSICAL AND OTHER DETERMINATIONS				
Corrosivity by pH	Waste	Method 1110 - Corrosivity Toward Steel	RCRA	

Regional Laboratories Unique Capabilities — FY2015

REGION 7				
Analyte/Group Name	**Sample Media**	**Analytical Technique**	**Supported Program(s)**	**Comments**
INORGANIC CHEMISTRY				
CD	Air	40 CFR Part 58	Air	OAQPS Protocol Gas Verification Program
NOx	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 Bioaccessibility Assays for Arsenic and 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 Sorptive 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	2008 NFWA
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 — FY2015

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		
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 and Tribes
Low Level Pesticides/CLLE	Water	GC/MS	Water/Superfund	Monitoring for States and 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	IC/ICP/MS	Water/Superfund	Endocrine disruptors
Waste Indicator Compounds	Water	GC/MS	Water/Superfund	Monitoring for States and 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	
	Water	Membrane Filtration	Water/Superfund	

Regional Laboratories Unique Capabilities — FY2015

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 and 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 bioaccessibility assays for arsenic and 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 (Haliotis rufescens) Larval Development	Water	EPA/600/R-95/136	NPDES	
Toxicity Test, Sea Urchin Fertilization [Stronglyocentrotus purpuratus]	Water	EPA/600/R-95/136	Water, NPDES	

Regional Laboratories Unique Capabilities — FY2015

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
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 Bioaccessibility Assays for Lead in Soil	Soil	Leachates by Method 1340, IC/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 and SVOA	Industrial wastes, Solids, Tissues	Vacuum distillation, Methol 8261A	Superfund, RCRA	
Low Level Polyaromatic Hydrocarbons and Other Neutral Organics	Soil, Sediments	GC/MS-MS	Superfund, Brownfields, Water	
PCB aroclors	Wipes	GC/ECD	Brownfields, RCRA	
Low Level Polyaromatic Hydrocarbons	Shellfish, Water	GC/MS-MS	Superfund, Brownfields	
PHYSICAL AND OTHER DETERMINATIONS				
Incremental Sampling Methodology (ISM) Preparation of Soil Samples for Organic and Inorganic Analyses	Soil	Described in Method 8330B Appendix	Superfund, Brownfields	
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 and 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 drinking

Regional Laboratories Developing Capabilities — FY2015

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 and semi-VOA analysis	Drinking and Surface Water	Developing methods on current instrumentation	FY2015
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 and Superfund.	Identified developmental need; initiated research and evaluation of analytical procedures; project placed on hold due to lack of demand for analysis	On hold
EPA Method 1694 for Pharmaceuticals and Personal Care Products (PPCP) by LC/MS/MS	Need for capability to identify and quantify pharmaceutical and personal care products.	Cancelled due to loss of analyst.	On hold
PCR quantitation and 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
Enzyme-Linked Immunosorbent Assay (ELISA)	Need for in-field testing of surface and drinking water for presence of estrogen and estrogen-like compounds.	Complete	FY2013
Dissolved Gases	Superfund	Initiated. Method 537	
SVOCs in drinking water	Drinking Water	Initiated. Method 537	
REGION 4			
EPA Method 8261	VOCs in difficult matrices	Initial investigation	Unknown
Internal Method - GC/MS/MS	Low-level pesticides w/MS confirm	Institute of Technology and Marine Engineering (ITME) is in process	Jan-15
Lead bioavailability in soil, Method 1340	Superfund	continued work	
REGION 5			
PFOA/PFOS in biosolids and water	Water Division study - Resource Management Information System (RMIS)	Initial work done, new instrument installed and standards run to set up instrument. SOP in draft.	FY2016
qPCR, Gene Sequencing Guar Gum	Hydrofracking (HF) fluid screening tool - Region 3 support	Some samples sequenced, screening tool in process.	FY2016
Glyphosate in water by IC/MS	Pesticide program request for stream survey	Method development completed, SOP in process.	FY2016
Fluorotelomer alcohols in water by MS/ MS	Water	Initiated. SOP in draft.	FY2016
Glyphosate by IC/MS	Pesticides	completed	
Pesticide screen by LC/MS/MS	Pesticides	completed	
Low-level 1,4-Dioxane by GC/MS	Superfund	initiated	
PCB congeners by GC/MS/MS	Great Lakes National Program Office (GLNPO)	completed	
LC/MS methods	ORD	completed	

Regional Laboratories Developing Capabilities — FY2015

REGION 6			
Project Method	**Developmental Need**	**Status**	**Projected Completion**
Anions and Oxyhalides by IC	Remove dependence on State Lab for this test. Superfund, RCRA, CWA	Method developed, need DOC/MDL; SOPs,. continued	April 2016
Direct mercury analysis (CVAF - Milestone)	CWA, RCRA, Superfund	DOC/MDL; SOP preparation. continued	December 2016
Expanded 8270 list by GC/QQQ	RCRA, Superfund	Continued method development	December 2016
High Dissolved Solids/Modified Method/ Anion	CWA RCRA, Superfund	Method being developed. continued	October 2016
High Dissolved Solids /Modified Method/ Cation	CWA, RCRA, Superfund	Method being developed. continued	October 2016
High Dissolved Solids/Modified Method/ OA	CWA, RCRA, Superfund	Method being developed continued.	January 2017
Pharmaceuticals and Personal Care Products (PPCP) analysis	CWA	Method being developed. continued	August 2016
Passive formaldehyde	Clean Air Act (CAA)	Method being developed. continued	On hold
Asbestos	Superfund, RCRA	On hold	
Induction-coupled plasma axial method	Superfund	continued	
Low molecular weight acid in resource extraction analysis	Safe Drinking Water ACT (SDWA)	continued	
Haloacetic acids in resource extractor analysis	SDWA	continued	
REGION 7			
EPA Method 1694 for (PPCP) by HPLC/ MS/MS--Direct injection analysis-direct	Speciation data to be used for Risk Assessments in support of Clean Water Act and Superfund.	Performing method validation studies on surrogate compounds; developing SOP, expanded list of targets in FY2015 and FY2016. continued work	FY2016
Pesticides by GC/MS/MS	Confirmational analysis of pesticide analytes previously performed by GC/ECD CWA RCRA Superfund	Instrument installed, method development and validation pending initiated	FY2016
Microbial Source Tracking Using qPCR	TMDL and Stormwater	Non human marker test completed; Pending additional technical method guidance from ORD continued work	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 and Superfund.	Method development currently underway. on hold	On hold due to limited staff.
EPA Method 1694 for PPCP by HPLC/ MS/MS--direct injection analysis.	Speciation data to be used for Risk Assessments in support of CWA and Superfund. Water Program	Sample analysis for Urban Stream Monitoring, continued improvements.	Ongoing
PAH/SVOC in Water by Stir Bar Sorptive Extraction	Water Program	Sample analysis for Urban Stream Monitoring, continued improvements. Continued work pending final Code of Federal Regulations (CFR)	Ongoing
Airborne VOC by Solid Sorbent Tube (EPA Method TO-17)	Air Program	Air sample monitoring for ongoing sites with regular re-evaluations. Use three-phased sorbent tubes for low to moderate humidity.	FY2015, field tests in FY2016
Airborne VOC by Solid Sorbent Tube (EPA Method TO-17)	Air Program, vapor Intrusion	Developing a single-phase sorbent method for evaluating high humidity uses for vapor intrusion and cave air evaluations. This method will focus on a short list of chlorinated VOCs	FY2016
Independent Laboratories Institute Solid -Phase Extraction Study	Office of Water	Participation in the second phase of the study using two different solid phase extraction techniques: Horizon SPE, and Stir Bar Sorptive Extraction	FY2016

Regional Laboratories Developing Capabilities — FY2015

REGION 8			
Project Method	**Developmental Need**	**Status**	**Projected Completion**
Asbestos / Electron Microscope	Need for capabilities to analyze water and soils for asbestos contamination at Superfund sites.	Instrument operational and running samples.	Ongoing
Endocrine Disruptor Studies / LC/MS/MS	Emerging needs for the Water program and 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 and emerging needs for the Superfund, Water programs and 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 and 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 and Superfund.	Identified developmental need; initiated research and evaluation of analytical procedures; necessary modifications to laboratory in progress.	Ongoing
Toxicity - Acute & Chronic in Mobile Lab	On-site assessment for potential needs by the Water program.	Mobile lab available; team lead initiating discussion of projects and team development.	Ongoing
Pharmaceuticals by LC/MS/MS	Water and ORD	Progress continuing.	Ongoing
Pesticides by LC/MS/MS	Water	Progress continuing.	Ongoing
Hormones and Steroids by LC/MS/MS	Water and ORD	Progress continuing.	Ongoing
Algal Toxins	Water	completed	
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 and 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 VOCs in air using passive diffusive sampling media	Superfund (vapor intrusion)	completed	FY2015
Precious metals analysis of washcoat from automobile catalytic converters using a Niton ZL3t Field-Portable X-Ray Fluorescence (FPXRF)	Air enforcement	completed	FY2015
REGION 10			
Develop Methyl Mercury Analysis Capability for Sediment Samples	Methyl mercury data needed to support regional mercury strategy toward characterizing levels in the environment and 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 and sensitivity for sediments.	Progress delayed due to workloads and program needs are uncertain.
Ultra-trace Concentration Phosphorus Method for Treated Wastewater Effluent and Surface Water	NPDES compliance monitoring at ultra low phosphorus levels.	Ultra-trace standard concentration measurements were achieved on a Lachat colorimetric instrument and an ICP-MS system. Testing on actual effluent samples still to be planned.	Progress delayed due to workloads. Method developed but validation through matrix testing still to be done. New expected completion date to be determined.

Regional Laboratories Developing Capabilities — FY2015

REGION 10 - continued			
Project Method	**Developmental Need**	**Status**	**Projected Completion**
Develop Diffusive Thin-Film Gradient (DGT) Preparation and Arsenic Analysis Capability	The DGT disks are being tested at a Superfund site to determine if the material can effectively mimic arsenic uptake of bivalves in marine sediment. The DGTs require special conditioning at the laboratory and the arsenic analysis method needed to be developed for this matrix.	The development of the methods was initiated in 2015. Actual use of the disks and comparisons to actual data of clams are scheduled for early 2015.	FY2015
Develop Pesticides Analysis Capability for Wipe Samples	Wipe samples are planned to be collected at various tribal childcare facilities in OR to test for pesticides during CY 2016.	The pesticides were identified and a literature search of methods was conducted.	FY2016
Methyl Mercury Analysis for Sediment Samples	Superfund, water	continued work	
Develop/Mobilize Activity Analysis Capability by SM2310GB in Water Samples	Superfund, water	initiated	
Develop New extraction Methods for Pyrethroids and other common pesticides in wipe samples	Enforcement and ORD	initiated	

Appendix A — Acronyms/Abbreviations

Acronyms/Abbreviations

-A-	
ACHD	Allegheny County Health Department
ACIL	American Council of Independent Laboratories
ADEM	Alabama Department of Environmental Management
-B-	
BTEX	benzene, toluene, ethylbenzene and xylenes
-C-	
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
-D-	
DGT	diffusive thin-film gradient
DOC	demonstration of capability
-E-	
EAID	Environmental Assessment & Innovation Division
EBCI	Eastern Band Cherokee Indians
EDXA	energy-dispersive x-ray analysis
EFED	Environmental Fate and Effects Division
EPA	Environmental Protection Agency
EPR	Office of Ecosystems, Protection and Remediation
ESA	Environmental Site Assessment
ESAT	Environmental Services Assistance Team
-F-	
FBAS	fluidized bed asbestos segregator
FBT	Office of Monitoring and Assessment Freshwater Biology Team
FIT	FOG Implementation Team
FOG	Field Operations Group
FY	Fiscal Year
-G-	
GC/FID	gas chromatography/flame ionization detector
GC/MS	gas chromatography/mass spectrometry
-H-	
HA	Health Advisories
HC	hydrocarbon
HHRA	Human Health Risk Assessment
HRS	Hazard Ranking System

Acronyms/Abbreviations

-I-	
ICP	inductively coupled plasma
ICP/MS	inductively coupled plasma/mass spectrometry
IR	infrared
ISM	incremental sampling methodology
ISO	International Standards Organization
-J-	
-K-	
-L-	
LC	liquid chromatography
LDW	Lower Duwamish Waterway
LIMS	Laboratory Information Management System
LTAB	Laboratory Technology and Analysis Branch
-M-	
MST	microbial source tracking
-N-	
NEIC	National Enforcement Investigations Center
NELAC	National Environmental Laboratory Accreditation Conference
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
-O-	
OASQA	Office of Analytical Services and Quality Assurance
OEI	Office of Environmental Information
OPP	Office of Pesticide Programs
OPP-AD	Office of Pesticide Programs Anti-Microbial Division
OPRA	Office of Partnerships & Regulatory Assistance
ORD	Office of Research and Development
OTMS	Office of Technical & Management Services
-P-	
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PID	photoionization detector
PLM	polarized light microscopy

Acronyms/Abbreviations

-Q-	
QA	Quality Assurance
QAFAP	QA Field Activities Procedure
QAPP	Quality Assurance Project Plan
QC	Quality Control
-R-	
RARE	Regional Applied Research Effort
RCRA	Resource Conservation and Recovery Act
RLN	Regional Laboratory Network
RME	Reasonable Maximum Exposure
-S-	
SEM	scanning electron microscopy
SESD	Science & Ecosystem Support Division
SIM	Selected Ion Monitoring
SIP	state implementation plan
SLAMS	State and Local Agency Monitoring Station
SME	subject matter expert
SPE	solid-phase extraction
STC	Science and Technology Center
SVOA	semi-volatile organic analysis
-T-	
TCE	trichloroethylene
TEM	transmission electron microscopy
THM	trihalomethanes
TMDL	total maximum daily load
TOC	total organic carbon
TSS	total suspended solids
TTHM	total trihalomethanes
-U-	
U.S. EPA	United States Environmental Protection Agency
-V-	
VOA	volatile organic analysis
VOC	volatile organic compound
-W-	
WPD	Water Protection Division
-X-	
XRD	X-ray diffraction
XRF	X-ray fluorescence
-Y-	
-Z-	