United States
Environmental Protection
Agency

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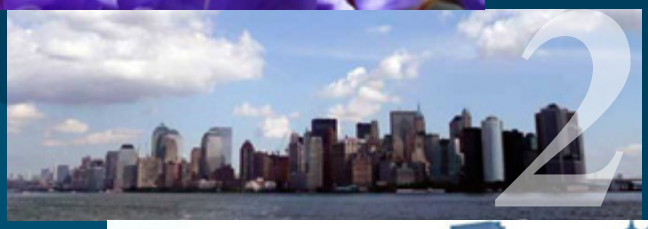
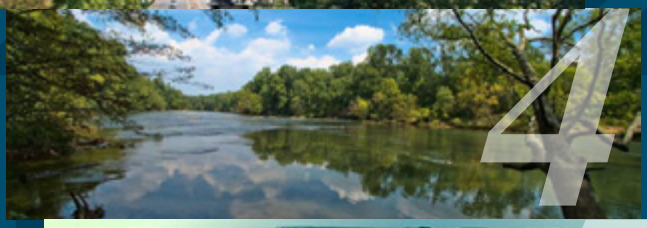
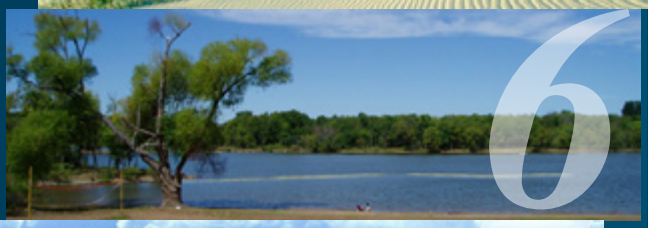
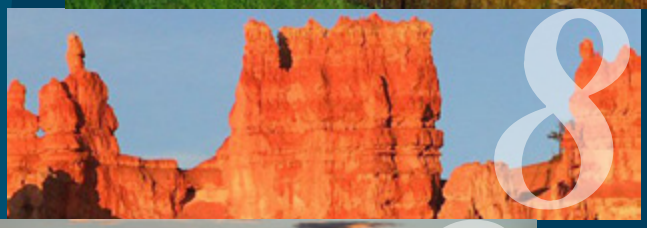
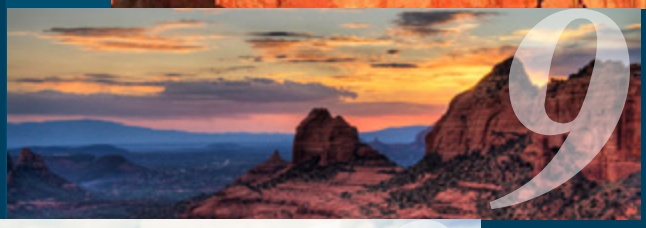










US EPA Regional Laboratory Network

Annual Report 2012

September 2013
www.epa.gov

US EPA Regional Laboratory Network Annual Report 2012

List of Acronyms

BNA..... Base/Neutrals and Acids Extractable Organics

BOD ..... Biological Oxygen Demand

CAFO..... Concentrated Animal Feeding Operation

COD ..... Chemical Oxygen Demand

CRL..... Chicago Regional Laboratory

CVAA..... Cold Vapor Atomic Absorption Spectrometry

CWA..... Chemical Warfare Agent or Clean Water Act (dependent on context)

DBCP..... Dibromochloroproprane

EDB ..... Ethylene dibromide

EDC ..... Endocrine Disrupting Chemicals

ERLN ..... Environmental Response Laboratory Network

EPA..... US Environmental Protection Agency

GAO ..... General Accounting Office

GC..... Gas Chromatography

GC/ECD ..... GC/Electron Capture Detector

GC/NPD ..... GC/Nitrogen - Phosphorus Detector

GC/MS ..... GC/Mass Spectrometry

GFAA..... Graphic Furnace Atomic Absorption Spectrometry

GOM ..... Gaseous Oxidized Mercury

IC ..... Ion Chromatography

ICP ..... Inductively Coupled (Argon) Plasma

ICP/AES ..... ICP/Atomic Emission Spectrometry

ICP/MS..... ICP/Mass Spectrometry

IR ..... Infrared

ISE..... Ion Selective Electrode

JPHC..... Jackson Park Housing Complex

LC/MS ..... Liquid Chromatography/Mass Spectrometry

LC/MS/MS ... Liquid Chromatography/Dual MS

MCL ..... Maximum Contaminant Level

NEIC..... National Enforcement Investigations Center

NERL ..... National Exposure Research Laboratory

NIST ..... National Institute of Standards and Technology

NPL ..... National Priorities List

NRC..... National Research Council

NRMRL..... National Risk Management Research Laboratory

NO3 ..... Nitrate

NO2 ..... Nitrite

NOAA..... National Oceanographic and Atmospheric Administration

ODEQ..... Oklahoma Department of Environmental Quality

OGWDW ..... Office of Ground Water and Drinking Water

ORD ..... Office of Research and Development

OSWER..... Office of Solid Waste and Emergency Response

PAHs ..... Polynuclear Aromatic Hydrocarbons

PCBs..... Polychlorinated biphenyls

PEP..... Performance Evaluation Program

PLM ..... Polarized Light Microscopy

PPCP ..... Pharmaceuticals and Personal Care Products

QAPP ..... Quality Assurance Project Plan

QC..... Quality Control

REMAP..... Regional Monitoring and Assessment Program

RLN ..... Regional Laboratory Network

RPM ..... Remedial Project Manager

RTP ..... Research Triangle Park

SDWA..... Safe Drinking Water Act

SRP..... Standard Reference Photometer

SSBE..... Sorbent Stir Bar Extraction

TCLP..... Toxicity Characteristic Leaching Procedure

TDS ..... Total Dissolved Solids

TKN ..... Total Kjeldahl Nitrogen

TOC..... Total Organic Carbon

TSS..... Total Suspended Solids

TTP..... Through-The-Probe

USGS ..... US Geological Servey

VOA ..... Volatile Organic Analytes/Analyses

XRF..... X-ray Fluorescence

1.0 Introduction

The US Environmental Protection Agency (EPA) Regional Laboratory Network (RLN) consists of ten regional laboratories that provide mission-critical support to the Agency in the protection of human health and the environment. Services and expertise provided by each regional lab are tailored to meet the particular needs of a region or program to address complex and emerging environmental issues where little background experience or knowledge exists. Scientific communication and collaboration across the Laboratory Network leverages regionally-specific expertise and methods across the nation thereby maximizing efficiency and flexibility while assuring responsiveness.

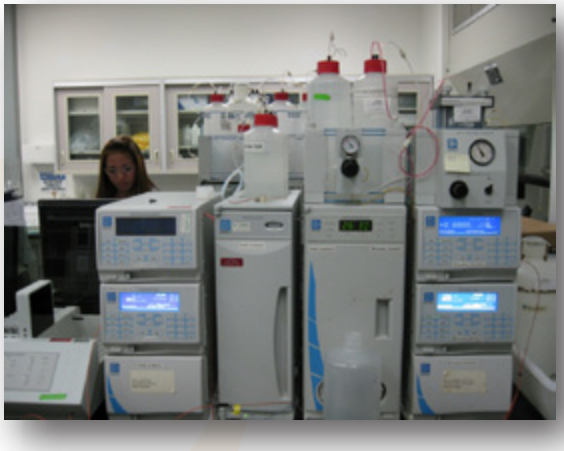
Services are tailored to meet particular regional needs to address complex environmental issues where little experience or knowledge exists.

Sound analytical data form the underpinning of sound environmental decisions and effective environmental policy. The RLN produces environmental analytical data that meet EPA's data needs for our air, water, waste and enforcement programs. Most importantly, the Regional labs have the capability to support special or non-routine analytical needs that cannot be readily obtained from any other source. In that particular niche, the RLN fills a gap between basic research and commercially available analyses. Even though these requests encompass the most challenging analytical work garnered by the Agency, data from our regional labs consistently meet project data quality objectives. To further ensure and enhance the defensibility of our data, each regional laboratory operates under an accredited quality system.

Support special or non-routine analytical requests that cannot be readily obtained from commercial sources while consistently meeting project-specific DQOs.

The RLN has access to additional mechanisms for procurement of routine analytical services such as the Contract Laboratory Program, which provides readily available standard methods from private sector labs for the Superfund program. RLN laboratories are also supported by Environmental Services Assistance Team (ESAT) contractors to supplement EPA's existing capabilities. The RLN complements rather than competes with these analytical service delivery mechanisms. The organizational structure provides for maximum flexibility to support Agency response to natural disasters and emergencies, while maintaining sufficient laboratory infrastructure to continue high priority national program work and maintain a core expertise in monitoring technology. EPA's RLN labs provided over 165,000 sample analyses in support of 1,380 projects in FY 2012. In keeping with prior years, Superfund remained the most significant user of analytical services with over 57% of the total analyses requests.

Provide maximum flexibility to support Agency response to natural disasters and emergencies by developing effective approaches for a wide range of analytical challenges.



Because of their expertise, Regional laboratory scientists are a valuable resource for reviewing Quality Assurance Project Plans, validating data not generated by the regional labs, and providing expert witness testimony. This expertise, complemented with that of our Office of Research and Development (ORD) partners, also ensures that EPA programs have access to state-of-the-art laboratory services and expertise to tackle the most difficult analytical projects requiring method development. During the year, our regional labs worked on development of over 70 different non-routine analytical methods, with the Office of Water being the largest source of requests (50%). Much of this work is driven by regional needs for new methods to address emerging contaminants. Our ORD partners played a role in about one-third of these projects.

Developed over 70 different non-routine analytical methods to satisfy regional needs to address emerging contaminants.

According to EPA's Office of Groundwater and Drinking Water (OGWDW), scientists with recent bench level experience in OGWDW methods make the best drinking water certification officers. It is only prudent that many of our regional laboratories play crucial roles in their regional drinking water audit programs by providing important oversight for our primacy state drinking water laboratory programs and principal state laboratories. The regional labs also house the air monitoring quality assurance programs by providing management, technical oversight and logistical support to EPA and State programs, and in many regions the regional labs house the field sampling and monitoring functions.

Serve crucial roles in regional drinking water audit programs.

EPA established the Environmental Response Laboratory Network (ERLN) to provide coordinated response to a nationally significant event (in response to Homeland Security Presidential Directive 9, issued in 2004.) Each regional lab serves as the region's principal laboratory in the ERLN and has responsibility for coordinating support from their network labs in conjunction with a national incident. This new responsibility, which is practiced under joint functional exercises, has significantly strengthened both our nation's ability to respond to a national incident and the important relationships with our State Laboratory partners. During the year, our regional labs completed the second phase of mobilization for the ultra-dilute chemical warfare program. At year-end, five regional labs have the capability to analyze environmental samples suspected to contain chemical warfare agent (CWA). Also, several regional labs developed and validated new methods for CWA degradation compounds important in characterizing and cleaning contaminated areas.

Mobilize and coordinate the national network of state and private sector labs during a nationally significant incident while serving as principal labs for incidents involving chemical warfare agents.

In the section that directly follows, each regional laboratory has provided two *Project Highlights* that illustrate how their work products contribute to the Agency mission under the Administrator's seven key priorities. Section 3 includes additional support services provided by the RLN labs. While this list is not comprehensive, it captures the major areas of support common to our network labs. The appendices at the end of this report summarize by laboratory, core analytical capabilities shared by several of the regional labs, unique analytical capabilities that are region-specific, and method development projects that are underway.

2.0 Regional Project Highlights

Region 1
(New England)

Serving Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and 10 Tribal Nations

EPA Priority 7: Building Strong State and Tribal Partnerships

New England Tribal Nutrients Workshop

Strengthening our partnerships with the ten New England tribes has been a major initiative for the New England Regional Laboratory over the past two years. Calls were held with each tribe's environmental department, that were attended by Laboratory staff and managers from various programs that resulted in the identification of close to forty requests for assistance. Many of those needs were tribe specific; however, an overarching theme also emerged – the need for up-to-date information and assistance with monitoring and analysis of nutrients, which is a critical water quality issue in New England.

A small EPA-tribal workgroup was formed to discuss how best to tackle this, and the consensus was to host a workshop to assist tribes in developing skills and knowledge to implement nutrient monitoring and analysis strategies. The workgroup collected information on current knowledge and practices and designed a two-day workshop held in March of 2012. The workshop included several presentations on the latest science on nutrients, discussion of the tribes' monitoring programs, and hands-on demos of various field sampling equipment and analytical instruments. Attendees included eleven representatives from six tribes, three US Geological Survey (USGS) staff who work regularly with the Maine tribes, and a number of EPA water program and Laboratory staff.

The workshop kicked off with presentations on the state of nutrient science in New England, including nutrient cycling, fate and transport (freshwater and marine), a lake nutrient budget case study, and cyanobacteria blooms. A session on tribal nutrient monitoring programs included a summary of tribal nutrient issues, designing a monitoring program to address issues, setting up a program/lab, and current tribal activities. The afternoon and next morning sessions addressed field sampling, and included demonstrations of water quality sondes and probes, sediment sampling, pore water sampling using Henry samplers (photo 1), field filtering for chlorophyll and more. The lab analysis session included demos of chlorophyll using UV/VIS spectrophotometer and fluorimeter (photo 2), ion chromatograph, and Lachat. A session on QA assistance and data issues concluded the workshop.

Feedback from the tribal representatives was very positive. They felt that they gained a better understanding of the latest on nutrient science, got some practical hands-on demonstrations, and received some useful advice on enhancing their monitoring programs.

Region 1
(New England)

Serving Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and 10 Tribal Nations

EPA Priority 4: Cleaning up Our Communities
EPA Priority 5: Protecting America's Waters

Real-time Field Analysis Offers Efficiency to a Removal Action at a Former Mine Site

The Callahan Mine site is located approximately 1,000 feet east-southeast of Harborside Village in the Town of Brooksville, Hancock County, Maine. The site is the former location of a zinc/copper open-pit mine. Mining operations were conducted adjacent to and beneath Goose Pond, a tidal estuary. The Callahan Mine was reputedly the only intertidal heavy metal mine in the world at the time of its operation. The zinc/copper sulfide deposit was discovered in 1880 at low tide by a clam digger. Main components of this deposit were sphalerite and chalcopyrite, accompanied by abundant pyrite and lesser amounts of pyrrhotite. The first mine operated until 1887. Ore was mined from three shafts. Efforts were made to mine the ore sporadically through 1964. Callahan Mining Corporation geologists became interested in the potential of the property in 1964 and subsequently open pit mining operations commenced in 1968. The open pit mine ceased operations in 1972. Facility features include large waste piles (waste rock piles), a tailings pond, and mine operations buildings and structures.

In addition to many areas with high levels of metals, PCBs are present in the soil of the Mine Operations Area at levels that are unsafe for even occasional human contact. Removal of these PCB contaminated soils began in 2012 and the regional lab provided mobile lab and sampling services to help provide real-time verification of the efficacy of removals efforts. The mobile lab and sampling field teams were deployed at the site on several different occasions for a total of 44 field days each. The mobile lab conducted 1,653 field analyses for PCBs with a subset of samples sent to the fixed laboratory for confirmatory analysis. The field method is a rapid analysis method in which a gram of soil/sediment is extracted in a 4-mL vial using a water/methanol/hexane mix. Analysis is conducted using a GC/ECD. Compound identification and quantitation is made by comparison of retention times and peak shapes/patterns to a standard. A total of 124 field analyses by XRF were also conducted. The real-time work showed many areas where PCB contaminated soils had worked deeper into the jointed and weathered bedrock surface and additional removal actions were required. The fast turn analyses allowed these needs to be identified and addressed as part of one event rather than requiring redeployment into areas that would have otherwise have been presumed complete. The removal work will continue in 2013 and the regional lab will continue to support the removal action.

Region 2 (Northeast)

Serving New Jersey, New York, Puerto Rico, US Virgin Islands and eight Tribal Nations.

EPA Priority 6: Expanding the Conversation on Environmentalism and Working for Environmental Justice

Supporting the Region 2 Administrator's Request to Provide Technical Support to the CDC's National Children's Study of Homes in Puerto Rico for Pesticide/Phthalates

The Regional Administrator's office requested the Region 2 Laboratory to provide support for the analysis of pesticides and phthalates in wipe samples collected in over 200 homes throughout Puerto Rico. This study was part of a broader program, the National Children's Study. The National Children's Study examines the effects of the environment, as broadly defined to include factors such as air, water, diet, sound, family dynamics, community and cultural influences, and genetics on the growth, development, and health of children across the United States, following them from before birth until age 21 years. The goal of the Study is to improve the health and well-being of children and contribute to understanding the role various factors have on health and disease.

This work involved the joint effort of EPA Region 2, the Puerto Rico Department of Health and the Center for Disease Control. The study was particularly significant because this is the first population-based survey of pesticides in Puerto Rico. It was designed to assess the presence, and potential exposure, of over 90 pesticides and 6 phthalates to children. The focus was on homes with children less than 6 years of age.

Door-to-door interviews were collected across the island. Over 400 wipe samples of kitchen floors were collected during two distinct sampling events. At each sampling site, two samples were collected: one sample was collected using a gauze wipe, and another was collected using a glass fiber filter wipe. The two wipe media were selected due to amenability for the analysis of certain pesticides by GC/MS and others by LC/MS/MS methods, respectively.

The Region 2 Laboratory had the instrumentation needed for the study but did not have a method in place for the determination of pesticides in wipe media. Based on literature searches of published methods, there were few methods reported that would adequately address the needs of this project, especially for the number of pesticide compounds and the low detection limits needed. The method development was intensive. It involved the selection of the native and labeled standards used to identify the target compounds, calibrate the instrument and determine method recovery, optimization of extraction, cleanup and sample reconstitution procedures as well as development of the LC/MS/MS parameters for 60 target analytes. In all, it took over six months to develop the LC/MS/MS method.

The Region 2 Laboratory analyzed over 400 wipe samples (including field blanks and field spikes) in support of this project. In all, the Laboratory reported nearly 20,000 analytical results!

This project was a good example of the regional laboratory's ability to address a specialized, highly complex program need in a relatively short period of time. In addition to applying this method to future studies, the Region 2 Laboratory intends to publish the LC/MS/MS method for the determination of pesticides in wipe media in a scientific journal so the environmental laboratory community can benefit.

Region 2 (Northeast)

Serving New Jersey, New York, Puerto Rico, US Virgin Islands and eight Tribal Nations.

EPA Priority 6: Expanding the Conversation on Environmentalism and Working for Environmental Justice

Science Outreach Through EPA's Region 2 Caribbean Science Consortium

In November of 2011, representatives of the Region 2 Division of Environmental Science and Assessment visited Puerto Rico and the US Virgin Islands and met with government and university representatives. This "science" visit was a first of a kind and focused on mutual environmental science programs and opportunities for science outreach and collaboration in serving those programs. A common problem in the islands is that government and academic research institutions, individually, lack adequate resources in terms of capability or capacity to conduct environmental science programs and activities. In addition, the limited resources are not leveraged in any systematic way.

Based on the science visit, the Region established the EPA Region 2 Caribbean Science Consortium to expand science collaboration and facilitate the exchange of information among the key science organizations of the islands. The Science Consortium is comprised of members of Region 2 and government and university organizations in Puerto Rico and the US Virgin Islands. It is coordinated and managed under the Region 2 Laboratory as part of our lead for science in the Region.

The main goal of the Caribbean Science Consortium is to expand science communication and collaboration among the environmental science programs and activities of the member organizations. The Science Consortium will identify and share resources, where applicable and within the member organization's resources, including technical assistance, education, and outreach. It will also leverage the strengths and resources of the member organizations to build the capacity of the territories to respond to their environmental science needs.

As part of our membership in the Caribbean Science Consortium, the Region 2 Laboratory provided analytical support to two projects during the year:

Caño Martín Peña, San Juan, Puerto Rico – The Ponce School of Medicine and Health Sciences (PSMHS), a Science Consortium member, conducted an environmental-epidemiology study of the communities of Caño Martín Peña, San Juan, Puerto Rico. The objective of the study was to determine if there is an association between gastrointestinal illness and wastewater exposure among residents within Caño Martín Peña. As a part of the project, students from the School conducted sampling for bacteria and heavy metals in the drinking water of 200 residents. The Region 2 Laboratory provided the analytical support for metals analysis, analyzing over 200 samples.

Coral Reefs at La Parguera, Puerto Rico - The Inter-American University, also a Science Consortium member, conducted a study under a National Oceanic and Atmospheric Administration (NOAA) grant involving the treatment of Polynuclear Aromatic Hydrocarbons (PAHs) in watershed runoff to the coral reefs at La Parguera. The main objective of the study was to test the effectiveness of a green infrastructure based treatment system on the removal of PAHs to the watershed. Samples were collected under wet weather conditions, before, during, and after construction of the treatment system. The Region 2 Laboratory provided support for the PAH analysis.

The analytical support provided by Region 2 for these two projects made these projects feasible and is an excellent example of leveraging the limited resources in a systematic way among the Science Consortium members.

Region 3 (Mid-Atlantic)

Serving Delaware, District of Columbia, Maryland, Pennsylvania, Virginia and West Virginia

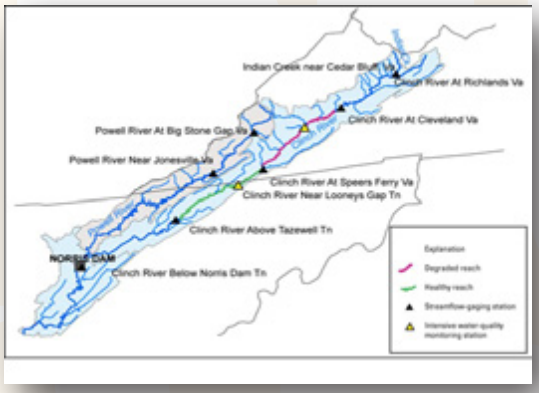
EPA Priority 5: Protecting America's Waters

The Clinch-Powell River System – Home of the Imperiled Mussels

The Clinch and Powell river systems in southwest Virginia and northeast Tennessee, support some of the highest numbers of rare and imperiled species in North America according to NatureServe.org. The mussel diversity is equally impressive with at least 45 species, including one species found nowhere else in the world.

Unfortunately, surveys of the mussel and fish community structure over past decades have shown a pattern of decline throughout the Powell River and on parts of the upper Clinch that have suggested a connection to changing land-use practices in these river basins—in particular to possible episodic or chronic effects of coal mining on water quality and hydrology.

The Clinch-Powell Clean Rivers Initiative (CPCRI) is a collaborative effort of numerous non-profit, state, and federal agencies working in Virginia and Tennessee formed to develop a science plan that begins to identify the most pressing science questions to be addressed that could explain the decline. In 2007, a Memorandum of Understanding



was signed between Region 3 and Region 4, Virginia Department of Environmental Quality, Tennessee Department of Environment & Conservation, and others to bring regulatory resources to bear upon this unique and significant watershed.

Because of this effort, scientists with CPCRI were able to launch a coordinated research project beginning the summer of 2012. Discharge, water-quality, sediment quality, and juvenile mussel survival are going to be evaluated over a period of three years at two primary monitoring sites and at about 8 other point locations along this reach.

The Region 3 Office of Analytical Services and Quality Assurance Lab performed over 432 analyses on waters collected from the two rivers as part of this initiative. There have been three sampling events so far, beginning August 2012. Tests included ammonia, anions, nitrite+nitrate, TKN, alkalinity, TDS, TSS, mercury, metals, total nitrogen, and total phosphorus. CPCRI will compile results of these analyses and attempt to address possible solutions to reverse the decline of the imperiled mussel.

Region 3
(Mid-Atlantic)

Serving Delaware, District of Columbia, Maryland, Pennsylvania, Virginia and West Virginia

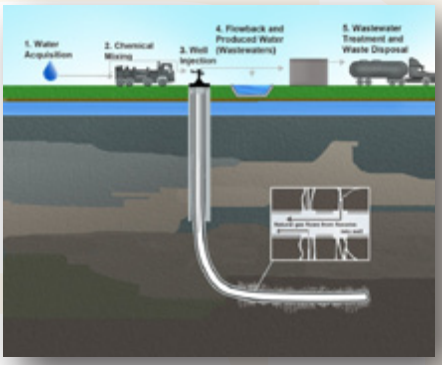
EPA Priority 3 - Assuring the Safety of Chemicals
EPA Priority 4 - Cleaning up Our Communities
EPA Priority 5 - Protecting America's Waters

Developing New Analytical Capabilities to Assess Impacts on Drinking Water from Hydraulic Fracturing

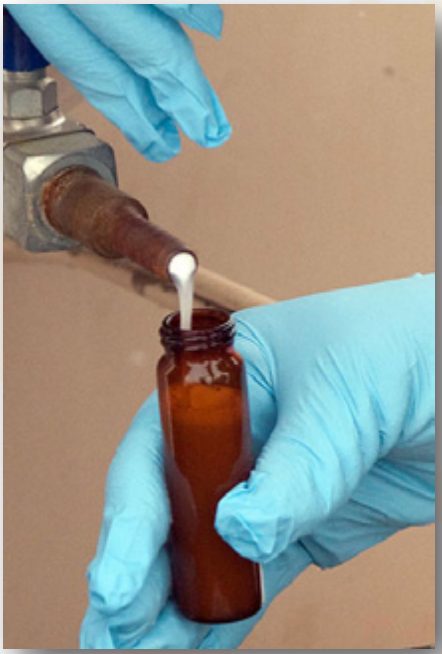
Hydraulic fracturing ("Fracking") has become increasingly prevalent as a method of extracting energy from unconventional reservoirs such as coalbeds, shales, and tight sands. One concern that has been identified with fracking is the potential for chemicals used during the hydraulic fracturing process to enter surface waters or groundwater aquifers that may be used as drinking water sources.

In 2011, EPA/ORD initiated a research program entitled Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources. The study's goal is to assess the impacts of hydraulic fracturing on drinking water resources and identify factors that may affect the severity and frequency of impacts. Five fracking sites were identified for retrospective case studies. The sites are located in Regions 3, 6, and 8 and represent a wide range of shale formations and fracking activities.

Of special importance to the study are a group of chemicals commonly found in fracturing fluids called glycols and glycol ethers. Because they are relatively stable, not naturally occurring and some are considered toxic; they may serve as reliable indicators of contamination from hydraulic fracturing activities.



http://www2.epa.gov/hfstudy/hydraulic-fracturing-water-cycle



Prior to the start of this study, standard analytical methods for this suite of compounds were either nonexistent or had detection limits that were too high for the intended data quality objectives. In response to this concern, analytical chemists at the US EPA Region 3 Environmental Science Center in Fort Meade, Maryland developed a robust HPLC/MS/MS (High Performance Liquid Chromatography/Tandem Mass Spectrometry) method for the rapid identification and quantitation of 5 glycols and glycol ethers commonly found in fracking fluid mixes: diethylene glycol, triethylene glycol, tetraethylene glycol, 2-butoxyethanol and 2-methoxyethanol.

Between 2011 and 2013, to support the ORD Study of the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources, the Region 3 lab analyzed more than 600 water samples from homeowner wells, monitoring wells and production wells, from the five study sites along with water samples from two regional sites.

The Region 3 lab is currently assisting other ORD and Regional labs in establishing this analytical capability as part of a multi-laboratory validation study. This study is in the second phase of validation and is slated to be a published method.

Region 4 (Southeast)

Serving Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and 6 Tribes

EPA Priority 4: Cleaning Up Our Communities
EPA Priority 6: Expanding the Conversation of Environmentalism and Working for Environmental Justice

Developing Methods to Help Evaluate Treatment Technologies at a Superfund Site

Woolfolk Chemical Works is a 31-acre National Priorities List (NPL) Superfund site resulting from the production, formulation, and packaging of **pesticides, herbicides, and insecticides**, activities which began in 1910. In the early 1980s, the site was investigated based on complaints from local citizens. The company was discharging waste products to a drainage corridor leading away from the industrial site located in downtown Ft. Valley. Contamination has affected soil, sediment, and ground water on both commercial and residential properties in and around the former facility. The affected residents are part of an **environmental justice** community.

At the request of the Superfund program, the Region 4 Laboratory analyzed 97 soil samples for a remedial design pilot project at the Woolfolk Chemical Site, Ft. Valley, Georgia from November 2011 through March 2012. The soil samples were analyzed for organochlorine pesticides and toxaphene congeners. The cost of these analyses in the commercial sector, if available, would have been approximately $120,000. One of the analyses, the identification of toxaphene breakdown products, was jointly developed by the Region 4 Laboratory and Office of Solid Waste and Emergency Response (OSWER) Office of Resource Conservation and Recovery and is not readily available from commercial laboratories. The site's target pesticides are alpha and gamma chlordane, dieldrin, toxaphene and methoxychlor.

The analyses were performed in support of a bench study on pesticide impacted soils collected from the site to identify a bioremediation formulation (Factor) that would achieve the greatest reductions in the site's target pesticides in the shortest time and at the lowest cost. Since toxaphene was one of the contaminants, the RPM was also interested in finding out if the Factor Treatment could reduce the concentration of the toxaphene congeners (breakdown products of toxaphene), which may be more toxic than the toxaphene mixture, and could pose a greater threat to human health and the environment. The best performing Factor in the study achieved an average 79.4% reduction on these pesticides after 10 weeks of treatment. During any bench study of this type, the goal is not to reduce contamination levels to non-detect, but to identify the most effective Factors to achieve the site's desired clean-up level.

Region 4 (Southeast)

Serving Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and 6 Tribes

EPA Priority 4: Cleaning Up Our Communities
EPA Priority 5: Protecting America's Waters

Meeting the New Challenges for Analyzing Hexavalent Chrome in Water at 50 PPT

Chromium is one of over 90 regulated drinking water contaminants that must be routinely monitored in finished drinking waters. The National Primary Drinking Water regulations set a maximum contaminant level (MCL) of 0.1 mg/L for total chromium, which includes chromium-6 (hexavalent chrome). However, recent studies indicate the potential for greater human health risks from chromium-6 (the toxic form of chromium) than was previously thought. When EPA completes the human health risk assessment for chromium-6, the conclusions will be carefully reviewed and all relevant information will be considered to determine if a new standard needs to be set.

The Region 4 Laboratory is certified to perform total chromium in drinking water samples. At the request of the Region 4 Water Protection Division, EPA Method 218.6 was modified to analyze chromium-6 at the lower concentration levels (50 parts per trillion) recommended in the Agency's guidance. In addition to being a regulated drinking water contaminant, chromium-6 is also a contaminant of concern at various Superfund sites where chromium has been used in manufacturing processes and subsequently released into the groundwater. One of the sampling challenges for chromium-6 groundwater samples is a short 24-hour holding time between sampling and analyses. This holding time requirement makes transport to the lab and subsequent analysis difficult when collecting samples at Superfund sites. The laboratory performed research and holding time studies for the CWA 40 CFR 136 Table II ammonium sulfate buffer solution. The goal was to find a preservative buffer formulation which achieved and maintained the correct pH in complex matrices for an extended time period. The studies indicated that slight modifications of the buffer solution reagents extended the sample holding times to 28 days. Region 4 has adopted this new preservative and currently is providing pre-preserved bottles for both EPA and contractor field teams. This improved preservative procedure has significantly increased the flexibility of regional project managers and Region 4 states to select and schedule labs for this analysis because they no longer are required to immediately ship samples to a lab in order to meet a 24-hour sample holding time.

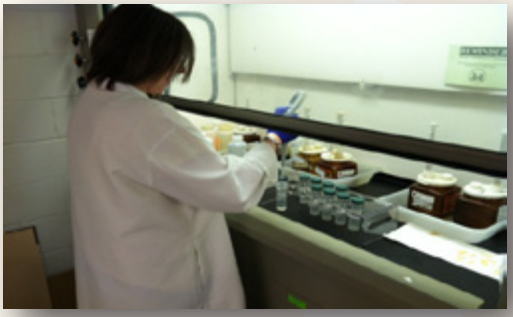
Region 5 (Great Lakes)

Serving Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin and 35 Tribes

EPA Priority 5: Protecting America's Waters
EPA Priority 7: Building Strong State and Tribal Partnerships

Partnering with ORD and Wisconsin's Bureau of Drinking Water to Assess Lead in Drinking Water at Local Daycare Facilities

The Chicago Regional Laboratory (CRL) participated in the Milwaukee, WI, Westlawn Community Action for a Renewed Environment project to examine drinking water for lead at child care facilities in that area. The overall objective was to determine lead concentrations at drinking water taps within the facilities so that corrective actions could be taken if necessary.



Sample preparation and analysis followed the CRL standard operating procedure for metal analysis.

There is no federal law requiring child care facilities to test their water for lead except those who are using their own water supply system. Since the facilities in question were in-home child care facilities with less complex plumbing than public schools, the plan called for a different sampling protocol from EPA's 3T monitoring guidance for child care schools and facilities. This protocol was designed to identify the potential sources of lead from endpoint devices, underlying brass fixtures and connectors, and internal plumbing pipes and components. CRL participated in the planning of the project with the Westlawn Partnership for a Healthier Environment, the Wisconsin DNR Bureau of Drinking and Ground Water, the Milwaukee Water Works and ORD/National Risk Management Research Laboratory (NRMRL).

Two 250-mL samples were taken sequentially from each tap with six one-liter samples taken from the tap furthest from the point of entry into the facility. The larger samples were to assess any contribution to lead concentrations due to internal plumbing. CRL provided the sampling bottles and conducted the lead analyses.

Samples began arriving in August, 2012 and are continuing into 2013. About 56 samples were analyzed during fiscal year 2012, with all being well below the action level of 15 ppb. The detection limit for the CRL method is 0.5 ppb. Another 150 samples are expected to be taken to complete the project.

The region 5 Drinking Water Branch took the lead in communicating the project to prospective facilities. There were concerns from some of the facilities about the possible remediation issues that would follow a test result that showed elevated levels of lead. Participants were instructed on sample collection and sent them to CRL. Samples were acidified in CRL so no hazardous materials were required at the child care facilities.

This project is a good example of cooperation among federal, state and local entities working cooperatively to assess the safety of children's drinking water in an underserved community.

Region 5 (Great Lakes)

Serving Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin and 35 Tribes

EPA Priority 5: Protecting America's Waters

Ensuring the Safety of Drinking Water in Real Time for the City of Chicago and the US Secret Service During the 2012 NATO Summit

The North Atlantic Treaty Organization (NATO) Summit was held in Chicago at McCormick Place May 19 to 21, 2012. In the weeks that led to those meetings, the Chicago Regional Laboratory (CRL) worked with our Drinking Water Security Coordinator to plan a course of analyses to ensure the integrity of the drinking water supply going into the venue. The US Secret Service was in charge of the event, and the regional emergency operations staff coordinated with them. CRL worked directly with the Chicago Department of Water Management and the Illinois EPA. A protocol was developed between agencies to coordinate responses in the event anomalies were found.

Although plans included having the local Civil Support Team had their field equipment within the security perimeter around the venue, they would only be able to screen air and water for a few warfare agent compounds at elevated levels. The major in charge felt that great value was brought by CRL by screening for a wide range of additional compounds at trace concentrations. The analytical support that was requested included total metals, cyanide, mercury, volatile and semi-volatile organics, and LC/MS/MS screening against the new National Institute of Standards and Technology (NIST) library for various pharmaceutical, agricultural and industrial compounds.

To prepare for the event, CRL shortened the analytical time for organic methods based on smaller extractions, minimal clean-up, and reduced quality control (QC). Time was reduced to less than three hours to report data for all analyses for six samples and a blank. The plan indicated three rounds of sample collection at drinking water points of entry to the venue during the days of the meetings. By the time the next round of samples were delivered to the lab all the data from the previous round had to be reported.

The week before the event, the Chicago Dept. of Water Management field samplers brought samples from their established points to practice delivery times based on traffic flow. In turn, CRL practiced doing the analyses and reporting the data to achieve the target three-hour turnaround time. This exercise not only established speed but also baseline data of the drinking water going into the venue for comparison purposes.

During the actual event, there were no anomalies found in the drinking water. However, a very small trace of an organic compound was found and identified with the LC/MS/MS system using the NIST library in the water collected from a water main going to the venue that was collected in the basement of the CRL building. The compound was ethylene glycol butyl ether which was determined to be a constituent of a cleaner stored near the faucet used to take the sample. Although it was of no concern in the context of the event, it gave us confidence that the library system was a useful and relevant tool for rapidly screening water samples for thousands of compounds.

CRL received a letter of appreciation and thanks from the City of Chicago Water Commissioner for the work done to help protect the thousands of visitors to the NATO Summit.

Region 6
(South Central)

Serving Arkansas, Louisiana, New Mexico, Oklahoma, Texas and 66 Tribal Nations

EPA Priority 2: Improving Air Quality
EPA Priority 5: Protecting America's Waters

RARE Project to Evaluate Gaseous Oxidized Mercury Dry Deposition in Region 6

The Region 6 Houston Lab has been actively involved in efforts to field test new passive air devices by providing analysis for several different parameters, such as NOx, SO2, ozone, and ammonia, for numerous projects, resulting in several journal articles.

Starting in 2009, the Region 6 Lab became involved in a passive mercury monitoring project, which was an important priority for the Region due to numerous potential sources for airborne mercury, at the request of New Mexico. Staff from the Region 6 Air Program partnered with the Houston Laboratory to propose a RARE project (2009-2011) to collect gaseous oxidized mercury (GOM) dry deposition by a new innovative passive technique in the arid four corners area of New Mexico and eastern Oklahoma. The purpose of the study was to test out the new passive devices, establish a baseline, and to investigate dry mercury deposition patterns from coal-fired power plants in the area. The study was conducted and the analyses were done by an outside lab which holds the patent for the technique. The Region 6 Lab helped to compile, review, and evaluate the data for the study. One conclusion of this study was that up to 40-51% of airborne mercury in the Four Corners area is GOM dry deposition, while eastern Oklahoma mercury is mostly wet.

The R6 Lab also helped to compile, review, and evaluate the data for the second study.

In 2011, staff from the Region 6 Air Program and the Houston Laboratory proposed a RARE project (2011-2012) to continue the earlier work by collecting GOM dry deposition data in central and eastern Texas. It was also decided that fish tissue data be collected for both projects as a part of the latest RARE project to evaluate for correlations to airborne mercury levels.

A total of 422 fish tissue samples were collected and analyzed by the Region 6 Laboratory for total mercury, utilizing a Milestone DMA-80 direct mercury analyzer. This device analyzes for mercury by thermally decomposing the sample to directly evolve the entrained mercury from the tissue, thus eliminating the laborious digestion process of sample preparation. This technique makes mercury analysis of fish tissue much more efficient.

The first project has been published "Long-Term Gaseous Oxidized Mercury Dry Deposition Measurements in the Four Corners Area and Eastern Oklahoma" in the journal Atmospheric Pollution Research. The fish tissue data had to be removed from that paper due to size constraints. These data are still being scrutinized and evaluated with the Texas data for inclusion in a second paper.

Region 6
(South Central)

Serving Arkansas, Louisiana, New Mexico, Oklahoma, Texas and 66 Tribal Nations

EPA Priority 5: Protecting America's Waters
EPA Priority 7: Building Strong State and Tribal Partnerships

"One EPA" Assists Oklahoma with the Red River Fish Kill

In July 2011, the Oklahoma Department of Environmental Quality (ODEQ) discovered a major fish kill in the Red River. Water samples prepared for analysis by ODEQ's laboratory formed a white precipitate/gel material which they could not identify. The ODEQ asked the Region 6 Laboratory to provide analytical assistance to help identify this suspicious material or any other substance that might be the cause of the kill. The Region 6 Laboratory performed several different analyses on the white gel and water samples but could not identify anything that would appear to be toxic enough to cause a massive fish kill.

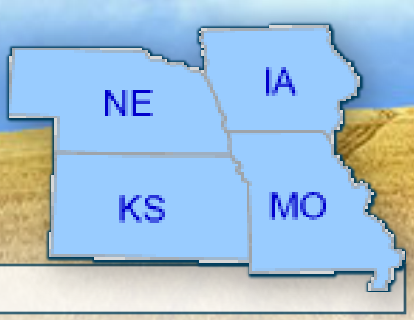
The Region 6 Laboratory then contacted the National Enforcement Investigations Center (NEIC) laboratory in Denver to see if they could help to further identify the white gel, which they then confirmed as mostly magnesium hydroxide. Since that didn't seem likely to be the source of the fish kill, the Region 6 Lab contacted the Office of Research and Development (ORD) National Exposure Research Laboratory (NERL), Las Vegas, to see if they could help find the toxin using more exotic non-conventional techniques. The ORD/NERL-LV laboratory was able to tentatively identify a possible mycotoxin (ergot alkaloid) which is highly toxic to fish and does attack the liver as found.

In June 2012, another fish kill was discovered in a similar fashion and location as the 2011 kill. The ODEQ contacted the Region 6 Laboratory again for assistance. Since conventional lab data did not reveal any new potential culprits, the R6 Lab asked the NERL-LV laboratory if they could assist to see if the same mycotoxins might be present and related to this fish kill. They performed analysis of water and liver samples and identified a similar but slightly different ergot alkaloid for the 2012 fish kill.

Further investigation of the site revealed a gas source bubbling up in the river by ODEQ. To rule out this gas as another possible culprit for the fish kill, they requested assistance from the R6 Laboratory for dissolved gases and isotope ratio analysis to determine what the gas was and if it was natural decomposition or geothermal. The Region 6 Laboratory was able to provide dissolved gases analysis, but did not have the capability for the isotope ratio analysis and asked the NERL -LV lab if they could assist ODEQ with their request. Even though it presented some challenges, the NERL-LV lab agreed to do whatever was required to provide the needed assistance to Region 6 and ODEQ. Final analysis indicated that the gas was primarily naturally occurring biogenic methane.

This collaborative effort demonstrates different parts of the EPA efficiently working together to marshal their unique capabilities to solve a complex environmental problem for one of our States.

Region 7 (Midwest)



Serving Iowa, Kansas, Missouri, Nebraska and Nine Tribal Nations

EPA Priority 5: Protecting America's Waters

Rapid Public Notification of Estimated Bacteria Concentrations in Local Streams by Smart Phone App

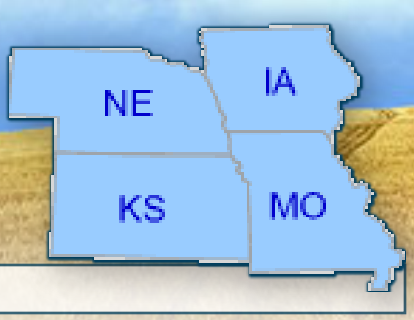
Scientists at Region 7's Science & Technology Center have established an Urban Stream Monitoring Network in the Kansas City Metropolitan area that provides real time stream condition data and recreation advisories to the public for estimated bacteria levels. In addition to providing important public data regarding aquatic resource conditions, this novel monitoring network design can be used to support and supplement the National Aquatic Survey assessment of status, trends, and current conditions of urban streams nationwide.

The Region 7 Laboratory's Stream Team designed, purchased, and installed monitoring and satellite communications equipment to support 18 remote, autonomous monitoring sites located on 13 separate streams across the Kansas City metropolitan area. Monitoring sites are located on the upper, middle and lower portions of each stream. This real-time monitoring program capitalizes on the direct correlation between seasonal stream turbidity and bacteria concentration. In order to develop the regression equation, Region 7 scientists perform multiple simultaneous measurements of stream turbidity and bacteria at each real-time monitoring location over multiple seasons and flow conditions.

Continuous stream turbidity and temperature measurements are collected by a sonde which is connected to a data logging, solar powered, Geostationary Observational Environmental Satellite (GOES) satellite telemetry unit. The GOES satellite transmits our local water quality data to the Wallops Command and Data Acquisition Station (Wallops Island, Virginia) which then sends the data via the web to our server at the University of Missouri at Kansas City (UMKC). From the UMKC server the data is presented on the web at www.kcwaters.org or on your phone using the free mobile app KC Water Bug.

This has proven to be an extremely valuable tool. Not only for assessment of stream conditions, but also to empower the public with real time environmental information they can use to minimize potential exposure to harmful levels of bacteria in urban waterways.

Region 7 (Midwest)



Serving Iowa, Kansas, Missouri, Nebraska and Nine Tribal Nations

EPA Priority 5: Protecting America's Waters

Green Chemistry – Better Sensitivity and Better for the Environment

Chemists at the Kansas City Science & Technology Center are continually seeking ways to develop improved, innovative, and green methods for chemical analysis of environmental samples.

Traditional laboratory methods of analysis for pesticides, herbicides, polychlorinated biphenyls and semivolatile compounds require large quantities (50-250 mL per sample) of toxic solvent for sample extraction, clean up, and preparation. This requires multiple labor intensive steps, often spanning 2-3 days. In addition, the extraction and preparation process results in generation of significant quantities of hazardous laboratory waste.

Scientists at the Region 7 Laboratory identified a novel technique to simultaneously extract water samples for pesticides, herbicides, polychlorinated biphenyls and semivolatile compounds using solid sorbent stir bar extraction (SSBE) technology. The SSBE technique typically uses a small sample volume (<100 mL) placed in a bottle with a solid sorbent (polydimethylsiloxane) coated magnetic stir bar. The coating absorbs the contaminants of interest, thus eliminating solvent extraction and clean up of samples for a wide variety of analytes. The stir-bar is flash desorbed in the injection port of the GC/MS for analysis. This innovative technique can analyze water samples for trace levels of semivolatiles, pesticides, and emerging contaminants while reducing staff solvent exposure and hazardous waste generation. This novel method requires substantially fewer laboratory resources for sample preparation.

SSBE in Holder

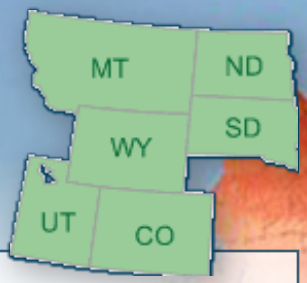
SSBE Ready for Analysis

SSBE on Stir Plate

The SSBE technique generates identical levels of detection for pesticides, herbicides, polychlorinated biphenyls and semivolatile compounds when compared to traditional methods by simply stirring 5 mL of water sample for one hour with a coated stir bar. Additionally, up to 20 SSBE extractions can be performed simultaneously, providing significant improvement in laboratory throughput. This method reduced solvent usage for one major project by 50%, saving almost 38 liters of solvent and subsequent waste generation. Recent additional work using SSBE has demonstrated that analytical detection limits can be reduced by an order of magnitude over traditional techniques by increasing SSBE extraction sample size and stirring times. This innovative method requires only hours of staff time for preparation and analysis, as well as provides lower detection limits for contaminants that are insoluble or slightly soluble in water.

This method was developed and validated against traditional sample extraction techniques in support of our Regional Laboratory's Stream Team sampling and characterization of contaminants in urban waterways. Region 7 will continue to use this new method to support additional waterway characterization studies and in total maximum daily load (TMDL) development. With improved sample turnaround times, and less solvent consumption and hazardous waste generation, this technique is an example of the key advantages offered through greening our analytical methods.

Region 8
(Mountains and Plains)

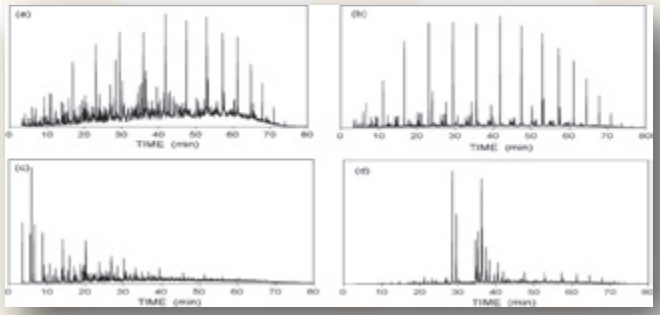


Serving Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations

EPA Priority 5: Protecting America's Waters

The EPA Region 8 Laboratory's Role in the ORD National Hydro-Fracking Study

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

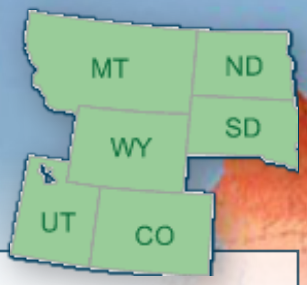


Hydraulic fracturing is a well stimulation technique used to maximize production of oil and natural gas in unconventional reservoirs, such as shale, coal beds, and tight sands. During hydraulic fracturing, specially engineered fluids containing chemical additives are pumped under high pressure into the well to create and hold open fractures in the formation. These fractures increase the exposed surface area of the rock in the formation and, in turn, stimulate the flow of natural gas or oil to the wellbore. As the use of hydraulic fracturing has increased, so have concerns about its potential environmental and human health impacts. Many concerns about hydraulic fracturing center on potential risks to drinking water resources, although other issues have been raised. In response to public concern, the US Congress directed the EPA to conduct scientific research to examine the relationship between hydraulic fracturing and drinking water resources.

This study plan represents an important milestone in responding to the direction from Congress. EPA is committed to conducting a study that uses the best available science, independent sources of information, and a transparent, peer-reviewed process that will ensure the validity and accuracy of the results. The Agency will work in consultation with other federal agencies, state and interstate regulatory agencies, industry, non-governmental organizations, and others in the private and public sector in carrying out this study. Stakeholder outreach as the study is being conducted will continue to be a hallmark of our efforts, just as it was during the development of this study plan.

The Region 8 Laboratory is providing organic chemical analysis support to this study. The R8 Laboratory provides semi-volatile analysis, diesel range organics, and gasoline range organics, and unknown identification analyses for all of the sights in the ORD project. Hundreds of samples over the last two years and thousands of results have been provided in support of this important work. The R8 Laboratory staff also provides technical expertise, data interpretation and other technical consultation.

Region 8
(Mountains and Plains)



Serving Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations

EPA Priority 5: Protecting America's Waters

The EPA Region 8 Laboratory Pharmaceutical and Pesticides Method Development

Over 98 million prescriptions were filled at pharmacies in Region 8 alone in 2010, and over one billion pounds of pesticides are used in the United States each year. Results obtained by the Scientists in Region 8 demonstrate that pharmaceuticals, personal care products (PPCPs), and pesticides are being detected in surface waters, and there is increasing concern that the potential exists for low-level, chronic exposure to mixtures of these chemicals to have adverse ecological or human health effects. Numerous studies have shown that some PPCPs can disrupt the endocrine system, and at high enough concentrations pose a threat to aquatic life, such as feminizing changes observed in male fish. The occurrence, fate, and transport of these chemicals are an important water quality concern, both nationally and regionally and have gained public interest.

The work conducted by Region 8 scientists is providing useful information to address those concerns and fill information gaps which could then be used to guide future studies conducted under the Safe Drinking Water Act (SDWA) and Clean Water Act (CWA), as appropriate. Data collected at the Region 8 Laboratory were shared with the National Research Council (NRC) Committee, "Science for EPA's Future" on August 8, 2011 by the Region 8 scientist, Dr. Kristen Keteles, who was invited to address the committee and presnet the state of Region 8 Science. The NRC Committees' report, "Science for Environmental Protection was published in Nov 2012. Dr Keteles reported that the committee commended Region 8 for their innovative work. This work was also cited in the National Academy of Sciences (NAS) Report "Science for Environmental Protection: The Road Ahead" (2012, p 169) available at: **http://www.nap.edu/catalog.php?record_id=13510**) This work is also in keeping with the recommendations published by the General Accounting Office (GAO) in their report "Action Needed to Sustain Agencies' Collaboration on Pharmaceuticals in Drinking Water" (GAO-11-346, August 8, 2011), which recommended that "EPA establish a formal mechanism to coordinate research on pharmaceuticals and other contaminants in drinking water."

The work by this team resulted in development of analytical methods for one of the first multi-parameter, multi-partner surface-water monitoring programs developed in the nation. The Pesticide Program from the Office of Partnerships & Regulatory Assistance, the Water Quality Unit from the Office of Ecosystems, Protection and Remediation, and the Laboratory Services Program from the Office of Technical and Management Services all worked together to develop a list of compounds that resulted in the development of 3 analytical methods to monitor over 250 chemicals. Data has been collected for all 6 states in the region, and for 12 individual tribes, three municipalities, two universities and two other federal agencies (DOI and USDA). This coordination expands the utility of the data to improve our scientific understanding of fate and effects from emerging contaminants, and may have use in regulatory decisions such as re-registration of pesticides and implementation of the CWA and SDWA, for regional and national water quality initiatives, and to serve as a national program model suggested by NAS.

Region 9
(Pacific Southwest)

Serving Arizona, California, Hawaii, Nevada, Pacific Islands & 148 Tribes

EPA Priority 4: Cleaning Up Our Communities
EPA Priority 5: Protecting America's Waters

Time Critical Removals Related to Ongoing Exposures

In 2010, a state of emergency for San Bernardino County was declared by the governor of California after perchlorate was detected in the City of Barstow's drinking water. Perchlorate is chemical used in rocket fuel, fireworks, flares and explosives that may have adverse health effects. Scientific research indicates that this contaminant can disrupt the thyroid's ability to produce hormones needed for normal growth and development. An assessment of the area by the region's Emergency Response Section found perchlorate contaminated soil at a nearby property associated with Mojave Pyrotechnics, Inc. Mojave Pyrotechnics, Inc. is a former fireworks manufacturing company that operated in the 1980's.

The Mohave River Pyrotechnics site is one of the time-critical removals supported by the Region 9 Laboratory in FY 2012. Time-critical removals are a high priority because of ongoing exposures and immediate threat to human health and the environment. In order to provide support for assessment and removal efforts at this site, the Region 9 Laboratory modified EPA Method 314.0 to include a procedure for extracting perchlorate from the soil samples. The extraction method utilized a mechanical shaker and reagent water followed by filtration with a 0.2 um filter. Ultimately, the Region 9 Laboratory performed over 300 analyses of soil and water samples collected at the site. Concentrations of perchlorate in the soil samples ranged from 203 mg/kg to 130,000 mg/kg (or 13 % by weight). The laboratory also analyzed samples for other contaminants of concern, including anions and metals. The data provided by the laboratory was used to determine the lateral and vertical extent of perchlorate site contamination and to evaluate alternatives for the removal, treatment, containment and control of the perchlorate contaminated soil. The Region 9 Laboratory data were also used for primary confirmation for a field-based screening technique that had been developed to collect real time data on site. Clean-up activities at the site were scheduled to start at the end of 2012.

Region 9
(Pacific Southwest)

Serving Arizona, California, Hawaii, Nevada, Pacific Islands & 148 Tribes

EPA Priority 4: Cleaning Up Our Communities
EPA Priority 5: Protecting America's Waters
EPA Priority 6: Building Strong State and Tribal Partnerships

Continuous Web Available Water Quality and Flow Monitoring at Remote Sites

The Region 9 Laboratory pioneered the coupling of remote water quality monitoring sensors with web-based telemetry to provide real-time oversight of discharges and receiving waters at Superfund mine sites, Concentrated Animal Feeding Operations (CAFOs), and water quality-limited lakes and streams. These innovative sampling methods conserve Agency resources while expanding the temporal scope of monitoring by orders of magnitude. In addition to optimizing the combination of commercial sensors, telemetry systems, and automated samplers, in 2012 the laboratory designed and built a mechanized depth profiler to allow continuous real-time water column monitoring in lakes and reservoirs.

The Region 9 Laboratory began using remote sensors to assess impacts below mine sites 15 years ago. The initial benefit realized was an increase in sample numbers per location from about 10 to more than 9,000 per year. In 2007, the team added satellite telemetry to the systems allowing year-round water quality monitoring by site Remedial Project Managers from their desktops.

After perfecting the system at Superfund mine sites, laboratory staff began transferring the technology to other programs such as the TMDL program, and began transferring the technology to other agencies, like the California Department of Fish and Game, which deployed six systems to investigate suspected illegal discharges from CAFOs. The laboratory also successfully coupled the system with automated ISCO samplers so that a monitored parameter, such as turbidity or conductivity, could trigger sample collection for subsequent lab analysis that could later provide evidence in enforcement actions.

The most recent success is the design and construction of an automated depth profiling system, named "Bob", which raises and lowers water quality monitors in lakes and reservoirs. Water column stratification greatly increases the complexity of characterizing spatial and temporal variability in deep water systems. This device was designed and built for about $300, and was first deployed to investigate Microcystis blue-green algae blooms in the Klamath River in northern California. Since then, "Bob" has been used for continuous web-based monitoring throughout the water column of numerous routine water quality parameters as well as Chlorophyll-a and Phycocyanin, a blue green algae pigment. With continuous monitoring it is possible to observe toxic algal bloom activity in real time to help guide public-health monitoring and posting determinations.

Region 10
(Pacific Northwest)

Serving Alaska, Idaho, Oregon, Washington and 271 Native Tribes

EPA Priority 4: Cleaning Up Our Communities
EPA Priority 5: Protecting America's Waters

Development of an Extraction and Analysis Method for Ordnance Compounds in Marine Tissues for the Jackson Park Site

The Jackson Park Housing Complex (JPHC) is located east of Highway 3, approximately two miles northwest of Bremerton, Washington. The 300-acre complex currently contains housing for 3,000 military personnel. From 1904 to 1959, the facility operated as a Navy ammunition depot and included ordnance manufacturing, processing, and disassembly. Residual ordnance powders were disposed of by open burning. Hazardous dust that was deposited on floors during ordnance handling was washed into floor drains that lead directly into Ostrich Bay (Puget Sound). The munitions buildings were demolished between 1973 and 1975, when the housing complexes were built. According to reports from several sources, the water in Ostrich Bay occasionally became a yellow color due to discharges emanating from the ordnance facility. JPHC was placed on the National Priorities List (NPL, Superfund list) in 1994.

To conduct an NPL site-wide human health and ecological risk assessment, the analysis of marine organisms in the area for the ordnance compounds listed in EPA Method 8330B was needed. However, previous studies as described in literature did not evaluate all 17 EPA Method 8330B analytes nor the multiple site-relevant marine tissue matrices. Initially the only EPA methods available to the site manager for analyzing tissue samples were associated with water, soil, and sediment matrices. The Region 10 Laboratory took on the task of developing the analytical methods for marine species identified as relevant to the site, which were Dungeness crabs, manila clams, geoducks (see the figure above), sea cucumbers and starry flounders. Early in this development it was clear that the magnitude and potential extent of matrix interferences were tissue specific. The effect of these complex matrices could not be addressed without significant experimentation. The high level of analytical experience, particularly for tissue matrices, at the Region 10 Laboratory allowed various sample homogeneity and extraction techniques to be readily evaluated and optimized. The most effective approach to meeting the project's data quality objectives and detection limit needs required a novel homogenization step that utilizes dry ice for grinding of the tissue in an industrial blender, extraction with acidified acetonitrile, removal of chemical interferences using hydrophilic-lipophilic type solid phase extraction cartridges, and then analysis by High Performance Liquid Chromatography (HPLC) per EPA Method 8330B.

EPA's Remedial Project Manager (RPM) believes this new method will have application at other military disposal sites, like the Waianae Coast in Hawaii (Region 9) and the Coral Reefs of Isla de Vieques in Puerto Rico (Region 2 – see figure on the left), and so the Region 10 scientists are pursuing a formal method revision. Before these modifications can be added to EPA Method 8330B, the new approaches must be subject to a multi-laboratory validation. This work, which is currently underway, involves the manufacture of several fortified marine tissue standards using newly-developed methodology that was also developed for this project.

Region 10
(Pacific Northwest)

Serving Alaska, Idaho, Oregon, Washington and 271 Native Tribes

EPA Priority 4: Cleaning Up Our Communities

Working with ORD to Mobilize a New Lead Bioavailability Method to Measure Soil and Dust Ingestion Levels

During 2012, the Region 10 Laboratory had a unique opportunity to participate in a highly-visible Region 10 study under ORD's Regional Applied Research Effort (RARE) program to assess soil ingestion rates. Currently, estimates of soil/dust ingestion rates used in the EPA Integrated Exposure Uptake and Biokinetic (IEUBK) Model and the EPA Exposure Factors Handbook are based on limited data. Moreover, there is general scientific consensus that uncertainty in soil ingestion rates is high and confidence in the supporting studies is low.

The project involved the confluence of a number of key factors. The first and foremost was the existence of a large archive of over 2,000 soil and 3,000 house dust samples that were collected over a period of 15 years (1988-2002) and linked with more than 5,000 measures of pediatric blood-lead levels from the Bunker Hill Mining and Metallurgical Complex Superfund Site. This complex site includes mining-contaminated areas in the Coeur d'Alene River corridor, adjacent floodplains, downstream water bodies, tributaries, and fill areas, as well as the 21-square-mile Bunker Hill "Box" where historical ore-processing and smelting operations occurred. In 1974, when the smelter was being operated without pollution control devices, mean blood lead concentrations exceeded 60 ug/dL in the Smelterville population. By 2002, mean blood levels had been reduced to less than 4 ug/dL, which is below the CDC's Level of Concern for children (10 ug/dL). The second factor was the availability of a draft SOP published by EPA OSWER in 2007 in conjunction with their intra-agency workgroup on bioavailability of metals in soils. The third factor was a knowledgeable regional toxicologist who proposed connecting these two dots and who was confident in the capabilities of his regional lab.

Region 10 chemists interfaced with members of the EPA National Bioavailability Workgroup to identify the ORD scientists knowledgeable with the procedure, and procured a water-equilibrated tumbler from the University of Colorado. The lab next determined in-house method detection limits, and confirmed acceptable method precision and accuracy and documented the procedure. Staff were counseled that the small quantities of these samples – often just enough to sieve, weigh and extract – may allow only a single analytical determination. Accordingly, particular care was taken to ensure the team was well trained in the new procedure, and that the instruments were calibrated and ready for the challenge.

A total of 300 of the archived soil and house dust samples with sufficient weight (≥ 1.25 g) were statistically selected for analysis. During sample analysis, Region 10 scientists noted low bias in high concentration samples, which was determined to be a method limitation not yet observed. Text documenting this limitation was proposed for addition to the method and includes a suitable work-around. The draft method is in preparation for the SW-846 (EPA Draft Method 1340). Data from this project, which met all method QC criteria for 100% of the samples, may support revision of the IEUBK Model soil ingestion rate from 100 mg/day to 60 mg/day.

3.0 Regional Laboratory Support Services

REGIONAL LABORATORY SUPPORT SERVICES

This section summarizes most of the common support services that are provided by our RLN labs. As mentioned earlier, this list is not comprehensive, but indicates services that are common to the RLN member labs.

Because of the unique nature of the support provided by our RLN labs, the ideal regional lab scientist is typically one part research scientist, one part production scientist. They must be capable of developing methods often with short lead times, but be vigilant about quality control and possess the drive of a strong production scientist. In practice, our staff are key in supporting the wide diversity of challenging requests the RLN labs receive. During fiscal year 2012, the RLN supported over 165,000 analyses. The distribution of this work by EPA program is shown in Figure 3.1. This count excludes QC samples, which can add an additional 20%.

In keeping with prior years, the Agency's Superfund Program continued to be our largest volume requestor of analytical services (57.4%) followed by the Office of Water (23.4%). Support to the Emergency Response Program (8.2%) continued to be significant, with the RLN labs analyzing over 13,600 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.

Field analyses (over 4,500 samples) continued to provide important real-time results aiding in timely and cost-effective decision making in the field. Our RLN labs augmented the NEIC's capacity by analyzing over 3,600 criminal samples. Eight of 10 RLN labs supported criminal projects during the year, and in doing so, strengthened the Agency's ability to prosecute important cases.

Projects supported at each lab during a fiscal year typically vary in size and in the number of sampling events. Figure 3.2 is a summary of the number of analytical projects supported by the RLN labs by EPA Program element. In aggregate, the RLN labs supported 1,380 projects during 2012. Multiple rounds of analytical work for the same site represent just one site supported. More than one round of work at the same site for a different purpose or client may be counted as two sites supported. Multiple sample site monitoring projects like those related to the Regional Monitoring and Assessment Program (REMAP) are counted by individual water body. For example, all sampling locations at a single lake or stream count as one site, but different lakes or streams count as different sites, even though it may support only one project.

The sample analyses reported above were supported using a wide range of analytical methods. Some of these, which are common to a number of regional labs, are listed in Appendix A as Core Methods. A significant amount of our work during the year required methods

Figure 3.1: Analytical Support to EPA Programs in FY2012 (165,621 sample analyses total)

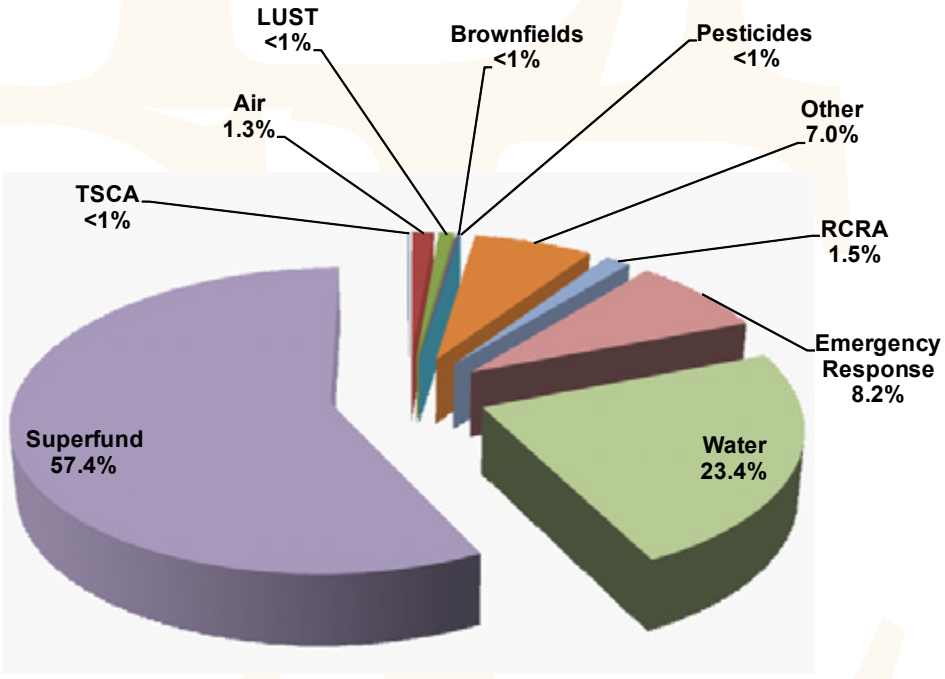
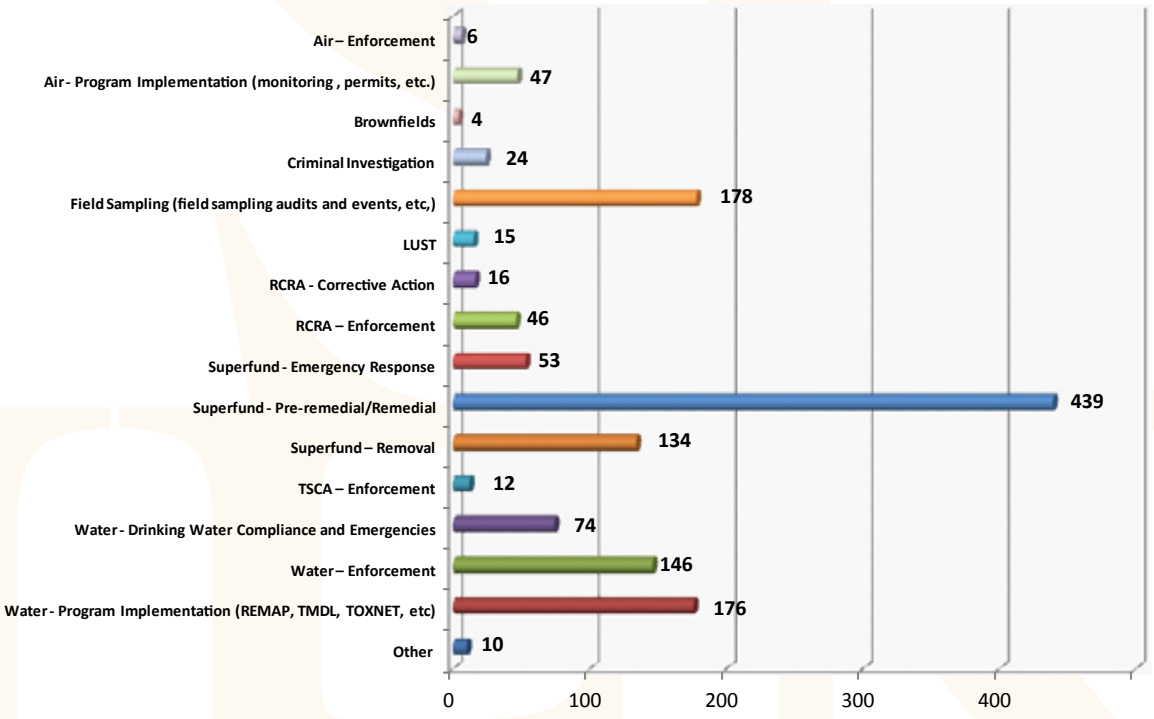


Figure 3.2 Projects/Sites Supported by Regional Laboratory Data FY 2012 by Program Element (1,380 total)

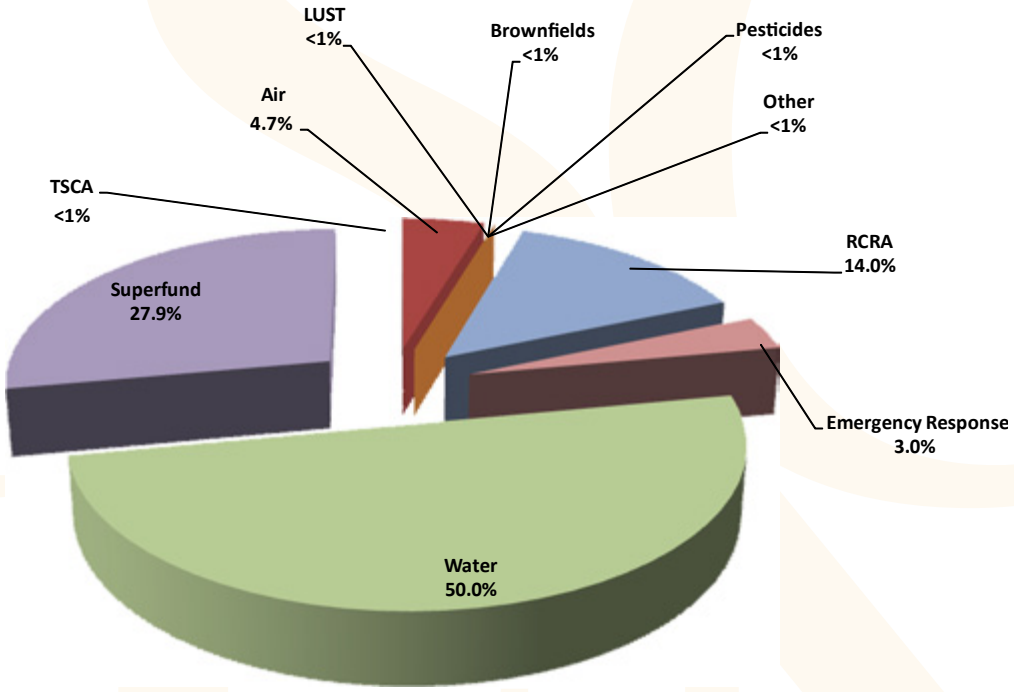


that have been developed specifically to address the unique needs of a particular region. These methods are listed in Appendix B. Often, methods developed by a region to address a local environmental challenge are mobilized in other regions as their benefit is realized and/or as the need arises. Recent examples include microbial source tracking and monitoring potential ground water contamination associated with new oil and gas extraction techniques.

The ability of our RLN labs to develop new methods that keep pace with our changing program needs is vital to the Agency's mission. During the year, our regional labs had 71 active method development projects (see Appendix C). Some of this work was illustrated in the Project Highlight section of this report. It is fairly common for regional projects to require method development. For our Superfund work, we often require lower detection limits and/or a method to address a new sample matrix. For our water program, the challenge often involves new or emerging contaminants (or contaminant family). For our criminal and enforcement programs, each project can involve a new set of unique hurdles often requiring our most seasoned method development staff. Figure 3.3 shows the distribution of the method development projects by program for fiscal year 2012. The distribution of this work differs from Figure 3.1 with Office of Water being the largest requestor, followed by Superfund. This difference is largely driven by the need to develop new methods for emerging contaminants as EPA works to protect our watersheds.

Whenever possible, regional scientists take advantage of the research conducted in our ORD labs by mobilizing draft methods or SOPs that may be available from our ORD partners. For long-lead projects requiring new methods, ORD involvement through the Regional Methods initiative, the Regional Applied Research Effort and/or the Regional Research Partnership Program continues to be a valuable resource for the regions. ORD and their scientists were involved in 22 of the 71 method development projects during the year. For new methods that are in the critical path to project mobilization where no ORD method exists, our regions must rely on the expertise of their in-house scientists to get the job done. This work, often termed "just-in-time" method development, poses one of the greatest challenges to today's modern analytical laboratories. The ability of our RLN labs to consistently meet this challenge and generate data that meet project DQOs is a testament to the technical strength of our network labs, and a key science contribution.

Figure 3.3: Method Development Project Support to EPA Programs in FY12 (71 Methods)



The knowledge of our regional staff in a number of quality and oversight-related areas continued to benefit regional and state programs (see Table 3.1). Bench-level method experience keeps our drinking water auditors sharp and able to strengthen the programs they audit. Participation in EPA drinking water audit program starts with the successful completion of a grueling, week-long drinking water audit course taught by the EPA's Office of Groundwater and Drinking Water (OGWDW) in Cincinnati. Our auditors attend monthly conference calls to keep abreast of new OGWDW requirements to ensure regional audits are in keeping with current national guidance. Audit findings contained in the lab and program audits, and the States' response to these deficiencies, form the basis of important certification decisions made by each regional EPA Drinking Water Certification Authority and in turn help ensure the effective implementation of state drinking water oversight programs. During the period, regional staff conducted over 50 audits of state drinking water labs and programs.

Work done at EPA and contract labs requires the development of quality assurance project plans. While these documents are often prepared in the regional offices by QA staff, RLN staff participated in or prepared over 770 QAPPs in 2012. Occasionally, RLN labs are asked to validate analytical work not supported in their labs. During the year, the regions supported the validation of nearly 17,000 samples.

American communities, and in particular environmental justice communities, face serious health and environmental challenges from air pollution. Improved monitoring and assessment is a critical building block for air quality improvement. EPA has a number of programs in place to ensure that ambient air monitoring data are of a quality that meets the requirements for informed decision making. The regional labs support a number of important air monitoring quality assurance programs by providing management and technical oversight

Table 3.1. Support during FY2012 in oversight-related areas.

Activity	Supported During 2012
Drinking Water Lab Audits	34
Drinking Water Program Audits	18
QAPP Reviews	773
Samples Validated	16967
Expert Witness Testimony	3
PM Filter Weighings	2761
PM 2.5 Audits	405
PM Filter Anaylsis for Lead	326
PM Through-the-probe Audits	200
Other PM-related Audits	232

of contractors, lab space for equipment storage and calibration, field and laboratory work and audits, and logistical support.

PM 2.5 Performance Evaluation Program (PEP): The goal of the PEP is to evaluate total measurement system bias of the PM 2.5 monitoring network. The laboratory component of the program includes particulate matter (PM) filter handling, inspection, equilibration, and weighing; data entry, data validation, data management and distribution to regional clients. The laboratory component of the programs also includes filter archival and data submittal to the Air Quality System (AQS). The PM filter weighing lab is located at the Region 4 Laboratory in Athens, Georgia. In FY 2012, the laboratory processed and weighed over 2,700 filters from state agencies, tribal nations and all ten EPA regions. The Region 4 Laboratory also reviewed the data from PM2.5 PEP audits and evaluated individual audits for submittal to EPA's national ambient air database. The other regional laboratories provided support for the PM 2.5 PEP through performance evaluation audits, quality assurance collocations and PEP audits. In FY 2012, the regional laboratories supported the completion of 405 PM2.5 PEP audits.

Lead Performance Evaluation Program (PEP): The national lead monitoring network measures concentrations of lead in the outdoor air, to assess compliance with the lead National Ambient Air Quality Standards. Similar to the PM 2.5 PEP, the goal of the Lead PEP is to evaluate total measurement system bias of the lead monitoring network. The Lead PEP requires extensive laboratory activities, including filter handling, sample extraction, analysis, data entry/management and archival. The Region 9 Laboratory in Richmond, California currently serves as the Lead PEP Laboratory and, in FY 2012, performed analysis of 326 particulate samples from around the nation to support this PEP.

Through-The-Probe (TTP) Audit System: The Through-The-Probe audit system provides performance audits at state and local ambient air monitoring stations. In FY 2012, the regional laboratories supported the completion of over 200 through-the-probe audits. These performance audits ensure the validity of the ambient air quality monitoring data.

Standard Reference Photometer (SRP) Program: Standard reference photometers (SRPs) are used to ensure that the national network of ozone ambient monitors is accurately measuring ozone concentrations. Eight regional laboratories maintain SRPs and provide verification or certification of primary and transfer ozone standards from state, local and tribal organizations.

Appendix A: EPA Regional Laboratory Core Capabilities

EPA Regional Laboratory Core Capabilities

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	REGIONAL CAPABILITY									
			1	2	3	4	5	6	7	8	9	10
INORGANIC CHEMISTRY												
Acidity	Water	Titrimetric		X	X	X	X		X	X		
Alkalinity	Water	Titrimetric	X	X	X	X	X	X	X	X	X	X
Asbestos	Solids/Bulk material	PLM	X						X	X		X
	Soil/Sediment	PLM	X						X	X		X
Chloride	Water	IC	X	X	X	X	X	X	X	X	X	X
	Water	Titrimetric		X	X							
Chromium, Hexavalent (Cr+6)	Water	Colorimetric		X		X		X	X			X
	Soil/Sediment	Colorimetric		X		X						X
	Water	IC			X	X	X	X	X		X	
	Soil/Sediment	IC			X		X		X			
Cyanide, Amenable	Water	Colorimetric	X	X		X	X	X	X	X	X	X
	Soil/Sediment	Colorimetric	X	X		X		X	X	X		X
Cyanide, Total	Water	Colorimetric	X	X	X	X	X	X	X	X	X	X
	Soil/Sediment	Colorimetric	X	X	X	X	X	X	X	X		X
	Waste	Colorimetric	X	X	X	X	X	X	X	X		X
Fluoride	Water	ISE	X	X		X	X		X			
	Water	IC	X	X	X	X		X	X	X	X	X
Hardness	Water	Colorimetric										X
	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			
Mercury, Total	Soil/Sediment	CVAA	X	X	X	X	X	X		X	X	X
	Soil/Sediment	Direct Hg Analysis							X			
	Tissue (fish &/or plant)	CVAA	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	X
	Waste (oil, drum, etc..)	Direct Hg Analysis							X			
Mercury (TCLP)	Soil/Waste (oil, drum, etc..)	CVAA		X	X	X	X	X		X	X	X
	Soil/Waste (oil, drum, etc..)	Direct Hg Analysis							X			
Metals, Total	Water	ICP /AES	X	X	X	X	X	X	X	X	X	X
	Soil /Sediment	ICP /AES	X	X	X	X	X	X	X	X	X	X
	Tissue (fish &/or plant)	ICP /AES	X	X	X	X			X	X	X	X
	Waste (oil, drum, etc..)	ICP /AES	X	X	X	X	X	X	X	X	X	X

EPA Regional Laboratory Core Capabilities

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	REGIONAL CAPABILITY									
			1	2	3	4	5	6	7	8	9	10
INORGANIC CHEMISTRY												
Metals (TCLP)	Soil/Waste (oil, drum, etc..)	ICP /AES		X	X	X	X	X	X	X	X	X
Metals, Total	Water	GFAA	X				X					X
	Soil/Sediment	GFAA	X				X					X
	Tissue (Fish &/or plant)	GFAA	X									X
	Waste (oil, drum, etc..)	GFAA	X				X					X
Metals (TCLP)	Soil/Waste (oil, drum, etc..)	GFAA					X					X
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
	Tissue (Fish &/or plant)	ICP/MS		X	X	X			X	X	X	X
	Waste (oil, drum, etc..)	ICP/MS			X	X		X	X	X		
Metals (TCLP)	Soil/Waste (oil, drum, etc..)	ICP/MS				X		X	X	X		
Nitrogen (Ammonia)	Water	Colorimetric		X	X	X	X	X	X	X	X	X
	Soil/Sediment	Colorimetric			X	X	X					X
	Water	Electrode		X								
Nitrogen (NO3 &/or NO2)	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	
Nitrogen, Total Kjeldahl	Water	Colorimetric		X	X	X	X	X	X		X	X
	Soil	Colorimetric			X	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		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
	Soil	IC	X		X	X			X	X	X	

EPA Regional Laboratory Core Capabilities

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	REGIONAL CAPABILITY									
			1	2	3	4	5	6	7	8	9	10
INORGANIC CHEMISTRY												
	Soil	Turbidimetric	X				X					
Sulfide	Water	Colorimetric		X			X		X			X
	Soil	Colorimetric										
	Water	IC, Turbidimetric						X				
	Water	Titrimetric		X			X				X	X

EPA Regional Laboratory Core Capabilities

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	REGIONAL CAPABILITY									
			1	2	3	4	5	6	7	8	9	10
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
	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
	Soil/Sediment	GC/MS or GC				X	X	X	X	X	X	X
BOD	Water	Membrane Electrode		X	X	X	X	X	X	X	X	X
COD	Water	Photometric						X				
	Water	Colorimetric		X	X		X		X	X		
EDB & DBCP	Water	GC/ECD	X			X	X	X	X	X	X	X
Herbicides	Water	GC/ECD; GC/NPD				X		X	X			X
	Soil/Sediment	GC/ECD; GC/NPD				X		X	X			X
	Waste (oil, drum, etc..)	GC/ECD; GC/NPD				X			X			X
	Tissue (fish &/or plant)	GC/ECD; GC/NPD							X			
Herbicides (TCLP)	Solid/Waste	GC/ECD				X		X	X			X
	Solid/Waste	HPLC/UV Detection			X							
Oil & Grease	Water	Gravimetric		X	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
Pesticides / PCBs	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	X
Phenolics	Water	Colorimetric		X	X				X	X		X
	Soil/Sediment	Colorimetric			X				X	X		
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			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

EPA Regional Laboratory Core Capabilities

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	REGIONAL CAPABILITY									
			1	2	3	4	5	6	7	8	9	10
	Soil/Sediment	GC/MS	X	X	X	X	X	X	X	X	X	X
ORGANIC CHEMISTRY												
	Air	GC/MS	X	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		X
	Soil/Sediment	GC				X				X		X
	Waste (oil, drum, etc..)	GC	X		X	X	X			X		X
VOA (TCLP)	Solid/Waste	GC/MS		X	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
Chemical Warfare Agents	Water, Soil, Wipes	GC/MS	X		X			X			X	X

EPA Regional Laboratory Core Capabilities

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	REGIONAL CAPABILITY									
			1	2	3	4	5	6	7	8	9	10
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		X	X	X
Heterotrophic PC	Water	Various		X	X			X	X		X	

EPA Regional Laboratory Core Capabilities

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	REGIONAL CAPABILITY									
			1	2	3	4	5	6	7	8	9	10
PHYSICAL & OTHER DETERMINATIONS												
Flash Point	Aqueous/Liquid Waste (oil, drum, etc..)	Pensky-Marten or Seta	X	X	X	X	X	X	X		X	
Conductivity	Water	Specific Conductance	X	X	X	X	X	X	X	X	X	X
Ignitability	Soil/Sediment	Ignitability of Solids	X	X		X	X	X	X			X
	Waste (oil, drum, etc..)	Pensky-Marten or Seta Closed Cup	X	X	X	X	X	X	X	X	X	X
pH	Water	Electrometric	X	X	X	X	X	X	X	X	X	X
	Soil/Sediment	Electrometric	X	X	X	X	X	X	X	X	X	X
	Waste (oil, drum, etc..)	Electrometric	X	X	X	X	X	X	X	X	X	X
Solids, Non-Filterable	Water	Gravimetric	X	X	X	X	X	X	X	X	X	X
Solids, Percent	Soil/Sediment	Gravimetric	X	X	X	X	X	X	X	X	X	X
Solids, Total	Water	Gravimetric	X	X	X	X	X	X	X	X	X	X
Solids, Total Dissolved	Water	Gravimetric	X	X	X	X	X	X	X	X	X	X
Solids, Total Volatile	Water	Gravimetric	X	X		X	X	X	X	X	X	X
Turbidity	Water	Nephelometric	X	X	X	X		X	X	X	X	X

Appendix B: EPA Regional Laboratory Unique Capabilities

EPA Region 1 Laboratory Summary Of Unique Capabilities

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	
PAMS	Air	GC (EPA Method TO-12)	Air	
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	Field Method
Pesticides/PCBs	Water, Soil, Sediment, Waste (drum)	GC/ECD (EPA Method 680)	Superfund	Field Method
Pharmaceuticals and Personal Care Products (PPCPs)	Water	LC/MS/MS	Water	Endocrine disruptors
VOCs	Air (mini-cans)	GC/MS (EPA Method TO-15)	Superfund	Air Toxics
VOCs	Water, Soil, Air	GC/ECD/PID	Superfund	Field Screening
PHYSICAL AND OTHER DETERMINATIONS:				
Grain Size	Soil, Sediment	Sieve (Modified ASTM)	Superfund, Water	Region 1 SOP
Haz. Waste Characterization	Water, Soil, Waste (drum)	Miscellaneous		Reactivity with water, pH, ignitability, toxicity (PCBs, cyanide, sulfides)
Loss of Ignition (LOI)	Sediment		Water	
Percent Lipids	Tissue	Gravimetric		

EPA Region 1 Laboratory Summary Of Unique Capabilities

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
BIOLOGY/MICROBIOLOGY:				
Dehalococcoides ethogenes	Groundwater	qPCR	Superfund-Bioremediation	
E. coli	Water (drinking/waste/ ambient)	qPCR	CWA, SDWA, Ambient Monitoring Rule- recreationaal waters	2008 NFWA
Enterococci	Water (drinking/waste/ ambient)	qPCR EPA Method 1611	CWA, SDWA, Ambient Monitoring Rule- recreationaal waters	
Enterococci	Ambient water	Enterolert/ EPA Method 1600	Ambient monitoring	
Chlorophyll a	Ambient water	EPA 445.0	Ambient monitoring	
Toxicity (Acute)	Sediment	C. tentans, H. azteca	Water, Superfund	Bulk sediment

EPA Region 2 Laboratory Summary Of Unique Capabilities

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	
SO2	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	
Haloacetic Acids	Water	GC/ECD (EPA Method 552.2)	Water	
Methane, Ethane, Ethene	Water	GC/FID	SF/RCRA	
Ozone Precursors (hydrocarbons)	Air	GC/MS/FID	Air	
PCB Congeners	Solid	GC/ECD	Water	
PCB Congeners (209)	Water	HR GC/MS (based on EPA Method 1668A)	Water	
Pesticides	Water	HR GC/MS	Water	Select Pesticides
Pesticides	Water	GC/MS	FIFRA	West Nile Virus Pesticides: Resmithrin, Sumithrin, Piperonly, Butoxide, Malithion
TPH	Water, Solid	Hexane Extraction (EPA Method 1664)	Water	
VOCs	Air	GC/MS (EPA Method TO-14)	Air	Air Toxics
PHYSICAL AND OTHER DETERMINATIONS:				
Density	Ink, Paint	ASTM D1475	Air	
Grain Size	Solid	Pipet Method	Superfund, Water	
Grain Size	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:				
Biomass	Tissue (Animal/Plant)	Caricomp/EMAP Methods	Water	
Clostridium perfringens	Water	Membrane Filtration	Water	

EPA Region 2 Laboratory Summary Of Unique Capabilities

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Cryptosporidium	Water	Fluorescent Microscopy (EPA Method 1623)	Water	
DNA - qPCR (Enterococcus)	Water (Fresh & Marine)	EPA/Cepheid Methodology	Water	
Enterococcus Group	Water	Membrane Filtration	Water	
Giardia	Water	Fluorescent Microscopy (EPA Method 1623)	Water	
Heterotrophic Bacteria	Water	Pour Plate/Sim Plate Method	Water	
Salmonella	Soil, Sludge	EPA 1682	Water	
Toxicity Identification Evaluation	Effluents	TIE Phase I, II, & III Procedures	Water	Toxicity Assessment
Toxicity Testing	Water/Sediment (Marine)	Menidia sp.	Water	Survival & growth (fish)
Toxicity Testing	Water (Marine)	Cyprinodon variegatus	Water	Survival & growth (fish)
Toxicity Testing	Water/Sediment (Marine)	Mysidopis bahia	Water	Survival, growth & fecundity (crustacia)
Toxicity Testing	Sediment (Marine)	Ampelisca abdita	Water	Survival (amphipods) NOTE: Uses a reduced sediment volume
Toxicity Testing	Sediment (Marine)	Leptocheirus plumulosus	Water	Survival (amphipods)
Toxicity Testing	Sediment (Marine)	Eohaustorious estuaries	Water	Survival (amphipods)

EPA Region 3 Laboratory Summary Of Unique Capabilities

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
ORGANIC CHEMISTRY:				
Nitroaromatics & Nitramines	Water, Soil/Sediment	HPLC	Water	Method 8330
Nitroglycerine	Water, Soil/Sediment	HPLC	Water	Method 8332
Nitrogen, Total	Water	Colorimetric		
PCB Congeners	Water, Soil/Sediment, semipermeable membrane device (SPMD)*	HR GC/MS		Method 1668C
BIOLOGY/MICROBIOLOGY:				
Benthic Macroinvertebrate	Sediment, Water (Freshwater, Marine, Estuarine)			
Invertebrate Taxonomy	Invertebrates	EPA EMAP Protocols		
Marine/Estuarine Benthic	Benthic			Organisms identified to species or lowest taxonomy possible
PHYSICAL AND OTHER DETERMINATIONS:				
ID Ozone Depleting Compounds	Propellants/ Aerosols	FTIR	Air Enforcement	
ID Unknowns	Bulk Mercury	Density	Superfund, RCRA	
ID Unknowns	Water	FTIR	Water	Screening it, identify unknowns
ID 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

EPA Region 4 Laboratory Summary Of Unique Capabilities

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
INORGANIC CHEMISTRY:				
Chromium (+6)	Soil/Sediment	Std Method 3500 CrD		
Mercury, Total - Ultra Low Detection Level	Water	CVAF	Water	Method 1631
	Tissue	CVAF		Appendix 1631
	Soil/Sediment	CVAF		Appendix 1631
Metals, Total	Waste (oil, drum, etc…)	ICP/MS		Not Commonly Available
	Air	Hi-Vol Filters		"
Metals (TCLP)	Soil/Waste (oil, drum)	ICP/MS		"
Sulfide	Soil/Sediment	IC		
ORGANIC CHEMISTRY:				
Freon Products	Canister & Air	GC/MS	Air, OECA	Special analysis technique developed for criminal investigations of illegal Freon
Natural Attenuation Analytes	Water	GC/FID	Superfund	Methane, ethane, ethene
PCB Congeners	Water	GC/ECD (EPA Method 8082)	Water, SF	Capable of identifying 209 PCB congeners and 12 co-planar dioxin-like PCB congeners
	Soil/Sediment	GC/ECD (EPA Method 8082)	Superfund, RCRA	"
PCB Congeners	Water	HR GC/MS (EPA Method 1668A)	Superfund, RCRA	High resolution GC/MS
	Soil/Sediment	HR GC/MS (EPA Method 1668A)	Suoerfund, RCRA	"
	Tissue	HR GC/MS (EPA Method 1668A)	Superfund, RCRA	"
Pesticides	Water, Air	GC/MS (Method 8270D)		
Toxaphene Congeners	Water	EPA Method 8081A	Superfund, RCRA	Capable of identifying 24 toxaphene congeners - 22 of which are used as a guide to identify and report degraded toxaphene
Ultimate BOD	Water	Membrane Electrode (Std Method 5210C)	Water	
BIOLOGY/MICROBIOLOGY:				
Chlorophyll	Water		Water	

EPA Region 5 Laboratory Summary Of Unique Capabilities

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
Selenium Speciation for Selenate and Selenite	Water	IC w/metals method backups	Water	Speciation of selenate vs.selenite for toxicity determination
ORGANIC CHEMISTRY:				
Nonylphenol (NP), NP-1 and 2-ethoxylate, octyphenol & bisphenol-A	Water	GC/MS (ASTM D7065-11)	Water	Endocrine disrupter - High Concentration method (ppb)
Nonylphenol (AP), AP-1 and 2-ethoxylate, octyphenol & bisphenol-A	Soil/Sediment	GC/MS (8270 modified / Internal SOP)	Water	Endocrine disrupter
Nonylphenol (NP), NP-1 and 2-ethoxylate, octyphenol	Water	LC/MS/MS (ASTM D7485-09)	Water	Endocrine disrupter Low level method (ppt)
Bisphenol-A	Water	LC/MS/MS (ASTM D7574-09)	Water	Endocrine disrupter Low level method-(ppt)
Nonylphenol carboxylates	Water	LC/MS/MS	Water	Endocrine disrupter
Long chain NP, NPEOs (n=3-18)	Water	LC/MS/MS (ASTM D7742-11)	Water	Endocrine disrupter
COD	Soil/Sediment	Colorimetric	Sediment	
Polybrominated Diphenylether (PBDE) congeners	Water, Sludge	GC/MS/MS, GC/NCI-MS	RCRA, SF, TSCA, Water	Compares with HRGC/HRMS method
PCBs	Water, Oil, Soil, Wipes	8082 (GC/EC)	TSCA	Aroclor specific TSCA reg. Compliance method & multiple action levels
PCB Congeners	Water. Sludge	GC/MS/MS, GC/NCI-MS	RCRA, SF, TSCA, Water	Compare with HRGC/HRMS method
Purgeable 1,4-Dioxane & Tetrahydrofuran (THF)	Water	Method 624-Dioxane (Wide-Bore Capillary Column GC/MS)	Superfund	Specific analyte analysis method
Various analytes (VOAs, SVCOs & 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
129 Toxic Industrial Chemicals (TICs) & CWA degradants (107 validated)	Drinking Water	LC/MS/MS Library Screening	WSD, NHSRC	Library search routine developed under CRADA with Waters Corp. Now use NIST LC/MS/MS Library of over 2,000 analytes

EPA Region 5 Laboratory Summary Of Unique Capabilities

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
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
Thiodiglycol	Soil	LC/MS/MS, ASTM E2787-11	NHSRC	SAP Method
Thiodiglycol	Wipes	LC/MS/MS, ASTM E2838-11	NHSRC	SAP Method
Diethanolamine, triethanolamine, n-methyldiethanolamine and methyldiethanolamine	Water	LC/MS/MS, ASTM D7599-09	NHSRC	SAP Method
Dioctyl Sulfosuccinate (DOSS) in Seawater	Seawater	LC/MS/MS, ASTM D7730-11	NHSRC/SF	SAP Method
Dipropylene glycol monobutyl ether and ethylene glycol monobutyl ether in seawater	Seawater	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 -	RCRA, Superfund	Support for flashpoint
Paint Filter Test	Paints and coatings		RCRA, Superfund	
Specific Gravity	Soil/Sediment	Appendix IV of the Corps of Engineers Engineering Manual (F10-F22)	Sediment	
Synthetic Precipitation Leaching Procedure (SPLP)	Solid Waste	SW-846 1312	RCRA, Superfund	For all TCLP analytes except herbicides.

EPA Region 6 Laboratory Summary Of Unique Capabilities

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:				
Fingerprint (pattern recognition)	High level waste	GC/MS	RCRA	
	Oil	GC/MS	RCRA	
	Fuel	GC/MS	RCRA	
Incidental PCBs	Water	GC/MS; Method 680 Homologue Series	TSCA, RCRA	grouped by number of chlorine
	Soil/Sediment	GC/MS; Method 680 Homologue Series	TSCA, RCRA	grouped by number of chlorine
	Waste	GC/MS; Method 680 Homologue Series	TSCA, RCRA	grouped by number of chlorine
Chemical Warfare Agents	Water/Solid/Wipe	GC/MS	Emergency Response	
PAMS (C2s and C3s identified)	Air	GC/MS/FID (split)	CAA	C2s and C3s are individually quantitated
PCBs (Aroclor)	Electrical Cable	GC; Separation, extraction, analysis of individual components. Mod of program specific technique.	TSCA	Toluene is extraction solvent
PCB screen	Soil	Immunoassay	TSCA, RCRA	For field screening
Pesticides/BNAs	Water	GC/MS; PTV; Microextraction abbreviated & modified method 3510, 8081, 8270, 608, & 625	Water, RCRA, Superfund	Large volume injections for GC/MS
PAHs (trace)	Water/Solid/Oil	GC/QQQ	RCRA, Superfund	
Chemical Warfare Agents-Degradation products	Water	LC/MS/MS	Emergency Response	
VOCs by OVM	AIR	GC/MS	CAA	passive air monitoring
Organophosphorous Pesticides (OPPs)	Water	GC/NPD	CWA, RCRA, Superfund	
	Soil/Sediment	GC/NPD	RCRA, Superfund	
	Waste	GC/NPD	RCRA, Superfund	
PHYSICAL AND OTHER DETERMINATIONS:				
Corrosivity by pH	Waste	Method 1110 - Corrosivity Toward Steel	RCRA	

EPA Region 7 Laboratory Summary Of Unique Capabilities

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
INORGANIC CHEMISTRY:				
Lead bioavailability	Soil	In vitro digestion with ICP analysis	Superfund	Bioavailable Lead
Mercury	Water, Soil/Sediment, Tissue, Waste, TCLP	Direct Mercury Analyzer (Thermal Decomposition, Amalgamation & Atomic Absorption Spectrophotometry)	Superfund, Water, RCRA	Replaced CVAA with DMA 80
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	" " "

EPA Region 8 Laboratory Summary Of Unique Capabilities

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
INORGANIC CHEMISTRY:				
Silica	Water	Colorimetric	Water/Superfund	
Gadilinium	Water	ICP-MS	Water/Superfund	Wastewater Indicator
ORGANIC CHEMISTRY:				
Alcohols	Water	GC/FID	Water/Superfund	
Chlorophyll	Water	HPLC	Water/Superfund	
Endothall	Water	GC/MS	Water/Superfund	
TPH (VOA & BNA)	Water, Soil/Sediment	GC/MS or GC/FID	Water/Superfund	
LC/MS/MS Pesticides	Water	LC/MS/MS	Water/Superfund	Monitoring for States 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	LC/MS/MS	Water/Superfund	Endocrine disruptors
Waste Indicator Compounds	Water	GC/MS	Water Superfund	Monitoring for States and Tribes
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	
Bacteria (Clostridium perfringens)	Water	Membrane Filtration	Water/Superfund	

EPA Region 9 Laboratory Summary Of Unique Capabilities

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)	
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	
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 bioassessibility 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	Superfund,RCRA	
Methane, Ethane, Ethene	Water	GC/FID	Superfund, RCRA	
Microcystin Toxin	Water	Immunoassay	Water	
PHYSICAL AND OTHER DETERMINATIONS				
Pore Water Extraction	Sediment	Centrifugation	Superfund	
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	
Toxicity Test (Acute) [Daphnia magna, Daphnia pulex]	Water	EPA/600/R-90/27F	Water, NPDES	
Toxicity Identification Evaluation (TIE) Test	Water	EPA/600/6-91/003	Water, NPDES	
Toxicity Test, Amphipod [4 species]	Marine Drill Mud	40 CFR Part 435, Appendix 2 to support A.v.58, no41, 1993	NPDES	Acute for water
Toxicity Test, Mysid Red abalone (Haliotis rufescens)	Water	EPA/600/R-95/136	NPDES	Larval development for water
Toxicity Test, Sea Urchin Fertilization [Stronglyocentrotus purpuratus]	Water	EPA/600/R-95/136	Water, NPDES	
Toxicity Test, Sea Urchin Development [Stronglyocentrotus purpuratus]	Water	EPA/600/R-95/136	Water, NPDES	

EPA Region 10 Laboratory Summary Of Unique Capabilities

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
INORGANIC CHEMISTRY:				
Asbestos, Bulk	Solids	EPA 600/R93/116 - XRD	Superfund	
Mercury	Water	CVAF, Method 1631E	Water	
Metals	Air filters	ICP/MS, ICP	CAA	
Metals	Blood	ICP/MS	Superfund	
Metals	Soil	Portable XRF	Superfund, Criminal	Screening results for metals
Metals	Paint	Portable XRF	TSCA, Criminal	Lead in paint
Metals	Solid	X-Ray Diffractometer (XRD)	Superfund	Characterizes the form metals exist in sample
Metals - Arsenic speciation	Fish/shell fish	IC/ICP/MS	Superfund, Water	Speciation data needed for risk assessment
Metals (TAL) + Total Uranium	Small mammals, invertebrates	Microwave Digestion, ICP/AES, ICP/MS	Superfund, RCRA	Biomonitoring projects
Metals (SPLP)	Soil/Waste	ICP/AES	Superfund	
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
Dinoseb	Soil	GC/ECD	Superfund	Field screening with mobile lab
1,4-Dioxane	Water	EPA Method 8270D SIM/ Method 522	Superfund	
Diquat	Water	EPA Method 549.2	CWA	
Ethylene dibromide (EDB)	Water	GC/ECD	Superfund	Field screening with mobile lab
Explosives (Nitroaromatics & Nitramines)	Water, Soil, fish/shellfish	EPA Method 8330 / HPLC	Superfund	
Hydrocarbon Identification	Water, Soil/Sediment	NWTPH-HCID	Superfund, Criminal	
Herbicides/Pesticides/PCBs	Water, Soil/Sediment, Tissue	GC/MS, GC/CI/MS/MS	Superfund	
N-Nitrosodimethylamine	Water, Soil	Method 521	Superfund	
PAH	Water, Soil/Sediment	GC/FID	Superfund	Field screening with mobile lab
Pesticides/herbicides/PCBs	Water, Soil/Sediment, Tissue	GC/MS, GC/ECD	Superfund	
Polybrominated diphenyl ethers (PBDEs)	Water	GC/MS Low Resolution	Water	
Polybrominated diphenyl ethers (PBDEs)	Sediment/bio solids	GC/MS Low Resolution	Superfund, Water	

EPA Region 10 Laboratory Summary Of Unique Capabilities

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Polybrominated diphenyl ethers (PBDEs)	Tissue (fish)	GC/MS Low Resolution	Superfund	
TPH-GRO	Water, Soil	NWTPH-Gx	Superfund, RCRA	
TPH-DRO	Water, Soil	NWTPH-Dx	Superfund, RCRA	
VOA and SVOA	Industrial wastes, Solids, Tissues	Vacuum distillation, Methol 8261A	Superfund, RCRA	
PHYSICAL AND OTHER DETERMINATIONS:				
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 (drinking/waste)	EPA Method 1623 (Filtration/IMS/Staining)	SDWA, Water, Ambient Monitoring Rule - recreational waters	On approval list for LT-2 regulation
Chlorophyll-a	Water	SM 1002H	Water	
Enterococci	Ambient Water	EPA Method 1600	Ambient Monitoring Rule	
Microbial Source Tracking	Water	PCR	Water	
Microscopic testing	Drinking Water	Microscopic particulate analysis	Surface Water Treatment Rule	Microscopic technique used to establish GWUDI characteristics of a drinking water
Microscopic testing	Water	Filtration plant optimization	Surface Water Treatment Rule	Microscopic technique used to determine filtration plant efficiency

Appendix C: EPA Regional Laboratory Methods in Development

EPA Region 1 Regional Laboratory Methods In Development

PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
Quantification of Cyanobacteria/Microcystin in Surface Waters	Needed for calibrating microcystin probes as part of effort to monitoring cyanobacteria blooms in support of the Water program.	Culture established; cell counting SOP completed. Use and verification in probe calibration to be continued as schedule allows.	Spring of 2014
Microbial Source Tracking using Bacteriodes/Bacteriodales and Coliphage F+ by qPCR	Developing capabilities in this technology for use in Water program projects and emerging needs.	Instruments and sample processing, ESAT staff training and/or assessing methods; ongoing with the following products to date Draft coliphage F+ RNA SOP, Final Report for EPA R1 lab analysis and poster presentation at 2013 ASM meeting.	Ongoing
Chlorophyll-a (EPA Method 445.0) Capability Development	Water	Completed during FY 2012.	FY 2012
Enterococcus in Water by qPCR (EPA Method 1611 Capability Development	Water	Completed during FY 2012.	FY 2012

EPA Region 2 Regional Laboratory Methods In Development

PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
Microbial Source Tracking Using qPCR	TMDL and Stormwater	Non Human marker test completed.	FY 2014
Microbial Source Tracking using non qPCR Techniques including Coliphage F+ and Optical Brightners	Develop methods to complement qPCR MST program	Literature Search Initiated.	FY 2015
SIM Analysis for VOA and Semi VOA analysis	Drinking and Surface Water	Developing methods on current instrumentation.	FY 2013
Pesticides in Wipe Samples by LC/MS/MS	RCRA	Completed during FY 2012.	FY 2012
Pharmaceuticals in Water by Direct Injection LC/MS/MS	Drinking Water	Completed during FY 2012.	FY 2012

EPA Region 3 Regional Laboratory Methods In Development

PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
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; necessary modifications to laboratory in progress.	Not known
EPA Method 1694 for Pharmaceuticals and Personal Care Products by LC/MS/MS	Need for capability to identify and quantify pharmaceutical and personal care products.	Reading and researching the method.	Not known
PCR Quantitation and Source Tracking	Need for capability to determine source of E.coli contamination in support of Water Program.	In-progress.	FY 2013
Glycols in Water	Need for capability to identify glycol compounds in groundwater using LC/MS/MS to achieve lower quantitation limits.	In-progress.	FY 2013
ELISA	Need for in-field testing of surface and drinking water for presence of estrogen and estrogen-like compounds.	In-progress.	FY 2013

EPA Region 4 Regional Laboratory Methods In Development

PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
EPA Method 8276, Toxaphene and Toxaphene Congeners by Gas Chromatography/Negative Ion Chemical Ionization Mass Spectrometry (GC/NICI/MS)	Superfund	Completed Sept. 2012.	FY 2012

EPA Region 5 Regional Laboratory Methods In Development

PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
PFOA/PFOS in Biosolids and Water	Water Division study - RMI	Initial work done, new instrument installed and standards run to set up instrument.	2013, sooner if 2012 RMI awarded
qPCR, Gene Sequencing Guar Gum	HF fluid screening tool - Region 3 support	Some samples sequenced, screening tool in process.	FY 2014
Methane, Ethane and Ethene in Water by GC/FID	Water Program request	Method developed, SOP in draft.	FY 2013
Fluorotelemer Alcohols in Water by LC/MS/MS	Water	Initiated.	FY 2013
Organophosphonates in Soil by LC/MS/MS	Water	Completed during FY 2012.	FY 2012
BPA in Biosolids, Sludge and Soils by LC/MS/MS	Water	Completed during FY 2012.	FY 2012
Alkylphenols in Biosolids, Sludge and Soils by LC/MS/MS	Water	Completed during FY 2012.	FY 2012

EPA Region 6 Regional Laboratory Methods In Development

PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
Anions and Oxyhalides by IC	Remove dependence on State Lab for this test.	Method developed, need DOC/MDL; SOPs.	December 2013
Asbestos	Superfund/RCRA/Enforcement	Training; DOC; SOP preparation.	program dependent
Alcohols by Headspace GC/MS Analysis	Energy Extraction	Method developed, need DOC/MDL; SOPs.	December 2013
Dissolved Gasses in Water by GC/FID	Energy Extraction	Method developed, need DOC/MDL; SOPs.	December 2013
Bioreactor (Biodegradation Unit Modeling)	Developing need for Enforcement of biodegradation units.	Complete, but refining method (final SOP).	program dependant
Explosives	RCRA Remedial Sites	Method being developed.	program dependant - may be early 2014
Direct mercury analysis (CVAF - Milestone)	Clean Water Act, RCRA, Superfund	DOC/MDL; SOP preparation.	Projected 2015
Pesticide/Aroclors by GC/QQQ	RCRA, Superfund	DOC/MDL; SOP preparation.	December 2013
Energy Extraction/ Frack Anion	Clean Water Act, RCRA, Superfund	Method being developed.	December 2013
Energy Extraction/ Frack Cation	Clean Water Act, RCRA, Superfund	Method being developed.	December 2013
Energy Extraction/ Frack OA	Clean Water Act, RCRA, Superfund	Method being developed.	December 2013
PPCP analysis	Water	Method being developed.	December 2013
Passive Formaldehyde	Clean Air Act	Method being developed.	December 2013
Induction Coupled Plasma Axial Method	Superfund. New technique to generate lower reporting limits for metals.	Method being developed.	FY 2014
Additional Volatile Compounds Analysis for Resource Extraction	Drinking Water	Method being developed.	FY 2014
Cyanide in Soil Matrix	RCRA and Superfund	Method being developed.	FY 2014
Sulfide in Water Matrix	RCRA and Superfund	Initiated method development.	FY 2014
Optimized Total Petroleum Hydrocarbon Method (TX 1005) Using Fast GC Analysis	RCRA and Superfund	Completed during FY 2012.	FY 2012
Hexavalent Chromium, Method 218.7	RCRA and Superfund	Completed during FY 2012.	FY 2012
Air Toxics Analysis Upgrades, Scan Parameters and Target Compound List	Air	Completed during FY 2012.	FY 2012
Low Molecular Weight Acids in Resource Extraction Analysis	Drinking Water	Method being developed.	FY 2014
Haloacetic Acids in Resource Extraction Analysis	Drinking Water	Method being developed.	FY 2014
Modified Method for Chemical Warfare Agent Degradation Products Analysis	Superfund and Emergency Response	Completed during FY 2012.	FY 2012

EPA Region 7 Regional Laboratory Methods In Development

PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
EPA Method 1694 for Pharmaceuticals and Personal Care Products by HPLC/MS/MS	Speciation data to be used for Risk Assessments in support of Clean Water Act and Superfund.	Performing method validation studies on surrogate compounds; conducted gap analysis to address infrastructure, safety and security requirements; developing SOPs; modifying infrastructure as needed.	FY 2013
Improving Precision of Volatile Organics Analysis Samples from In-situ Chemical Oxidation Sites	Superfund	Publication in process.	FY 2013
Rapid Screening Method for PCBs	Superfund	Continued progress.	FY 2013

EPA Region 8 Regional Laboratory Methods In Development

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 Disrupter 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

EPA Region 9 Regional Laboratory Methods In Development

PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
Lead (Pb) in Air on Teflon PM2.5 Filter	Address analytical needs associated with new Pb NAAQS.	Final stages of development.	9/30/2013
Methyl Mercury in Environmental Samples	Address regional priority.	Instrumentation installed. Method development has started.	FY 2014
Inter-Laboratory Study for the Measurement of Toxicity in Sediments to Embryos and Larvae of Echinoids (sea urchins and sand dollars)	Water	Participated in two rounds. Project completed during FY 2012.	FY 2012
In-vitro Bioassessibility Assays for Arsenic and Lead in Soil	Superfund site risk assessments and remediation goals support.	Capability development completed during FY 2012. Providing support to Superfund projects.	FY 2012

EPA Region 10 Regional Laboratory Methods In Development

PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
Multi-Laboratory Validation of Arsenic Speciation Methods 3110 and 6870 for Marine Tissues	Speciation data needed for risk assessment.	Inter-laboratory study using Regional Methods Program funding was continued.	FY 2013
Develop Methyl Mercury Analysis Capability for Water and Sediment Samples	Methyl mercury data needed to support regional mercury strategy toward characterizing levels in the environment and evaluate public health risks.	Development of capability for water analyses completed. Capability for sediment analyses in progress.	FY 2014
EPA Method 8330B Marine Tissue Method Evaluation/ Development	Explosive concentration data in marine tissue samples are needed to help evaluate marine areas polluted with military munitions.	Method development completed. Multi-laboratory study through the QATS contract is in progress.	FY 2014
Endocrine Disruptor Compounds (EDCs) Testing of Wastewater Treatment Plant Effluent – Fathead Minnow and Coho Salmon Bioassay Comparison	Address waste water treatment effluent effects on coho salmon, an endangered species in the Northwest.	Began qPCR analysis of fish samples.	FY 2013
Bioavailability of Lead at the Bunker Hill Superfund Site	Human health risk assessment support for residences near mining sites.	Initiated and completed capability development. Analysis of Bunker Hill samples conducted.	FY 2013
Ultra-trace Concentration Phosphorus Method for Treated Wastewater Effluent and Surface Water	NPDES compliance monitoring at ultra low phosphorus levels.	Experiments conducted using UV/ Vis spectrophotometer, colorimetric type instrumentation and ICP-MS system.	FY 2014
Development of Active Air Sampling and Analytical Method for Selected Herbicides	Address drift issues with herbicide spraying operations by the agricultural industry.	Planning initiated only with target compounds identified for testing that are associated with timber industry spraying in Oregon.	FY 2014
Chemical Warfare Agent Analysis Capability	Need for capabilities to quantify chemical warfare agents during incident of national significance	Capabilities for water, wipes, and soils established using existing methods. Successfully completed a throughput study.	FY 2012
Quick Easy Cheap Effective and Rugged (QuEChERs, pronounced “catchers”) Method for Polycyclic Aromatic Hydrocarbons Analysis of Clam Tissues	Further reduce chemical solvent use in support of the Envirnmental Management System (EMS) program and improve analytical efficiency.	Initiated and completed in FY 2012.	FY 2012

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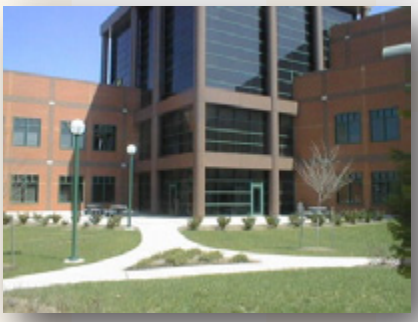

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US EPA REGIONAL LABORATORIES

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