United States
Environmental Protection
Agency

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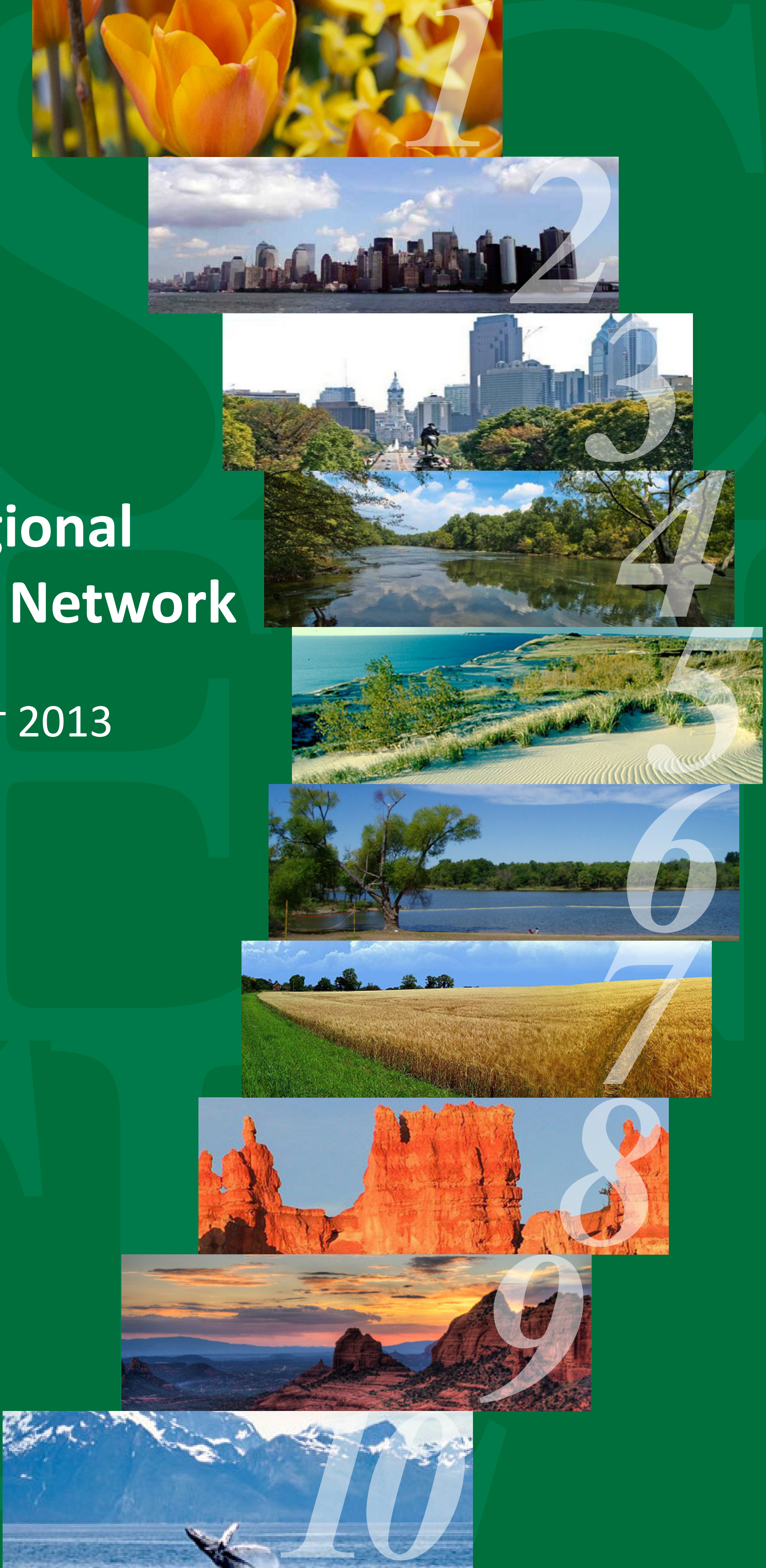

US EPA Regional Laboratory Network

ANNUAL REPORT 2013

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US EPA REGIONAL LABORATORY NETWORK

FY 2013 ANNUAL REPORT

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US EPA Regional Laboratory Network Annual Report 2013

List of Acronyms

AMD	Acid Mine Drainage
BNA	Base/Neutrals and Acids Extractable Organics
BMP	Best Management Practice
BOD	Biological Oxygen Demand
CAFO	Concentrated Animal Feeding Operation
CIMEK	Cumulative Impacts of Mining in Eastern Kentucky (project)
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
HAPSITE	Hazardous Air Pollution on Site
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
LCAA	Lead Contamination Control Act
LC/MS	Liquid Chromatography/Mass Spectrometry
LC/MS/MS	Liquid Chromatography/Dual MS
MADEP	Massachusetts Department of Environmental Protection
MIP	Membrane Interface Probe
NAS	National Academy of Sciences
NEIC	National Enforcement Investigations Center
NIST	National Institute of Standards and Technology
NPL	National Priorities List
NRCS	Natural Resources Conservation Service
NRMRL	National Risk Management Research Laboratory
NO3	Nitrate
NO2	Nitrite
NWCI	National Water Quality Initiative
OGWDW	Office of Ground Water and Drinking Water
ORD	Office of Research and Development
OW	Office of Water
PAHs	Polynuclear Aromatic Hydrocarbons
PCBs	Polychlorinated biphenyls
PEP	Performance Evaluation Program
PLM	Polarized Light Microscopy
PPCP	Pharmaceuticals and Personal Care Products
PRASA	Puerto Rico Sewer and Aqueduct Authority
QAPP	Quality Assurance Project Plan
QC	Quality Control
REMAP	Regional Monitoring and Assessment Program
RLN	Regional Laboratory Network
RNCS	Natural Resources Conservation Service
RPM	Remedial Project Manager
SCDHEC	South Carolina Department of Health and Environmental Control
SDWA	Safe Drinking Water Act
SIM	Selected Ion Monitoring
SPLP	Synthetic Precipitation Leaching Procedure
SRB	Sulfate-reducing Bacteria
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
WSD	Water Security Division
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 cogent 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.

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

To further ensure and enhance the defensibility of our data, each regional laboratory adheres to the Science Policy Council directive for "Assuring the Competency of Environmental Protection Agency Laboratories", February 23, 2004 and the Administrator's commitment to High Performance Organizations by participating in external third party accreditation programs for laboratories under either the NELAC Institute (TNI) or ISO 17025. Additionally, some are also accredited for forensic work under ILAC G19:2002. Under these programs the labs undergo periodic third party audits, conduct their own internal audits and participate in numerous Proficiency Testing studies all to ensure effective quality systems that continually improve performance and ensure data of known quality are generated.

Laboratory Quality Systems are accredited by independent external auditors following rigorous quality standards to yield High Performance Organizations.

The RLN has access to additional mechanisms for procurement of routine analytical services such as the Contract Laboratory Program, which provides readily available standard analyses from private sector labs using methods that were developed and refined by EPA for the Superfund program. RLN laboratories are also equipped with Environmental Services Assistance Team (ESAT) contractor support to supplement EPA's existing capabilities. The RLN complements rather than competes with these 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. During FY 2013, EPA's RLN labs supported over 159,000 sample analyses in support of 1,249 projects. In keeping with prior

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

years, Superfund remained the most significant requester of analytical services with over 62% of the total analyses.

Developed 44 different non-routine analytical methods to satisfy regional needs to address emerging contaminants.

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 ORD partners, also ensures that our regional labs are poised to tackle the most difficult analytical projects requiring method development. During the year, our regional labs worked on development of 44 different non-routine analytical methods, with the Office of Water again being the largest source of requests (44%). Much of this work is driven by regional needs for new methods to address emerging contaminants or to modify a current method for a regulated contaminant to achieve lower detection limits or apply it to a new sample matrix. Our ORD partners played a role in about 20% of these projects.

Serve crucial roles in regional drinking water audit programs.

According to EPA's Office of Groundwater and Drinking Water, 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 operate 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 functions.

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 response to Homeland Security Presidential Directive 9, which was issued in 2004, EPA established the Environmental Response Laboratory Network (ERLN) and the Water Laboratory Alliance (WLA) to provide coordinated analytical response to nationally significant events requiring large scale environmental responses and/or drinking water contamination. Each regional lab serves as the region's principal laboratory in the ERLN/WLA 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 our important relationships with our state laboratory partners. Currently, 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 remediating contaminated areas.

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 some 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.

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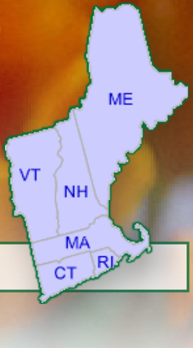
2.0 Regional Project Highlights

Region 1
(New England)

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



EPA Priority 5: Protecting America's Waters
EPA Priority 6: Building Strong State and Tribal Partnerships

Palmer River Source Tracking

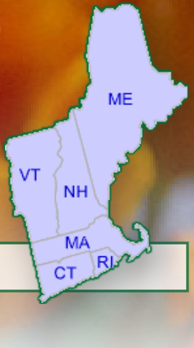
The EPA Region 1 Laboratory has played a leadership role in designing and conducting a large and complex agricultural source tracking project on the Palmer River, a small rural, agricultural watershed in southeastern Massachusetts (MA) that drains into Rhode Island (RI). The RI Department of Environmental Management (RIDEM) had identified high bacteria concentrations from sources in MA as a predominant contributor to bacterial contamination in the RI reaches, significantly impacting the water quality of downstream portions of the Palmer River and beyond, resulting in permanent shellfish bed closures, and requested the EPA Lab's assistance in tracking the sources. Previous studies conducted by MA Department of Environmental Protection (MADEP) implicated farms as potential bacteria sources.

The Region 1 Lab worked with RIDEM and MADEP to jointly develop a plan to look at *E. coli* bacteria levels throughout the watershed and then narrow down the sources with a second and third round of sampling to track the bacteria. Samples for *E. coli* bacteria were collected at 44 road crossings throughout the watershed in 2012 to conduct an initial assessment the water quality conditions using bracket sampling and bacteria source tracking methodologies to pinpoint the sources of elevated bacteria and narrow down the sources of contamination for future sampling. Additionally, water quality sondes with sensors were used to measure pH, dissolved oxygen, temperature, conductivity, and salinity at each location. Results indicated relatively low *E.coli* numbers throughout the watershed with a few hot spots identified for follow up. The group conducted two additional multi-agency surveys in 2013. In addition to helping scope this multi-year, multi-agency project, EPA lab staff coordinated field sampling efforts and conducted more than 150 microbiological analyses at the Region 1 Lab.

In 2013, this study became an EPA Regional priority when MADEP selected the Palmer River as its watershed for participation in the Natural Resources Conservation Service's (NRCS) National Water Quality Initiative (NWQI), a program where the NRCS works with farmers to improve water quality by implementing agricultural Best Management Practices (BMPs). A major focus of the NWQI is monitoring to determine possible areas impacted by nonpoint sources that NRCS can assist the farmers in correcting practices, and in-stream monitoring was designed and undertaken in such a way *to assess* whether water quality and/or biological condition related to nutrients, sediments, or (livestock-related) pathogens has changed in the watershed, and if so whether this can be associated with agricultural conservation practices. For this project, some nutrient sampling and analysis by the Region 1 Lab will be included during 2014 to establish a baseline, but plans are to continue using bacteria as a surrogate indicator in future sampling.

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 6: Building Strong State and Tribal Partnerships

Rapid Development of a Sampling and Analysis Method for Chlorpyrifos in Residential Wipe Samples by UPLC/MS/MS

In June 2013 when the Vermont Agency of Agriculture suspended the license of AAA Accredited Pest Control Company for the misuse of a pesticide in treating a residence for bed bugs, they had no idea of the extent of the problem. The subsequent investigation revealed that well over a hundred homes had been treated for bed bugs with chlorpyrifos, an organophosphate pesticide banned by the U.S. EPA for all indoor use in 2001. State of Vermont Department of Health immediately issued a health advisory to healthcare providers in Rutland County, warning of possible residential exposure to chlorpyrifos. Soon thereafter EPA Region 1 was contacted for assistance in clean-up, removal, and analytical services.

The EPA New England Laboratory responded with the rapid development of an LC/MS/MS sampling technique and analytical method to screen for this banned pesticide. This quick turnaround method has allowed EPA on scene coordinators to rapidly identify concentrations of chlorpyrifos in the contaminated residences. The method uses a pre-cleaned 3"x3" cotton gauze pad which is pre-wetted with methanol. The chlorpyrifos is extracted off the wipe samples by sonication with an acidified acetone solvent. The solvent is then evaporated to dryness using a Biotage V10 evaporator. The sample is re-dissolved in methanol and HPLC buffer. The chromatographic run was reduced to only seven minutes to maximize sample throughput and uses a binary gradient of 20% acetonitrile/ water and methanol with 0.1% formic acid using a Waters Acquity BEH C18 1.7 µm UPLC column (2.1x 50 mm). Deuterated chlorpyrifos D-10 was employed as an internal standard, and diazinon D10 is used as the surrogate compound to ensure accurate quantitation and confirm acceptable analyte recovery. Target compounds include both chlorpyrifos and the metabolite Chlorpyrifos-oxon. The positive electrospray LC/MS/MS method incorporated a secondary qualifier ion for chlorpyrifos which can be used to verify isotopic ratios further confirming analyte presence. The reporting limit for each compound based on a 100 cm^2 wipe area is 0.4ng/cm^2, which meets project goals based on health guidelines from ATSDR. The method has a throughput of approximately 40 samples per day.

To date over 1000 wipe samples have been analyzed at EPA New England Laboratory for this on-going investigation and clean-up.

Region 2
(Northeast)

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

EPA Priority 5: Protecting America's Waters

National Study - Lead in Drinking Water from Schools and Child Care Facilities

Lead is a toxic metal that can be harmful to human health when ingested. Young children are particularly sensitive to the effects of lead because their bodies are still undergoing development. Lead is rarely found in source water, but enters tap water through corrosion of plumbing materials containing lead. Common sources of lead in drinking water include: solder, fluxes, pipes and pipe fittings, fixtures, and sediments. Thus, it is possible that different water outlets in a given building could have dissimilar concentrations of lead.

There is no federal law requiring testing of drinking water in schools, except for schools that have their own water supply and would be subject to the Safe Drinking Water Act (SDWA) of 1974 as amended in 1986 and 1996. The 1988 Lead Contamination Control Act (LCCA) is aimed at identifying and reducing lead in drinking water in schools and child care facilities. The LCCA created lead monitoring and reporting requirements for all schools, and required the replacement of drinking water coolers that contained excessive levels of lead. The provisions are not enforceable. As a result, states have the option to voluntarily enforce the provisions of the Act (or alternate provisions) through their own authority.

In 2013, the Office of Water (OW) established a three year pilot study to promote awareness of the potential sources of lead in schools and child care facilities. The primary objective is to reduce children's exposure to lead from drinking water. The pilot is in collaboration with the Kellogg Foundation and the Calhoun County Public Health Department. A total of 100 schools and child care facilities will be tested in Calhoun County, Michigan, over a three year period, from 2013 to 2015. The OW pilot study is a first step in a nationwide effort to promote awareness of the potential exposure to lead in schools and day care facilities with a focus on testing and remediation options.

Based on its experience in Lead in Schools program, Region 2 provided guidance on the use of the appropriate sampling and quality assurance procedures for the pilot study. The Region 2 Laboratory coordinated the analytical support for this large-scale initiative, using the resources of EPA's Regional Laboratory Network to provide the analytical services for the nearly 4,000 lead analyses expected during the study. The Region 2, 3, 5, 6, 9, and 10 laboratories are participating in the study. The use of the regional laboratories will yield significant cost savings compared to use of commercial laboratories and ensure data quality and consistency.

The analytical results and field data will be used to make a determination as to whether drinking water distributed from outlets (i.e., fountains, bubblers, and faucets) is contaminated with lead. If the drinking water at a source is found to contain lead at a concentration greater than 20 micrograms per liter (ug/L) or parts per billion (ppb), guidance will be provided to the facility on how to remediate the problem.

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
EPA Priority 7: Building Strong State and Tribal Partnerships

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 of the islands. 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. The limited resources are not leveraged in any systematic way.

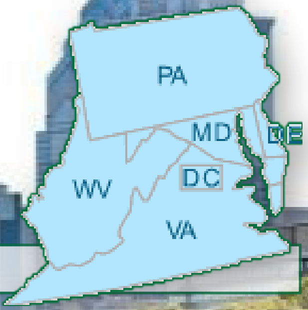
Based on the science visit, the Region established the EPA Region 2 Caribbean Science Consortium to expand science collaboration and facilitate the exchange of information among the key science organizations of the islands. The Science Consortium is comprised of members of Region 2 and government and 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 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 individual member organizations in order to build the capacity of the territories to respond to their environmental science needs.

One of the goals of the Science Consortium is to coordinate and collaborate, where appropriate, in addressing the critical research needs on the islands. One of the major research areas in Puerto Rico is the assessment and impact of drinking water systems that are not covered under the Puerto Rico Sewer and Aqueduct Authority (PRASA), referred to as "Non-PRASA Systems." There are nearly 250 Non-PRASA Systems serving an estimated population of 115,000, including a significant number of children and older people. The Non-PRASA systems only comply marginally, and just a few of them have the technical, managerial and financial capacity required to comply with the SDWA. Research into the health impact on the communities that are served by these systems is a high priority for Region 2, the Puerto Rico Department of Health, the local universities, and the community at large.

In FY'13, the second year of the Science Consortium, the group focused their efforts on the issue of Non-PRASA systems and some of the studies that are planned among its university members. The Science Consortium held a special half-day meeting in Puerto Rico to bring all of the research partners together to discuss how to best collaborate, focusing on establishing common objectives, current activities, and how to best leverage limited resources into addressing the research needs going forward. The Science Consortium established a workgroup among Consortium members, additional local universities, and EPA program staff to address the issues affecting the Non-PRASA systems and to develop a plan of action moving forward.

Region 3 (Mid-Atlantic)



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

EPA Priority 4: Cleaning Up Our Communities

Supporting an Emergency Removal Program Effort at the Price Battery Site

Under EPA's Emergency Removal Program, a multi-year cleanup effort is being conducted at the Price Battery Superfund Site located in Hamburg, Berks County, Pennsylvania. Since 2002, EPA has been in the process of cleaning up over 500 residential properties that were contaminated with lead due to the Price Battery Plant and the on-site lead smelter located in the county. Hamburg is located at the foot of the Blue Mountains along the Schuylkill River. The site, about three-fourths square mile in size, is located in a mixed commercial/residential area in the vicinity of the former Price Battery facility.

The Price Battery plant operated in the Borough of Hamburg from approximately 1940 to the mid-1990s. The on-site lead smelter was dismantled in 1971. In addition to the lead emissions produced from the lead smelter stack during operations, battery casings were broken open and the lead plates were removed for smelting. Lead-contaminated battery waste and casings were used as fill material throughout the Borough of Hamburg. Emissions and the fill material contaminated nearby residential homes around the facility.

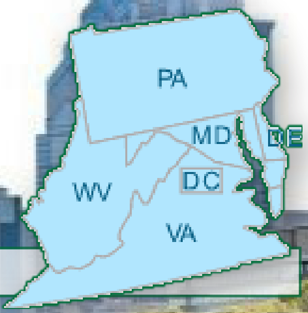
To date, 554 home exteriors and 402 home interiors of residential properties have been cleaned up. The cleanup process involved excavation of residential surface soils and in-home decontamination. Historically, some of the residential surface soils had lead concentrations above 50,000 parts per million. The cleanup action level is 572 parts per million. These soils were assumed to have been tracked into homes, posing an additional risk to residents.

In November 2002, EPA initiated the removal cleanup on residential properties that had lead levels above EPA's cleanup action level. Exide Corporation, the company potentially responsible for the contamination, has been carrying out a separate RI/FS on the Price Battery plant property since September 2008.

Several days were required to fully clean each resident's home and rapid analytical results were required to ensure the success of the cleanup. Residents were temporarily housed in hotels during cleanup work at their homes. Dust and wipes samples were collected during and after each residential cleanup to ensure lead levels were well below the site-specific action level. The Region 3 Laboratory analyzed these sediment, dust and wipe samples at the request of the Region 3 Removal Program. Because residents were being moved to temporary housing during the cleaning process, the lab was asked to submit results within 24 hours of receipt. During FY13, the Region 3 laboratory completed 37 project requests which included 234 dust and wipes, 90 sediment samples, and 55 vacuum dusts. For the vacuum dusts, the empty bags were pre-weighed by the lab prior to vacuuming the homes so that total lead per bag (ug/sample) and the lead per sample (ug/g) could be determined.

Region 3
(Mid-Atlantic)

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



EPA Priority 5 – Protecting America's Waters

Evaluation of Immunoassay Test Kits used to Measure Endocrine Disrupting Compounds (EDCs) in Animal Feedlot Runoff

Immunoassay tests kits provide a relatively fast low-cost means of measuring contaminants in surface waters. The technology involved exploits the unique relationship between an antibody compound and the specific antigen compound to which the antibody will bond. Antibodies have been designed to detect a wide range of antigens or target compounds. Although immunoassays are widely used in clinical settings, their ability to quantify target compounds in highly complex environmental samples has not been evaluated. A Region 3 / ORD collaboration was established to address this issue by evaluating the performance of two commercially-available immunoassay test kits designed to measure estrone, a known EDC, in water. Of particular interest was the capability of each kit to measure estrone in "real-world" complex water samples, such as might be collected downstream of concentrated animal feeding operations (CAFOs). Estrone is the most stable and persistent form of estrogen, a hormone used to promote animal growth in CAFOs.

For the purpose of validating kit performance, Standard Method Performance Requirements were established by a Stakeholders' Committee organized and led by the Association of Official Analytical Chemists (AOAC). This effort was the first attempt to use the capabilities of the AOAC to assist an EPA Region in method validation. Subsequently, the Region 3 Laboratory in collaboration with NRMRL (Cincinnati) conducted three rounds of multi-laboratory testing. In each round, 15 complex aqueous samples (three concentrations of estrone—2 , 5, and 50 ng/L—spiked in triplicate, a matrix duplicate spike in triplicate, and three blanks) were sent to each of six laboratories (including Region 3) each of whom used the two test kits under study to analyze all samples for estrone. A 15-sample set was also analyzed by ORD using LC/MS/MS. All testing was preceded with a practice round that assessed the capability of each laboratory to perform the assays.

The two test kits performed reliably well even at low concentrations. Their performance appeared to be dependent on the skill of the laboratory. Statistical analysis, however, showed that, although the laboratory and the sample matrix had some effect on the results, the performance of the two test kits were statistically the same. Furthermore neither kit produced any false negatives, a key result enhancing their value as screening tools. If used to screen samples, it would be very unlikely that one would miss any samples containing estrone. Overall, the study demonstrated that the test kits could be useful in measuring hormones in stream water, particularly as a rapid screening tool. The design of these kits allows for the analysis of many samples quickly and at low cost compared to LC/MS/MS, the conventional analytical method.

Region 4
(Southeast)

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

EPA Priority 5: Protecting America's Waters

Cumulative Impacts of Mining in Eastern Kentucky (CIMEK)

The CIMEK project is designed to assess the water and habitat quality of targeted streams in the Right Fork Beaver Creek watershed in the Eastern Kentucky area, which may be impacted by surface mining operations. Region 4 scientists, with the support of the Region 4 Laboratory, conducted a number of in situ and laboratory water quality measurements aimed at providing information on the ecosystem. Headwater streams and watersheds in Appalachia are keystone components of the region's ecology. They are sources of clean, abundant water for larger streams and rivers, are active sites of the biogeochemical processes that support both aquatic and terrestrial ecosystems, and are characterized by exceptional levels of plant and animal biodiversity. The benefits of healthy headwaters are cumulative as the critical ecological functions of many small streams flowing into the same river system are necessary for maintaining ecological integrity.

The practice of mountaintop mining and valley fills, which has become increasingly common in Appalachian states, can have major environmental consequences for the mountain ecosystem, the nearby valleys, and the downstream water quality. The effluent waters from valley fills are generally not acidic and can be somewhat alkaline (pH is generally 7.0 or greater). The alkaline pH has been attributed to exposure of the water to carbonate minerals within the valley fill that originate from fragmentation of the non-coal formations that form the overburden or are added during construction of the valley fill. However, there is a growing body of information in the scientific literature indicating that mining may cause deleterious ecological effects. Data indicate that concentrations of chemical ions are, on average, about 10 times higher downstream of mining operations than in streams in unmined watersheds. Sulfate (SO_4^{-2}), bicarbonate (HCO_3^-), calcium (Ca^{+2}), and magnesium (Mg^{+2}) are the dominant ions in the mixture, but potassium (K^+), sodium (Na^+), and chloride (Cl^-) are also elevated. These ions contribute to the elevated levels of total dissolved solids (TDS) typically measured as specific conductivity and observed in the effluent waters below valley fills. Water from sites having high chemical ion concentrations downstream of mining operations is acutely lethal to invertebrates in standard aquatic laboratory tests, and models of ion toxicity based on laboratory results predict that acute toxicity would be expected from the ions alone.

In 2013, the Region 4 Laboratory analyzed over 700 samples collected at 60 sampling locations for the CIMEK project. Lab personnel performed over 4,600 analyses for these samples which included alkalinity, ammonia-nitrogen, total metals, nitrite/nitrate – nitrogen, total phosphorus, sulfates, solids, and total organic nitrogen. In addition, 79 samples were analyzed and reported for ultra trace mercury in the parts per trillion concentration range. The data from this project is being used by Region 4 to document the current water quality conditions and biological structure of the watershed. The data will also be used in the development of a computational model to determine the impact of surface mining on stream health based on land use percentage of mining in the watershed.

Region 4
(Southeast)

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

EPA Priority 4: Cleaning up Our Communities

US Finishing/Cone Mills NPL Superfund Site

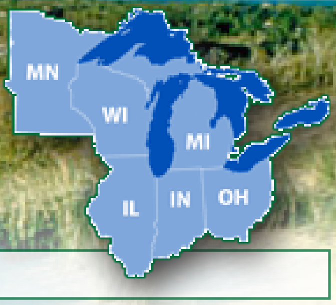
The US Finishing/Cone Mills site, three miles north of downtown Greenville, South Carolina includes an area used for various manufacturing operations from 1903 until 2003. Union Bleachery constructed the original facility in 1903 as a textile bleaching and finishing operation. The facility was sold in 1947, and then became the Cone Mills Operation in 1952. Cone Mills prepared and dyed grey goods and dyed other fabrics, including corduroy, denim and cotton-synthetic blends. American Fast Print purchased the facility in May 1984 and operated the facility under the name US Finishing. The facility shut down in 2003 after a fire.

EPA and the South Carolina Department of Health and Environmental Control have investigated site conditions and taken steps to clean up the site in order to protect people and the environment from contamination. EPA placed the site on the National Priorities List (NPL) in 2011 because of contaminated surface water, ground water and sediment resulting from facility operations. The area of known contamination is about 14 acres. Surroundings include Langston Creek and Highway 253 to the east, a residential neighborhood to the west, Old Buncombe Road to the north and Reedy River to the south. EPA is working with the community and its state partner to develop a long-term cleanup plan for the site, reflecting the Agency's commitment to safe, healthy communities and environmental protection. Community engagement and public outreach are core components of EPA program activities.

The Region 4 Laboratory provided significant support to the site investigation by analyzing over 350 samples and performing almost 1,900 analyses during a 12-month period. Among the analyses performed were total metals, hexavalent chromium, volatile organic compounds, semivolatile organic compounds, pesticides, and PCBs. Contamination in surface water, ground water and sediment was identified that could potentially harm people in the area. Contaminated areas include surface impoundments, surface and below-ground soils, ground water underneath the facility property, and sediments in Langston Creek and the Reedy River. Contamination resulted from facility operations and waste handling practices at the site. Potential contaminants of concern include metals such as chromium.

EPA is currently conducting the site's remedial investigation/feasibility study. After completing the study, EPA will issue a proposed cleanup plan to address any contamination and related risk to people and the environment. After receiving input from SCDHEC and the community, EPA will issue the final cleanup plan (a Record of Decision, or ROD) , and will begin preparations to carry out the approved cleanup activities. EPA selected this site as an Integrated Cleanup Initiative pilot project to demonstrate an innovative combination of management approaches and cleanup techniques. One of the early outcomes of this effort is the development of the US Finishing/Cone Mills Database Viewer, which shares more than 30 years of data and summaries of actions taken. EPA is also using the viewer to share removal action work plans, real-time perimeter air monitoring and progress metrics. In the future, EPA will link webcams thru the data viewer to allow real-time visual access to site activities such as demolition.

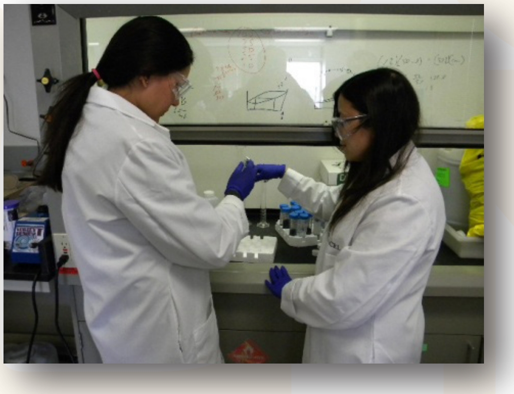
Region 5
(Great Lakes)



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

EPA Priority 5: Protecting America's Waters

Ensuring Continued Readiness to Provide Drinking Water Security



The Chicago Regional Laboratory (CRL) participated in the Headquarters Water Security Division (WSD) "Full Scale Exercise" in December, 2012. The purpose of this exercise was to practice laboratory response in the event of a large hurricane in the Gulf of Mexico. The scenario involved severe damage to drinking water resources as well as food storage and distribution systems throughout the southwest and mid-western parts of the country. The area affected involved 19 states.

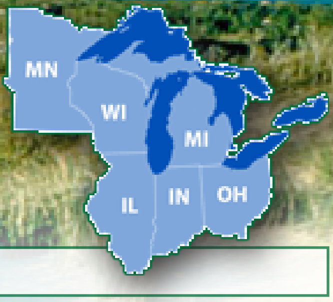
The objective was to coordinate lab efforts through the EPA's Water Lab Alliance to distribute "real" samples and generate useful data for a variety of chemical and biological contaminants in source and finished drinking waters The exercise covered a four day period. EPA partnered with the FDA, CDC, USDA and state laboratories. Overall 51 labs participated in the exercise.

The water contamination portion of the exercise involved a barge containing carbamate pesticides on the Ohio River that broke loose and spilled its contents just upstream of the Evansville, Indiana drinking water intake. Also, some old canisters of the nerve agent, Sarin, were dislodged and ruptured in Arkansas flood waters and posed a threat to neighboring communities. This allowed three methods developed by CRL to be used and evaluated during the exercise. One was for carbamate pesticides and the other two for phosphonic acid degradation compounds of Sarin in water and soil.

Based on the choice of chemical contaminates, CRL was able to incorporate a multi-lab validation study for our carbamate pesticide method. Several of the participating labs volunteered to do the validation procedure as part of the exercise. In collaboration with WSD and its contractor, spiked samples were sent to the labs including CRL to mimic the "spill". The method was performed in each lab as written. The data generated were consistent and the results gave a successful method validation. As a result, the method was adopted by ASTM as a standard D7645 in January, 2014.

Even though methods developed by regions for their particular need may be usable by others, a single lab validated method does not demonstrate the necessary robustness for general use. Therefore, multi-lab validation is important to ensure sound data. CRL explores any opportunity to validate methods through a low cost voluntary action as happened in the full scale exercise. CRL had several methods successfully multi-lab validated through voluntary actions. Five other methods associated with water security concerns were developed by CRL for chemical warfare degradation compounds and other threat agents through our partnership efforts with the National Homeland Security Research Center over the last several years.

Region 5
(Great Lakes)



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

EPA Priority 4: Cleaning Up Our Communities

Compliance Assistance to Region 5's RCRA Program

The Region 5 RCRA Enforcement Program and the Chicago Regional Laboratory (CRL) began an effort to investigate the possibility of treating arsenic contaminated sediments at the TYCO Fire Products facility in Marinette, Wisconsin. The effort became a Regional Administrator's priority to demonstrate cooperation with the facility through compliance assistance. The facility worked with the RCRA Enforcement Officer and CRL during the initial treatment process to determine the amount of Portland cement and ferric sulfate necessary to reduce the arsenic concentration. Arsenic concentrations were determined by the RCRA toxicity characteristic leachate procedure (TCLP). The goal was to use the treatability process to reduce arsenic concentrations below the regulatory threshold of arsenic in the RCRA toxicity characteristic.

CRL and the TYCO contract laboratory worked closely to ensure each step of the TCLP was completed as specified in the SW846 1311 test procedure. CRL discovered that the initial fluid determination steps to decide which TCLP extraction fluid should be used were being interpreted differently by each lab. The fluid determination procedure was broken down into more detailed steps, and the impact of each on the final TCLP results was examined. It was agreed that in order to proceed, each lab would have to follow the same steps in completing the fluid determinations exactly, since the final TCLP results were dependent upon it.

Both laboratories agreed to the procedural details along with the facility and the RCRA Enforcement Officer. Bench sheets documenting the additional details for the TCLP fluid determination procedure were shared and evaluated before any further testing was attempted. These new bench sheets for the fluid determination included additional key factors such as timing between treatment and testing, and temperature variability during the fluid test.

This effort took several weeks and was followed by each lab analyzing several dozen split samples of treated sediments applied with differing proportions of the cement-ferric sulfate mixture. The results showed greatly improved agreement between the labs. This collaboration gave confidence to the RCRA Enforcement Program that the treatability process would work and meet federal regulations.

Region 6
(South Central)

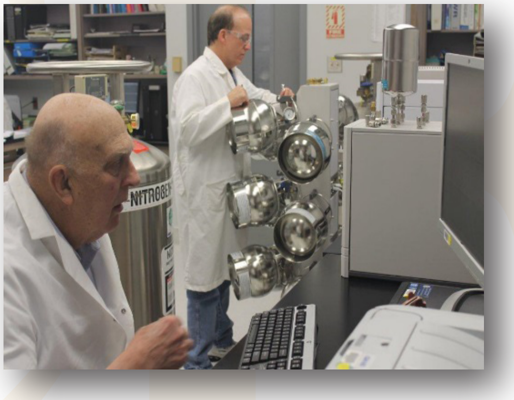
Serving Arkansas, Louisiana, New Mexico, Oklahoma, Texas and 66 Tribal Nations

EPA Priority 2: Improving Air Quality

Using Innovative Technologies to Advance Regional Capabilities in the Identification and Screening of Potential Vapor Intrusion Sites

Vapor intrusion is a general term given to the migration of volatile chemicals from subsurface contaminated soils and groundwater into the indoor air spaces of overlying buildings through openings in the building foundation (for example, cracks and utility openings). Vapor intrusion investigations traditionally rely on conventional sampling of soil, ground water, sub-slab and indoor air sites using analysis techniques which can be time consuming and expensive.

The Region 6 Vapor Intrusion Assessment Team comprised of Region 6 Laboratory, Superfund, and RCRA personnel, developed a new Regional vapor intrusion investigative approach based on the field capabilities of an instrument which can help to identify and measure very low concentrations of volatile organic compounds. This new investigative approach dramatically increased the ability to obtain field-screening (same day) quantitative data that can be used to make real-time dynamic sampling decisions such as where to collect additional samples and which samples to send to the laboratory.



To assist in establishing this new investigative approach, the Region 6 Laboratory used its experience in mobile lab field operations and GC/MS air analysis to train Superfund site managers, contractors, and others in the use of the HAPSITE ER (Hazardous Air Pollution on Site) portable GC/MS. The Region 6 Laboratory developed a standard operating procedure for the use of the HAPSITE ER and performed comparison quality assurance analysis of the instrument's results with that of conventional air analysis methods.

Field screening was further enhanced by using the Region 6 Laboratory to support very low quantitation levels of the target compounds after the field samples were collected in vacuum canisters. The canisters were analyzed by GC/MS using an analysis technique known as Synchronous Selected Ion Monitoring (SIM) for lower detection levels combined with full scan mass spectral data for library searching (also called SIM-SCAN) thereby collecting both SIM data and full-scan data in a single run. Sites studied in Region 6 by this new approach included Bandera Road, R&H Oil and Jones Road which were undergoing different phases of investigation, such as initial site assessment, hazard characterization or extensive remedial studies. Field sampling and screening using the HAPSITE ER made confirmatory analysis by the Region 6 Laboratory more efficient. The ability to obtain real-time vapor intrusion data combined with confirmatory laboratory analysis at the low part per billion detection level has enabled the Region to identify and take positive actions to address human health risks.

Region 6
(South Central)

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

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

Development of a Tandem Mass Spectrometry Method

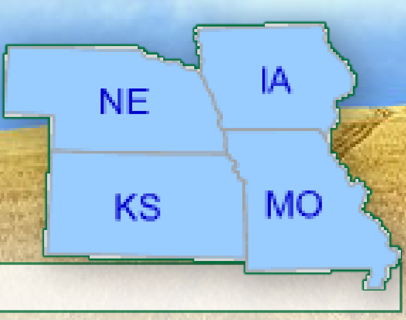
MacMillan Ring-Free Oil Company is a 100 acre site located in Union County Arkansas that was recently proposed for inclusion on the Superfund National Priorities List. The site has been subjected to numerous actions including an emergency removal to dispose of more than 300,000 pounds of hazardous waste, and is in critical need for remediation as it is bordered by residences, schools, parks, and creeks. The site is visibly contaminated with oil and asphalt products and has no drainage containment to prevent their migration off-site.

The Region 6 Laboratory received 58 samples from the site. All samples received were highly contaminated with oil which made preparation and analysis very labor intensive. The oil also masked the presence of target compounds using routine EPA Methods 8270 and 8081/8082, which initially yielded non-detects with high reporting limits. It was suspected that many PAHs were present in the samples but masked by the oil. After discussion with the customer, the decision was made to develop a method for analyzing PAHs using gas chromatography/tandem mass spectrometry (GC/MS/MS) to better meet the needs of the project. The analytical results were needed in a very rapid time-frame in order to get the site ranked.

The development of a tandem mass spectrometry method required a multi-step process to determine potential transitions and optimize collision energies but also to test the selectivity of the transitions in the oily matrix. Unresolved hydrocarbons that chromatograph as "humps" tend to contain practically every mass, making the selection of unique transitions critical to identifying the target analytes. All samples were re-prepared and re-analyzed by this new method. Where more unique transitions could not be found or where the matrix resulted in significant retention time shifting, the laboratory performed multiple analyses at various dilutions and employed post preparation spikes to ensure that target analytes were properly identified.

With all of the difficulties encountered, the Region 6 Laboratory was able to provide analytical results for PAHs at the part per trillion levels in very complex samples in a rapid timeframe using tandem mass spectrometry. Over 400 analyses were performed during the combined method development and sample analysis for the project. In addition to the PAH analyses, pesticide, aroclor, volatile and metals analyses were also provided for the 58 samples. All of the PAH and metals analytical data were used to get the site ranked under the Hazardous Ranking System, confirming the highest possible scores for observed releases. As a result, the site was proposed for NPL in the Federal Register in December 2013.

Region 7
(Midwest)



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

EPA Priority 2: Improving Air Quality
EPA Priority 4: Cleaning up our Communities

Innovative Field Support for Vapor Intrusion Projects

Indoor vapor intrusion is caused by the migration of hazardous volatile organic compounds through the soil above subsurface plumes. Region 7 has a large number of historical Superfund sites consisting predominantly of dry cleaner/industrial degreaser sites and leaking underground petroleum storage tanks. Many of these historical sites are located in small rural communities and are typically surrounded by residential areas and historical business districts. Additionally, much of the geology in Region 7 consists of sandy/loamy soils which are highly permeable and conducive to transmission of subsurface vapor.

As part of Superfund's five year review process, remedial project managers, regional risk assessors, and managers concluded that it is appropriate and necessary to characterize the potential for intrusion of subsurface plume vapors into the indoor living and working spaces of homes and businesses. As a result, the Region 7 Laboratory developed unique and specialized capability to support collection and analysis of samples in the vapor space directly below residential and industrial structural slabs.

Depending upon the structure being sampled, building basement slabs can vary in thickness from less than two to over ten inches. Regional lab scientists developed, designed, and manufactured specialized stainless steel vapor intrusion probes of varying lengths to allow collection of subsurface vapor samples over extended periods of time. Additionally, Regional scientists developed a unique process for slab drilling, probe installation, grouting and sealing that assures a gas-tight installation for long-term sampling that is also aesthetically pleasing and unobtrusive in the occupied areas of residential dwellings and industrial facilities. In 2013 alone, Region 7 scientists installed over 160 sub-slab sampling ports in 40 different residences and businesses.

Figure 1: Vapor Probe Installation

Figure 2: Vapor Sampling

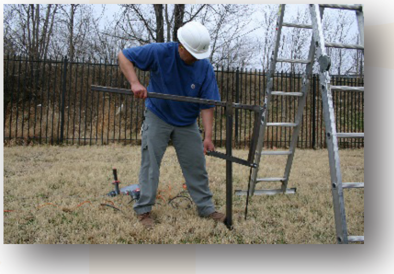
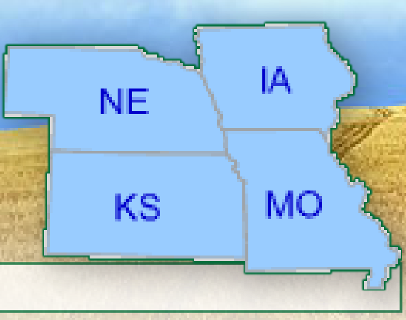


Figure 3: Probe Removal

In addition to sub-slab sampling for vapors, it is often desirable to collect subsurface vapor samples using either truck or track-mounted Geoprobe systems that hydraulically drive hollow probes to depth to facilitate sample collection. This type of sampling in residential areas can be particularly difficult due to limitations in available space between buildings and the potential for damage to homeowner property. To overcome this issue, Regional lab scientists engineered and manufactured a unique method which allows hollow vapor sampling probes to be driven to depth using an industrial hammer drill. Once sampling is completed, the sampling probe must be removed. Again, our scientists engineered and manufactured a unique probe pulling tool that completely removes the installed probe once sampling is completed. In total, over 500 sub-slab air samples were collected and analyzed by the Region 7 Laboratory in 2013.

Region 7
(Midwest)



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

EPA Priority 4: Cleaning up our Communities

Real-Time Site Characterization Speeds Time Critical Removals

Superfund time critical removals require rapid deployment of multiple resources to characterize and assess the extent of pollutant plumes and the potential for public health impact. In order to promote cost effective approaches to real-time site characterization, Region 7 Laboratory scientists partnered with Superfund Project Managers to develop and deploy a suite of advanced field technologies to characterize chemical plumes in-situ and to analyze samples on-site.

For rapid characterization of subsurface plumes, regional laboratory scientists operate and maintain a Geoprobe Membrane Interface Probe (MIP) system. The MIP consists of a specialized set of sensors that are incorporated into a Geoprobe sampling system. The MIP detects and maps soil conductivity, aromatics (BTEX) by PID, hydrocarbons by FID, and halogenated species by an XSD detector. The MIP allows laboratory staff to determine in real time not only the depth to various contaminant zones, but also the general type of contaminant that is present. MIP profiles are also very useful for determining the subsurface geology and depth to the water table at Superfund removal sites.

Data from the MIP is used to characterize the plume extent and concentration gradient of subsurface pollutants in near real time while working on-site. Additionally the data from the MIP also guides subsequent sampling events that would be supported through our Regional mobile analytical laboratory capacity.

Figure 1: Membrane Interface Probe

Figure 2: Trailer Mounted GC/MS System

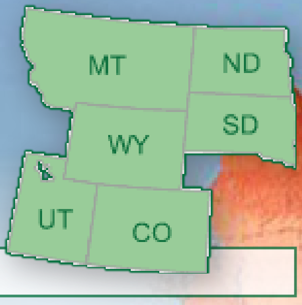
Figure 3: Loading the GC/MS into the mobile lab

Regional laboratory scientists have designed, engineered, and deployed a trailer mounted mobile laboratory platform that allows for rapid on-site analysis of samples for volatile organic compounds at Superfund sites by GC/MS. This application is particularly novel because our scientists have modified the original purge and trap sample introduction system to make it compatible with not only water samples, but also capable to analyze contaminated air and soil.

Additionally, laboratory scientists have resolved the issue of instrument installation and removal by placing the entire GC/MS system on a portable wheel mounted platform that facilitates the process of instrument removal and installation and allows the GC/MS system to be operated under laboratory conditions when not mounted in the mobile lab trailer.

In 2013 alone, the Geoprobe Membrane Interface Probe system was deployed to characterize five different sites with 76 different borings resulting in 860 different data points. In concert with the MIP work, over 750 total field samples were analyzed for air, water or soil contaminants in our mobile laboratory offering substantial savings in both analytical cost and time to our Superfund partners.

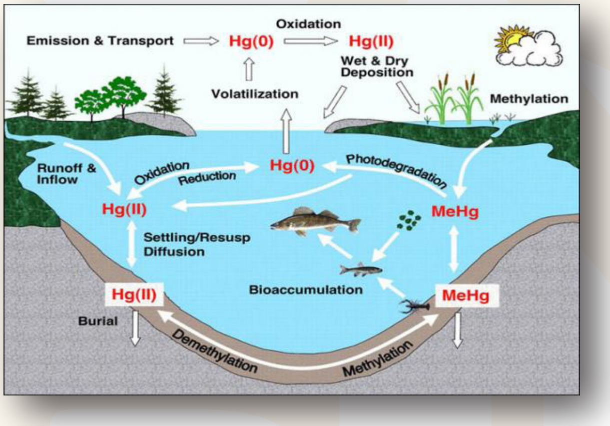
Region 8
(Mountains and Plains)



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

EPA Priority

The U.S. Environmental Protection Agency (USEPA) Region 8 Laboratory Mercury in Fish Tissue Project



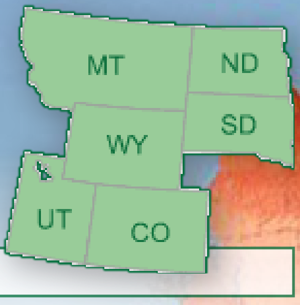
Millions of pounds of sport fish are caught and consumed in Region 8 each year. Results obtained by the scientists in Region 8 demonstrate that mercury is being detected in surface and ground waters within the Region. There is increasing concern that the potential exists for low-level, chronic exposure to mercury may have adverse ecological or human health affects if these fish, birds, or macroinvertebrates are consumed. Bioconcentration is the concentration of mercury via the consumption of a food source containing mercury and the inability of the consumer to eliminate the accumulated substance. The result is the concentration of mercury in the tissue of higher members of the food chain.

The occurrence, fate, and transport of mercury are an important water quality concern, both nationally and regionally. This concern has gained wide public interest particularly with sport fishermen. The work conducted by Region 8 scientists is providing useful information to address these concerns and fill information gaps which can be used for the implementation of the SDWA and CWA, as appropriate. The Region 8 data are shared with the State Agencies and used to make policy decisions about the placement of warning advisories around lakes and streams.

The Pesticide Program within the Office of Partnerships & Regulatory Assistance (OPRA), the Water Quality Unit within the Office of Ecosystems, Protection and Remediation, and the Laboratory Services Program within the Office of Technical and Management Services collaborated to develop this program. Data has been collected from over 2500 fish, bird livers, bird eggs, brine shrimp and macroinvertebrates in all 6 states in the Region, for 12 individual tribes, and in collaboration with two other federal agencies (DOI and USDA). Surprisingly, every fish sample tested to date has had measureable concentrations of mercury present.

Data generated from this collaborative approach were used in the Region by states and tribes, but was also shared with other USEPA divisions and offices, and other federal agencies to assess risk to human health. This coordination expands the utility of the data to improve our scientific understanding of the effects from mercury occurrence, for use in regulatory decisions such as implementation of the Clean Water Act and Safe Drinking Water Act, for regional and national water quality initiatives, and to serve as a national program model. This teamwork-based effort is improving the water quality as well as fostering partnerships within the agency, states, tribes, and other federal partners.

Region 8
(Mountains and Plains)



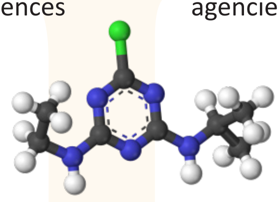
Serving Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations

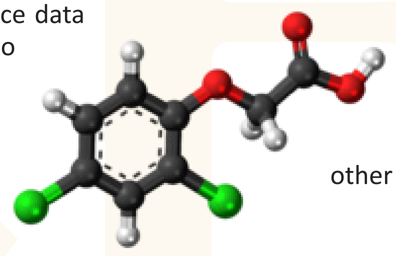
EPA Priority 5: Protecting America's Waters
EPA Priority 6: Building Strong State and Tribal Partnerships

Pesticides in Surface Water

Millions of pounds of pesticides (herbicides, insecticides, arachnicides, etc.) are used yearly in Region 8. Results obtained by the scientists in Region 8 demonstrate that pesticides and pesticide degradates, and other compounds of emerging concern are being detected in surface and ground waters within the Region. There is increasing concern that low-level, chronic exposure to mixtures of these chemicals may have adverse ecological or human health effects. For example, new information has shown that many of these chemicals may pose a threat to aquatic life, such as deformation of frog species exposed to pesticides and pesticide degradates in streams and lakes.

The occurrence, fate, and transport of pesticides and pesticide degradates are an important water quality concern, both nationally and regionally. The work conducted by Region 8 scientists is providing useful information to address those concerns and fill information gaps, which can be used for the implementation of the SDWA and Clean Water Act, as appropriate. The Region 8 data were shared with the National Academy of Sciences (NAS) in a review of the science being performed by USEPA. The feedback was overwhelmingly positive, and Region 8 was commended for this innovative work by the NAS committee. Furthermore, a Government Accountability Office report (GAO-11-346 August 8, 2011) recommended that EPA collect the pesticide and pesticide degradates environmental occurrence data to address these issues and their relationship to other contaminants in the nation's waterways. The work conducted by Region 8 directly addresses the recommendations outlined in the GAO report by collecting occurrence data and examining the co-occurrence of pesticides and pesticide degradates and other contaminants.





The Pesticide Program within the Office of Partnerships & Regulatory Assistance, the Water Quality Unit within the Office of Ecosystems, Protection and Remediation, and the Laboratory Services Program within the Office of Technical and Management Services collaborated to develop a list of over 75 compounds for monitoring. Data has been collected in all 6 states in the Region for 12 individual tribes, three municipalities, two universities, and two other federal agencies (DOI and USDA). The analytical method serves as a foundation for gathering the data needed to start evaluating what chemicals are present, what concentration they are at if present, downstream affects, what the human, ecological, and economic effects are, if any, and what synergistic affects are present. Example compounds include common pesticides such as 2,4-D, atrazine, and atrazine degradates.

Data generated from this collaborative approach were used in the Region by states and tribes, but were also shared with other USEPA divisions and offices, and other federal agencies to assess risk to human health. This coordination expands the utility of the data to improve our scientific understanding of fate and effects from emerging contaminants, for use in regulatory decisions such as re-registration of pesticides and implementation of the Clean Water Act and SDWA, for regional and national water quality initiatives, and to serve as a national program model suggested by NAS. This teamwork-based effort is enhancing and maintaining improvements in water quality as well as fostering partnerships within the agency, between the agency and states, tribes, and other federal partners.

Region 9
(Pacific Southwest)

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

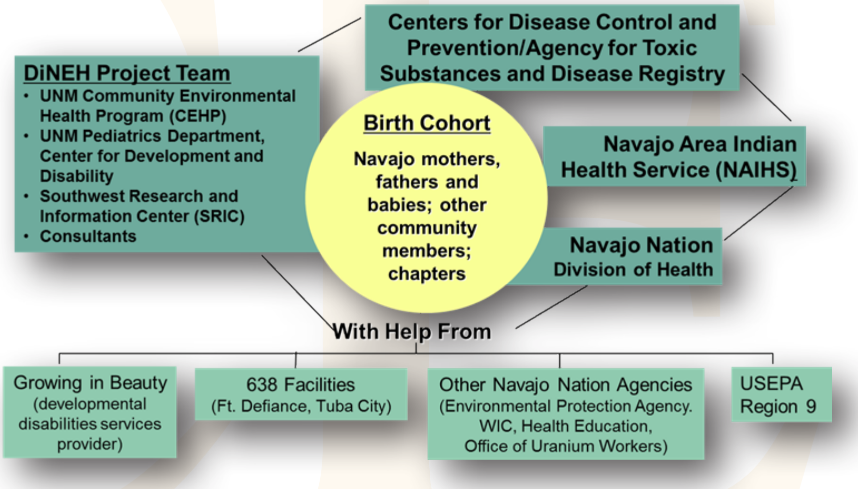
EPA Priority 4: Cleaning Up Our Communities
EPA Priority 6: Building Strong State and Tribal Partnerships

Navajo Birth Cohort Study

The Navajo Nation was heavily mined for uranium from 1942 through the late 1960s leaving behind over 1000 mine waste sites associated with over 500 mines. In 2007, Congressional Hearings were held on the impact of uranium mining on the Navajo Nation. As a result of those hearings, the U.S. House Committee on Oversight and Government Reform appropriated funds for a number of activities in the Navajo Nation, including health studies on uranium-impacted communities.

The resulting Navajo Birth Cohort Study is a multi-year, multi-agency prospective public health study to determine if exposures to uranium and other heavy metals affect pregnancies and child development in the Navajo Nation. The study involves 1,000 to 1,500 pregnant women living in the Navajo Nation who are monitored during their pregnancy and their infants who are followed through their first year. Environmental monitoring, biological sample analysis, surveys, and developmental screenings will be performed for each participant.

Dust wipe sampling was performed in homes and workshops on the Navajo Reservation as part of efforts to assess exposure to various metals in the home environments of research participants. After developing sample digestion protocols for these wipe samples, the Region 9 Laboratory analyzed over 50 wipe samples for a wide variety of metals and uranium. Analytical support for dust wipe samples will continue throughout the multi-year study. Ultimately, the results of this study will be used to improve future birth outcomes and services, and to inform policy on clean-up of environmental hazards.



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

Treatability Studies at the Blue Ledge Mine Superfund Site

The Blue Ledge Mine Superfund site is located within the Rogue River – Siskiyou National Forest in Northern California. Historical mining operations have resulted in generation of mine influenced water containing high acidity and toxic concentrations of copper, zinc, and other metals. A removal action was completed by the United States Forest Service (USFS) and EPA in 2010 and 2011. The removal action addressed surface source materials at the site by removal of waste rock piles and consolidation at a near-site repository. Although the majority of waste rock was removed, acid mine drainage discharges continue from a combination of on-site adits, groundwater seeps, and runoff from reclaimed waste rock piles. These discharges continue to impact aquatic life in nearby Joe Creek.

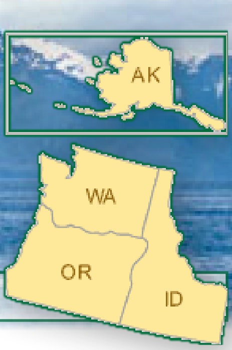
The Blue Ledge Mine pilot-scale treatability studies provide a cost-effective means of evaluating potential options for field treatment of acid mine drainage (AMD). The overall purpose of the treatability studies was to determine if a particular method and/or amendment provides more desirable results with regard to reduction of metals concentrations, neutralization of AMD, and practical considerations for full-scale field implementation. Both in-situ and ex-situ treatment methods involve a biologically-mediated process in which a carbon source (substrate) is provided as an electron donor for sulfate-reducing bacteria (SRB) to reduce sulfate present in the mine influenced water to various aqueous sulfide species.

The Region 9 Laboratory provided over 350 analyses of samples associated with various treatment options at the site. Analyses included sulfide, alkalinity, anions, Biological Oxygen Demand (BOD,) metals, metals with Toxicity Characteristic Leaching Procedure (TCLP,) metals with Synthetic Precipitation Leaching Procedure (SPLP,) mercury, ammonia, nitrate, nitrite, total phosphorus and percent solids. The data provided by the laboratory is being used to evaluate the effectiveness of various treatment options.

Region 10

(Pacific Northwest)

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

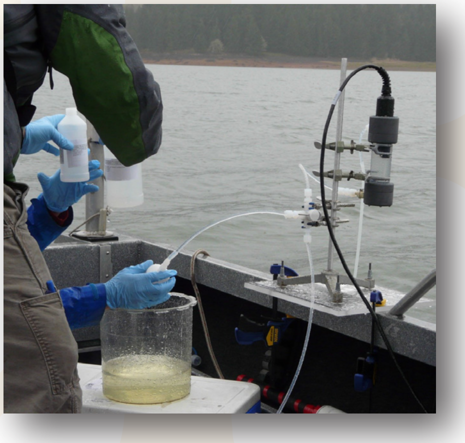


EPA Priority 4: Cleaning Up Our Communities
EPA Priority 5: Protecting America's Waters

Black Butte Mine Study of Methylmercury Formation

The Black Butte Mine Superfund Site is located near Cottage Grove, Oregon in Lane County. The mine operated between the 1890s and late 1960s and was one of the largest mercury mines in Oregon. It was added to EPA's National Priorities List in 2010. Mercury and other contaminations from tailing piles at the abandoned mine site affect creeks that flow into Cottage Grove Reservoir and the Coast Fork of the Willamette River.

The Cottage Grove Reservoir (constructed in 1942) is located approximately 10 miles downstream from the Black Butte Mine site. This reservoir is operated for flood-control, and water levels are dramatically decreased between the spring and fall, when 75% of the reservoir area sediments are exposed to the air. Fish in the reservoir have elevated mercury concentrations relative to other reservoirs in the area where mining in the watersheds did not occur. In 1979, Cottage Grove Reservoir was the first water body in Oregon to have a fish advisory issued because of mercury contamination found in the fish. From other studies, it was determined that the vast majority of mercury that accumulates in fish is an organic form of mercury, termed methylmercury. Methylmercury is the form of mercury most readily incorporated into biological tissues and is also the most toxic to humans. Most of the mercury transported over time from the Black Butte Mine to the reservoir is believed to be inorganic mercury. Moreover, it is not clear what processes control the rate of conversion of inorganic mercury in sediments to methylmercury in water within the lake. Addressing this question is the objective of this study, which is being conducted in collaboration with the EPA Office of Research and Development. This study investigated the impact of the changing water levels on the activity of sulfate reducing bacteria and methylmercury production in the reservoir. Sediment, porewater and water-column samples were collected from several locations in the reservoir during both low-pool and high-pool conditions to identify changes in total and methylmercury concentrations as well as changes in sulfur speciation and organic carbon.



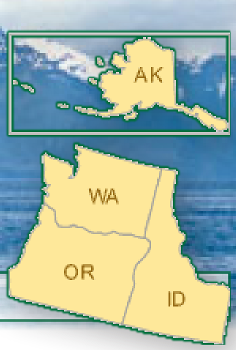
The Region 10 Laboratory supported this study during FY2013 with over 1,300 analyses for various parameters that included methylmercury, mercury and other metals, and general chemical parameters (sulfate, alkalinity, nitrate/nitrite, dissolved/suspended solids and organic carbon). Methylmercury analyses were performed using EPA Method 1630, which is a new Laboratory capability that was first developed in 2011 to address increasing regional needs. Continued collection of these data will allow for an assessment of the net mass of methylmercury generated in the reservoir during different seasonal conditions and water-level changes.

So far, methylation activity was found to be higher in sediments subjected to wet/dry conditions from water level fluctuations. Future activities will aim at further understanding bioavailable fractions of inorganic mercury and other variables affecting methylmercury production that will further assist in human and ecological risk assessment.

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

Support to the Kasaan Tribe during the Salt Chuck Mine Remedial Investigation

The Salt Chuck Mine is an inactive former gold, silver, and copper mine located on Prince of Wales Island in the Tongass National Forest at the northern end of Kasaan Bay, Alaska. The mine and mill operated from 1905 to 1941, processing more than 326,000 tons of ore. The mine entrance is about a half mile uphill from the mill area, which is on the northern shore of Salt Chuck Bay. Earlier site investigations determined that mine tailings had contaminated intertidal areas of Kasaan and Salt Chuck Bay, and that shellfish may be at levels posing a threat to human health and the environment. This area is host to the Kasaan Tribe, which uses Salt Chuck Bay as a commercial and subsistence shell fishery.

The extent to which releases of contaminants from tailings present within the intertidal areas of Salt Chuck Bay had not been adequately defined. The Organized Village of Kasaan (the federally recognized Tribal government) expressed concern regarding the contamination within the intertidal lands, particularly as it relates to subsistence consumption practices. Potential impacts on the beneficial use of crab and shrimp harvesting are of particular concern, both from past releases and from potential releases from any proposed remedial actions.

EPA initiated a remedial investigation of this site in 2011 to characterize potential risks to human health and the environment and to support a remedial decision. During the first year, the Region 10 Laboratory analyzed marine tissue samples from this site for metals and organic pollutants. In FY13, the Region 10 Laboratory performed over 1,350 analyses for metals, polyaromatic hydrocarbons (PAH), and a number of general chemical parameters (anions, hardness, Cr+6, %lipids, %solids, moisture and TOC) in vegetation, bivalve (clam) and crab tissue samples. Except for crab, the tissue samples were received in whole form as collected in the field; therefore, homogenization techniques needed to be developed prior to analyses. The vegetation matter consisted of berries and sea asparagus, which were especially difficult due to their fibrous nature. A freeze drying/grinding procedure that had been developed at the Region 10 Lab earlier was applied to the tissues prior to metals and/or PAH analysis. The tissues for PAH analysis required the additional development of Quechers extraction method to minimize the coextraction of background contaminants and GC/MS/SIM to achieve required selectivity and sensitivity. The Synthetic Precipitation Leaching Procedure (SPLP, EPA Method 1312) was employed for metals in the soil/sediment/tailings samples. To further address human health risks, tissue samples were also analyzed for arsenic species using a method developed at the Region 10 Lab that separates the arsenic species by liquid chromatography followed by ICP/MS analysis of the eluate.

A comprehensive Remedial Investigation Report is expected to be completed in 2014. At that time, the EPA will also complete their site Risk Assessment process for human and ecological receptors.

SCIENCE

3.0 Regional Laboratory Support Services

LABORATORY SUPPORT SERVICES

In this section we summarize a number of the common support services that are provided by our RLN labs. As mentioned earlier, this is not a comprehensive list, but rather a list that is common to the RLN member labs.

Because of the unique nature of the support provided by our regional 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 must also have a tight focus on quality control and the ability to operate under demanding delivery schedules. In practice, our staff are key in the ability of our regional labs to support the wide diversity of challenging requests. During fiscal year 2013, the RLN supported over 159,000 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, our Superfund Program continued to be our largest volume requestor of analytical services (62.2%) followed by our Office of Water (23.8%). Support to the Emergency Response Program (4.7%) continued to be significant, with the RLN labs analyzing 7,449 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 (8,877 samples) almost doubled from the prior year as the regions increased their use of real-time results, which aid in timely and cost-effective decision making in the field. Our RLN labs augmented the NEIC's capacity by analyzing 970 criminal samples. All 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. In **Figure 3.2**, we summarize the number of analytical projects supported by the RLN labs by EPA Program element. In aggregate, the RLN labs supported 1,249 projects during 2013. 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.

Figure 3.1: Sample Analyses by EPA Program in FY13 (159,930 total)

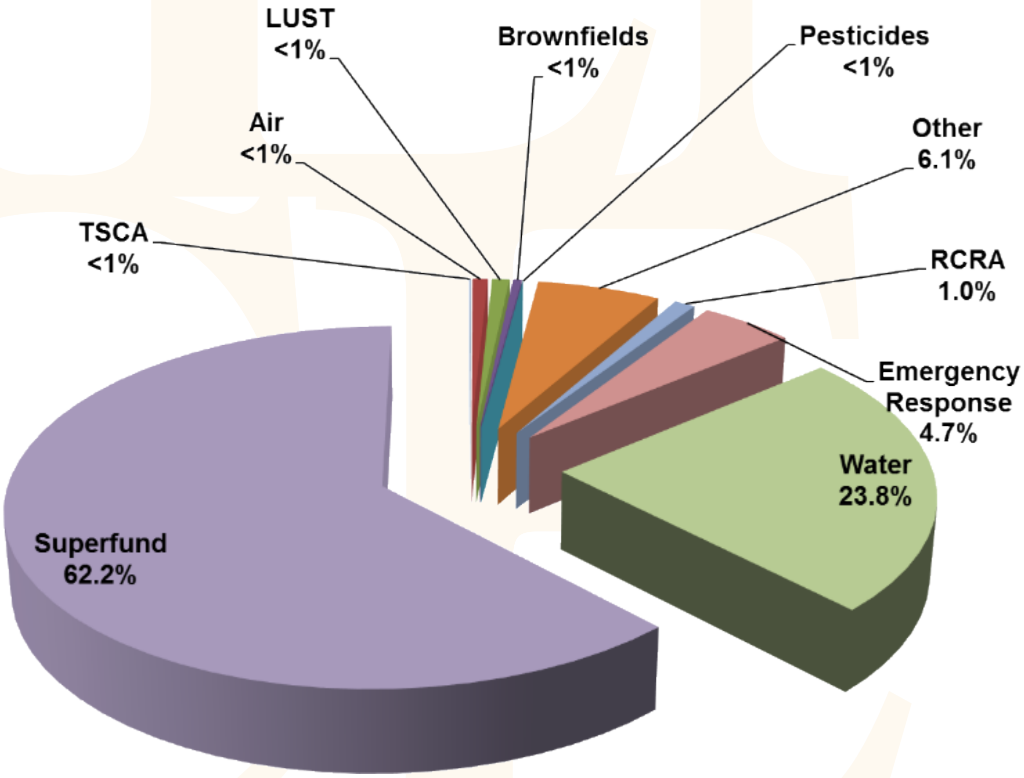
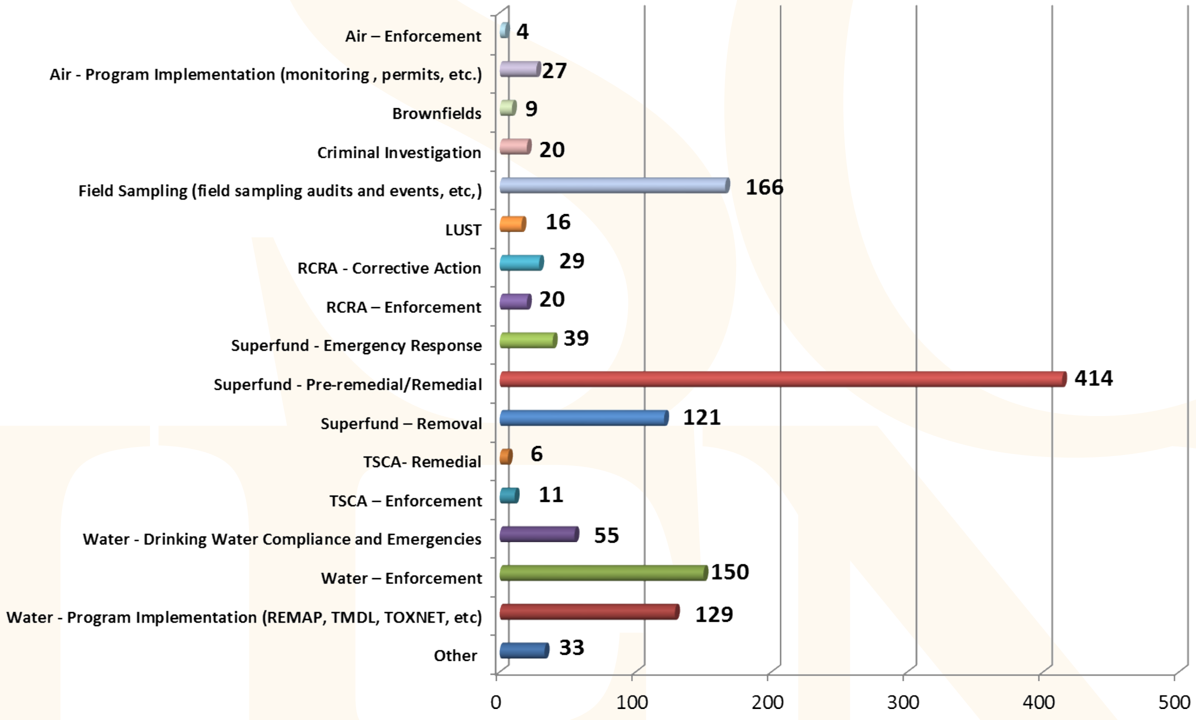


Figure 3.2 Projects/Sites Supported by Regional Laboratory Data FY 2013 by Program Element (1,249 total)

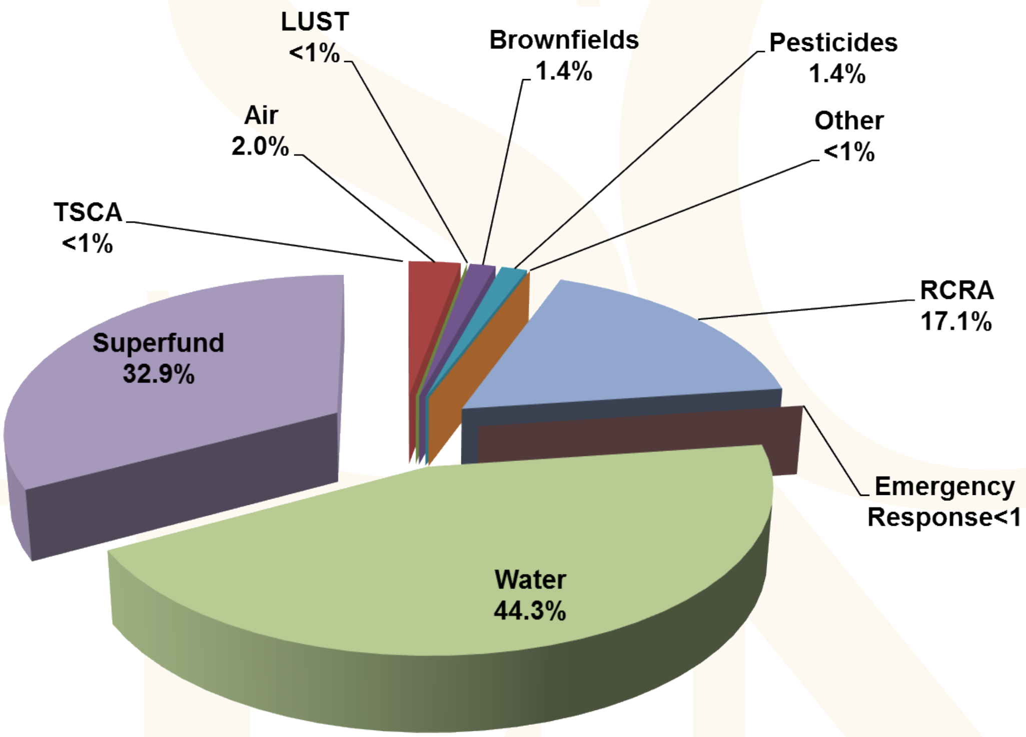


The sample analyses reported above were supported using a wide range of analytical methods. Some of these, which are common to a number of regional labs, are listed in **Appendix A** as Core Methods. A significant amount of our work supported during the year required methods that have been developed 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 of this are the bioassessibility for arsenic and lead in soils, pharmaceuticals and personal care products in water by LC/MS/MS, the methods developed to monitor potential ground water contamination associated with new oil and gas extraction techniques, and the new method for methyl mercury.

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 44 active method development projects (see **Appendix C**), including methods that were completed during the year. 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, this often entails the requirement of lower detection limits and/or a developing a method for 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 sample set seems to bring 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 2013. 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 Applied Research Effort Program (RARE) and/or the Regional Research Partnership Program continues to be a valuable resource for the regions. ORD and their scientists played some role in 9 of the 44 method development projects supported 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

Figure 3.3: Method Development Project Support to EPA Programs in FY13 (44 methods)



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.

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 current national guidance. Audit findings contained in the lab and program audits, and the state's 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 44 audits of state drinking water labs and programs.

Work done at EPA and contract labs require the development of quality assurance project plans (QAPPs). While these documents are often prepared in the regional offices by quality staff, RLN staff participated in or prepared 679 QAPPs during the period. Upon occasion, RLN labs are asked to validate analytical work not supported in their labs. During the year, the regions supported the validation of 9,193 samples.

Table 3.1. Support during FY2013 in oversight-related areas.

Activity	Supported During 2012
Drinking Water Lab Audits	30
Drinking Water Program Audits	14
QAPP Reviews	679
Samples Validated	9,193
Expert Witness Testimony	4
PM Filter Weighings	7,576
PM 2.5 Audits	483
PM Through-the-probe Audits	285
PM Filter Weighings for Lead	476
Other PM-related Audits	20

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 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. The PM filter weighing lab is located at the Region 4 Laboratory in Athens, Georgia. In FY 2013, the laboratory processed and weighed over 7,570 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 2013, the regional laboratories supported the completion of 483 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 2013 performed analysis of 476 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 2013, the regional laboratories supported the completion of 285 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.

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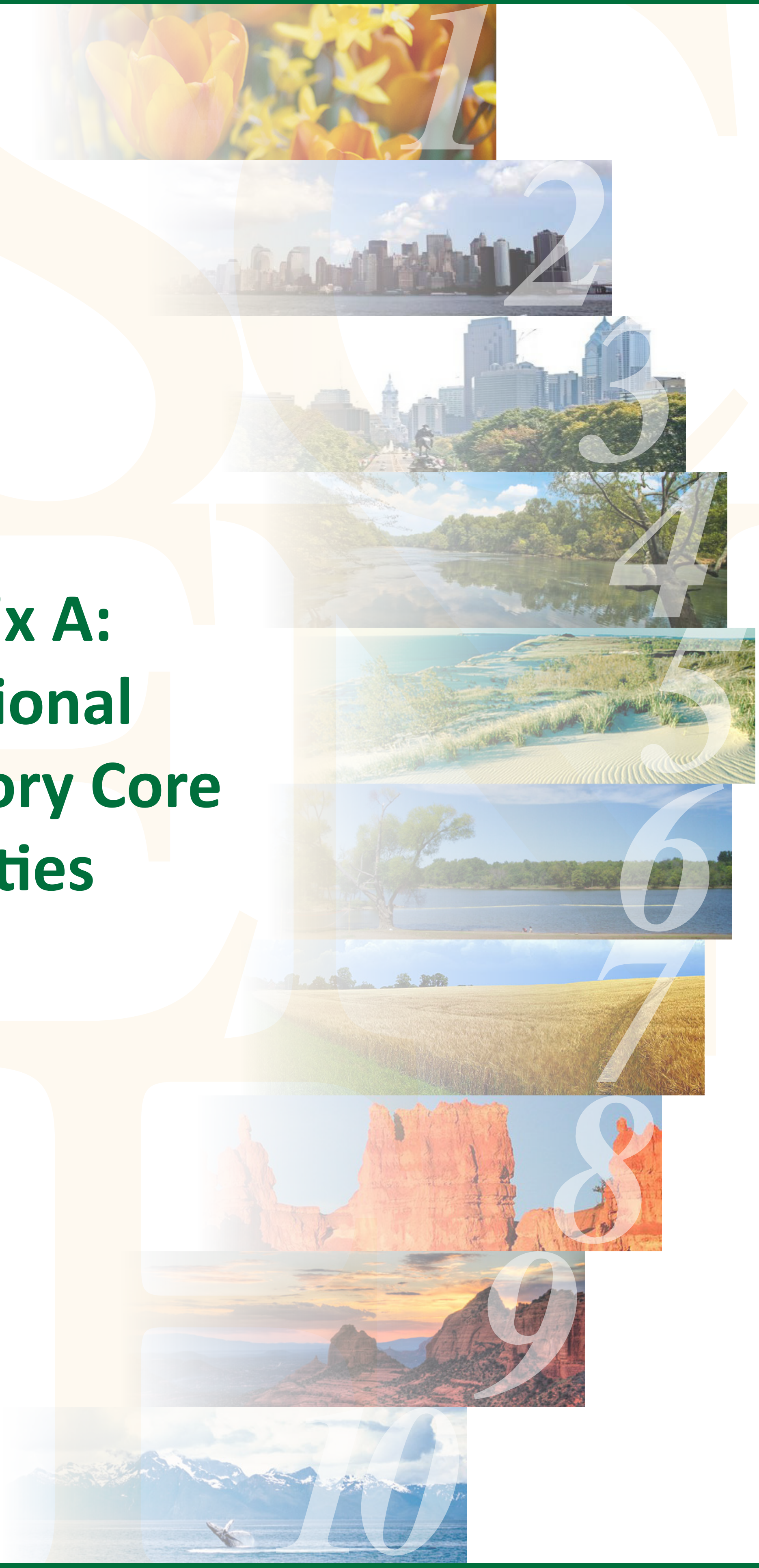


Appendix A: EPA Regional Laboratory Core Capabilities

EPA REGIONAL LABORATORIES CORE CAPABILITIES SUMMARY

Analyte / Group Name	Sample Media	Analytical Technique	Regional Capability									
INORGANIC CHEMISTRY:			**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Acidity	Water	Titrametric		X	X	X	X		X	X		
Alkalinity	Water	Titrametric	X	X	X	X	X	X	X	X	X	X
Asbestos	Solids/Bulk material	PLM	X						X	X		X
	Soil/Sediment	PLM	X						X	X		X
Anions	Water	IC	X	X	X	X	X	X	X	X	X	X
	Water	Titrametric		X	X							
Chromium, Hexavalent (Cr+6)	Water	Colorimetric		X		X		X	X			X
	Soil/Sediment	Colorimetric		X		X						X
	Water	IC			X	X	X	X	X		X	
	Soil/Sediment	IC			X		X					
Cyanide, Amenable	Water	Colorimetric	X	X		X	X	X	X	X	X	X
	Soil/Sediment	Colorimetric	X	X		X		X	X	X		X
Cyanide, Total	Water	Colorimetric	X	X	X	X	X	X	X	X	X	X
	Soil/Sediment	Colorimetric	X	X	X	X	X	X	X	X		X
	Waste	Colorimetric	X	X	X	X	X	X		X		X
Fluoride	Water	ISE	X	X		X	X		X			
	Water	IC	X	X	X	X	X	X	X	X	X	X
Hardness	Water	Colorimetric										
	Water	Titrametric		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	X			X		X		X	
	Tissue (fish &/or plant)	CVAA	X	X	X	X		X		X	X	X
	Tissue (fish &/or plant)	Direct Hg Analysis	X	X				X	X		X	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 LABORATORIES CORE CAPABILITIES SUMMARY

Analyte / Group Name	Sample Media	Analytical Technique	Regional Capability									
INORGANIC CHEMISTRY:			1	2	3	4	5	6	7	8	9	10
Metals (TCLP)	Soil/Waste (oil, drum, etc..)	ICP /AES		X	X	X	X	X	X	X	X	X
Metals, Total	Water	GFAA	X				X					
	Soil/Sediment	GFAA	X				X					
	Tissue (Fish &/or plant)	GFAA	X									
	Waste (oil, drum, etc..)	GFAA	X				X					
Metals (TCLP)	Soil/Waste (oil, drum, etc..)	GFAA					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					
	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			
Perchlorate	Water	IC					X		X		X	
	Soil	IC							X		X	
	Water	IC with LC/MS confirmation			X		X		X			X
	Water, Soil/ Sediment	LC/MS			X							X
	Water	LC/MS/MS	X					X		X	X	
Phosphorus, Ortho	Water	Colorimetric	X	X		X		X	X	X		X
	Water	IC	X	X	X	X	X		X	X	X	X
Phosphorus, Total	Water	Colorimetric	X	X	X	X	X	X	X	X	X	X
	Soil	Colorimetric	X		X	X	X					X
Sulfate	Water	IC	X	X	X	X	X	X	X	X	X	X
	Soil	IC	X		X	X	X		X	X	X	
	Water	Turbidimetric	X	X					X			
	Soil	Turbidimetric	X									
Sulfide	Water	Colorimetric		X			X		X			

EPA REGIONAL LABORATORIES CORE CAPABILITIES SUMMARY

Analyte / Group Name	Sample Media	Analytical Technique	Regional Capability									
INORGANIC CHEMISTRY:			**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
	Soil	Colorimetric										
	Water	IC, Turbidimetric						X				
	Water	Titrametric		X			X				X	
ORGANIC CHEMISTRY:			**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
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						
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	
Herbicides	Water	GC/ECD; GC/NPD				X		X	X			
	Soil/Sediment	GC/ECD; GC/NPD						X	X			
	Waste (oil, drum, etc..)	GC/ECD; GC/NPD							X			
	Tissue (fish &/or plant)	GC/ECD; GC/NPD							X			
Herbicides (TCLP)	Solid/Waste	GC/ECD				X		X	X			
	Solid/Waste	HPLC/UV Detection			X							
Oil & Grease	Water	Gravimetric		X	X	X	X		X			X
	Soil/Sediment	Gravimetric		X					X	X		
Pesticides / PCBs	Water	GC/ECD	X	X	X	X	X	X	X	X	X	X
	Soil/Sediment	GC/ECD	X	X	X	X	X	X	X	X	X	X
	Waste (oil, drum, etc..)	GC/ECD	X	X	X	X	X	X	X	X	X	X
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	
Phenolics	Water	Colorimetric		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			
	Tissue (fish &/or plant)	GC/MS	X			X			X			X
	Waste (oil, drum, etc..)	GC/MS	X	X	X	X		X	X	X		X

EPA REGIONAL LABORATORIES CORE CAPABILITIES SUMMARY

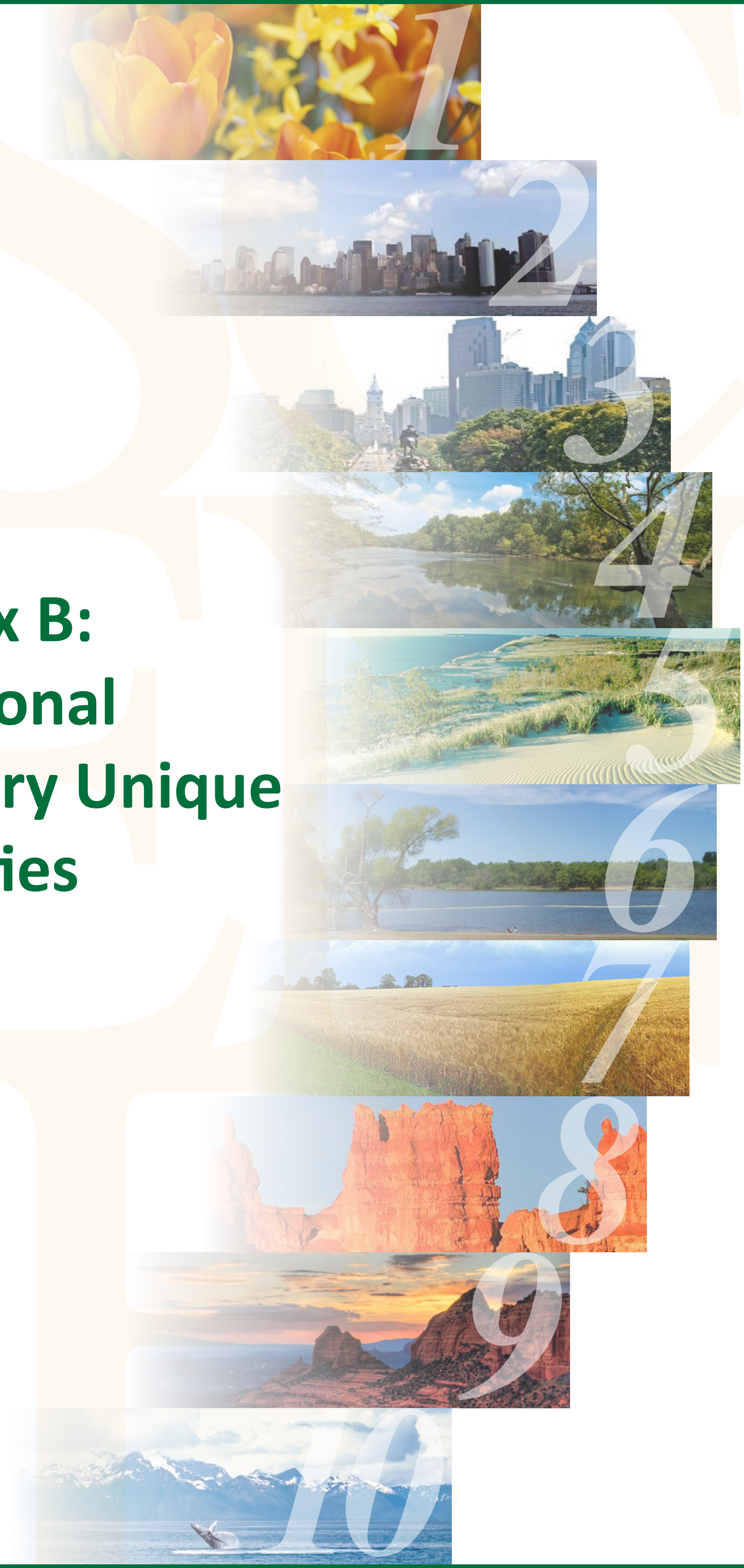
Analyte / Group Name	Sample Media	Analytical Technique	Regional Capability									
ORGANIC CHEMISTRY:			**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
TOC	Water	Combustion / IR		X	X	X	X		X	X		X
	Soil	Combustion / IR		X	X	X	X		X	X		X
	Water	UV/Persulfate			X			X		X	X	
VOA	Water	GC/MS	X	X	X	X	X	X	X	X	X	X
	Soil/Sediment	GC/MS	X	X	X	X	X	X	X	X	X	X
	Air	GC/MS	X		X	X	X	X	X	X	X	
	Waste (oil, drum, etc..)	GC/MS	X	X	X	X		X	X	X	X	X
	Water	GC				X				X		
	Soil/Sediment	GC				X				X		
	Waste (oil, drum, etc..)	GC	X			X	X			X		
VOA (TCLP)	Solid/Waste	GC/MS		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

EPA REGIONAL LABORATORIES CORE CAPABILITIES SUMMARY

Analyte / Group Name	Sample Media	Analytical Technique	Regional Capability									
BIOLOGY/ MICROBIOLOGY			**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Coliform, Total	Water, Soil &/or Sludge	Various	X	X	X			X	X	X	X	X
Coliform, Fecal	Water, Soil &/or Sludge	Various	X	X	X			X	X	X	X	X
E. coli	Water, Soil &/or Sludge	Various	X	X	X			X	X	X	X	X
Toxicity (Acute & Chronic)	Water	Fathead, Ceriodaphnia	X		X			X		X		
Heterotrophic PC	Water	Various	X	X	X			X	X	X	X	X

EPA REGIONAL LABORATORIES CORE CAPABILITIES SUMMARY

Analyte / Group Name	Sample Media	Analytical Technique	Regional Capability									
PHYSICAL & OTHER DETERMINATIONS:			**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
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			
	Waste (oil, drum, etc..)	Pensky-Marten or Seta Closed Cup		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
Turbidity	Water	Nephelometric	X	X	X	X	X	X	X	X	X	X



Appendix B: EPA Regional Laboratory Unique Capabilities

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
EPA REGION 1 LABORATORY SUMMARY OF UNIQUE CAPABILITIES				
INORGANIC CHEMISTRY:				
Inorganic Anions	Water	IC (EPA Method 300.0)	Water	
Mercury	Water, Tissue	Direct Mercury Analyzer (Thermal Decomposition, Amalgamation & Atomic Absorption Spectrophotometry) EPA Method 7473	Superfund, Water	
Metals	Water, Sediment, Soil, Waste (drum), Paint, Dust, Cosmetics	XRF (EPA Method 6200)	Superfund, TSCA (Pb)	Field Screening and Laboratory Testing
Perchlorate	Water	LC/MS/MS (EPA Method 331.0)	Superfund / Water	
ORGANIC CHEMISTRY:				
Carbonyls	Air	HPLC (EPA Method TO-11A	Air	
1,4-Dioxane	Water	GC/MS Purge & Trap (EPA Method 8260)	Superfund	
Ethylene Glycol	Water	GC		
Explosives	Water, Soil	HPLC (EPA Method 8330)	Superfund	
Oil Identification	Water	GC/FID (ASTM D-3415-79)	Superfund	
Organic Compounds	Solid, Liquid	FTIR	Superfund - ERB	Unknown ID
Oxygenated Compounds/Benzene	Fuel	IR (RFG Inspector's Manual)	Air	
PAHs	Soil/Sediment	Immunoassay (EPA Method 4035)	Superfund	
PCBs	Air, Wipes	GC/ECD (EPA Method 3508A)	Air / Superfund	
Pentachlorophenol	Soil, Sediment	Immunoassay (EPA Method 4010)	Superfund	
Pesticides/PCBs	Water, Soil, Sediment, Waste (drum)	GC/ECD (EPA Method 8081A/8082)	Superfund	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, Illicit Discharge Detection
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
Loss on Ignition (LOI)	Sediment		Water	
Percent Lipids	Tissue	Gravimetric		
BIOLOGY/MICROBIOLOGY:				
Enterococci	Ambient water	Enterolert/ EPA Method 1600	Ambient monitoring	
Chlorophyll a	Ambient water	EPA 445.0	Ambient monitoring	
Toxicity (Acute)	Sediment	C. dilutus, H. azteca	Water, Superfund	Bulk sediment

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
EPA REGION 2 LABORATORY SUMMARY OF UNIQUE CAPABILITIES				
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	
Pesticides	Wipes	LC/MS/MS and GC/MS	General	
Pharmaceuticals	Water	LC/MS/MS (modified EPA 1694)	Water	Direct Injection Method (150+) compounds
Total Petroleum Hydrocarbons	Water, Solid	Hexane Extraction (EPA Method 1664)	Water	
PHYSICAL AND OTHER DETERMINATIONS:				
Density	Ink, Paint	ASTM D1475	Air	
Grain Size	Solid	Pipet Method	Superfund, Water	
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:				
Clostridium perfringens	Water	Membrane Filtration	Water	
Cryptosporidium	Water	Fluorescent Microscopy (EPA Method 1623)	Water	
DNA - qPCR (Enterococcus)	Water (Fresh & Marine)	EPA/Cepheid Methodology	Water	
DNA-qPCR E. coli	Water (Fresh & Marine	EPA/CDC Protocols	Water	
Enterococcus Group	Water	Membrane Filtration	Water	
Giardia	Water	Fluorescent Microscopy (EPA Method 1623)	Water	
mColiblue24	Water	MF/Hach	Water	
Heterotrophic Bacteria	Water	Pour Plate/Sim Plate Method	Water	
Salmonella	Soil, Sludge	EPA 1682	Water	

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
EPA REGION 3 LABORATORY SUMMARY OF UNIQUE CAPABILITIES				
ORGANIC CHEMISTRY:				
Nitroaromatics & Nitroamines	Water, Soil/Sediment	HPLC	Water	Method 8330
Nitroglycerine	Water, Soil/Sediment	HPLC	Water	Method 8332
Nitrogen, Total	Water	Colorimetric		
PCB Congeners	Water, Soil/Sediment, semi permeable membrane device (SPMD)	HR GC/MS		Method 1668C
BIOLOGY/MICROBIOLOGY				
Benthic Macroinvertebrate	Freshwater	Identification	Water	
Marine/Estuarine Benthic Invertebrate Taxonomy	Invertebrate Specimens or Unsorted Sediment	EPA EMAP Protocols		Organisms identified to species or lowest taxonomy possible
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	DW, Superfund	
Mercury, Total - Ultra Low Detection Level	Water	CVAF	Water	Method 1631
	Tissue	CVAF	Water, Superfund	Appendix 1631
	Soil/Sediment	CVAF	Water, Superfund	Appendix 1631
Metals, Total	Waste (oil, drum, etc…)	ICP/MS	RCRA	Not Commonly Available
	Air	Hi-Vol Filters	Air	“
Metals (TCLP)	Soil/Waste (oil, drum)	ICP/MS	RCRA	“
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	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	“
Toxaphene Congeners	Water/Soil	GC/NIMS (EPA Method 8276)	Water, Superfund	6 Parlars, 2 breakdown products
Ultimate BOD	Water	Membrane Electrode (Std Method 5210C)	Water	
BIOLOGY/MICROBIOLOGY:				
Chlorophyll	Water		Water	

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
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

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
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.

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
EPA REGION 6 LABORATORY SUMMARY OF UNIQUE CAPABILITIES				
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
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:				
CO	Air	40 CFR Part 58	Air	OAQPS Protocol Gas Verification Program
NOx	Air	40 CFR Part 58	Air	OAQPS Protocol Gas Verification Program
SO2	Air	40 CFR Part 58	Air	OAQPS Protocol Gas Verification Program
O3	Air	40 CFR Part 58	Air	NIST Standard Reference Photometer
In-vitro Bioassessibility Assays for Arsenic and Lead in Soil	Soil	ICP-MS / ICP-AES	Superfund / RCRA	SUPR Exposure / Toxicity Assessment
ORGANIC CHEMISTRY:				
Chlordane	Air (PUF)	GC/ECD (EPA Method TO-4A)	Special Project	
Herbicides	Water, Soil/Sediment	GC/ECD	Water	Use Attainability Analysis (UAA)
Pesticides	Water, Soil/Sediment, Tissue	GC/ECD	Water	Use Attainability Analysis (UAA)
VOCs	Air	GC/MS (EPA Method TO-14 & TO-15)	Air / Superfund	Air Toxics
VOCs	Water	GC/MS	Superfund / ORD	In-Situ Chemical Oxidation Site Support
PCBs	Soil/Sediment, Waste	GC/ECD	Superfund / ORD	Rapid Site Screening
Pharmaceuticals and Personal Care Products (PPCPs)	Water	LC/MS/MS	Water	Endocrine disruptors
PAHs, Pesticides, Herbicides	Water	Twister GC/MS (solventless extraction)	Water	Use Attainability Analysis (UAA)
VOCs	Water, Soil, Air	GC/MS Mobile Laboratory	Superfund	Rapid Site Characterization
BIOLOGY/MICROBIOLOGY:				
E. coli	Water (drinking/waste/ ambient)	qPCR	Water	2008 NFWA
Enterococci	Water	qPCR	Water	
Heterotrophic Bacteria	Water	Plate Count - Standard Methods	Water	Heterotrophic Bacteria
Chlorophyll a	Ambient water	EPA 445.0	Ambient monitoring	
Invertebrate Taxonomy	Invertebrates	EPA EMAP Protocols	Water	
Marine/Estuarine Benthic Taxonomy	Benthic Organisims		Water	Organisms identified to species or lowest toxonomy possible

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
EPA REGION 8 LABORATORY SUMMARY OF UNIQUE CAPABILITIES				
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
Total Petroleum Hydrocarbons-Diesel Range Organics	Water, Soil	GC/FID	Water/Superfund	Hydro-Fracking
VOAs	Water, Soil/Sediment,	GC/PID/ELCD	Water/Superfund	
BIOLOGY/MICROBIOLOGY				
Bacteria (Arsenic-Reducing)	Water, Sediment	MPN	Water/Superfund	
Bacteria (Iron-Reducing)	Water, Sediment	MPN	Water/Superfund	
Bacteria (Sulfate-Reducing)	Water, Sediment	MPN	Water/Superfund	
Bacteria (Clostridium perfringens)	Water	Membrane Filtration	Water/Superfund	
Bacteria (Clostridium perfringens)	Water	Membrane Filtration	Water/Superfund	

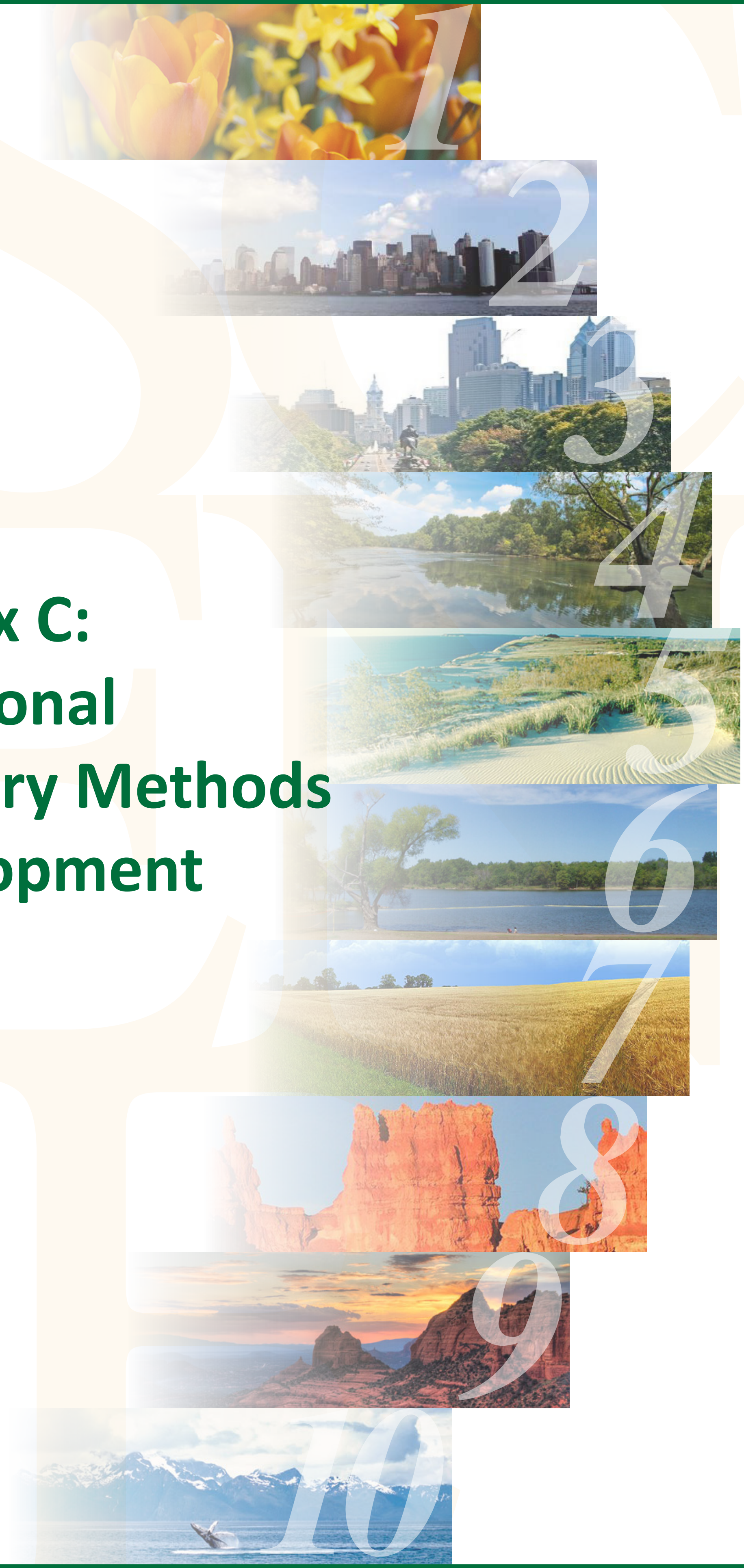
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
EPA REGION 9 LABORATORY SUMMARY OF UNIQUE CAPABILITIES				
INORGANIC CHEMISTRY:				
Ferrous Iron	Water	Titration with Dichromate	Superfund	
Mercury, Vapor, Particulate and Reactive	Ambient Air	Cold Vapor Atomic Fluorescence	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	
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	
Microcystin	Water	Immunoassay	Water	
Toxicity Test, Red Abalone (Haliotis rufescens) Larval Development	Water	EPA/600/R-95/136	NPDES	
Toxicity Test, Sea Urchin Fertilization [Stronglyocentrotus purpuratus]	Water	EPA/600/R-95/136	Water, NPDES	
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	
Low Level Mercury	Water	CVAF, Method 1631E	Water, Superfund	0.2 to 0.5 ng/L reporting limits
Methyl Mercury	Water	GC/CVAFS, Method 1630	Water, Superfund	
Metals	Air filters	ICP/MS, ICP	CAA	
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/seaweed	IC/ICP/MS	Superfund, Water	Speciation data needed for risk assessment
Metals (TAL) + Total Uranium	Small mammals, invertebrates	Microwave Digestion, ICP/AES, ICP/MS	Superfund, RCRA	Biomonitoring projects
Metals (SPLP)	Soil/Waste	ICP/AES, ICP/MS	Superfund	
Chlorophyll-a	Water	SM 1002H	Water	
In-vitro Bioassessibility Assays for Lead in Soil	Soil	Leachates by Method 1340, ICP/AES	Superfund	
Percent Water	Liquid Waste	Karl Fischer titration	RCRA	
Perchlorate	Produce (fruits, milk)	IC/MS	Superfund	
ORGANIC CHEMISTRY:				
BNA (Selected)	Tissue	SW846 Methods	Superfund	
Butyl tins	Soil/Sediment	GC/MS	Superfund, Criminal	WDOE method
1,4-Dioxane	Water	EPA Method 8270D SIM/Method 522	Superfund	
Explosives (Nitroaromatics & Nitroamines)	Water, Soil, fish/shellfish	EPA Method 8330 / HPLC	Superfund	
Hydrocarbon Identification	Water, Soil/Sediment	NWTPH-HCID	Superfund, Criminal	
N-Nitrosodimethylamine	Water, Soil	Method 521	Superfund	
Herbicides/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	
Polybrominated diphenyl ethers (PBDEs)	Tissue (fish)	GC/MS Low Resolution	Superfund	
Total Petroleum Hydrocarbons-Gasoline Range Organics	Water, Soil	NWTPH-Gx	Superfund, RCRA	
Total Petroleum Hydrocarbons-Diesel Range Organics	Water, Soil	NWTPH-Dx	Superfund, RCRA	
VOA and SVOA	Industrial wastes, Solids, Tissues	Vacuum distillation, Methol 8261A	Superfund, RCRA	

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
PHYSICAL AND OTHER DETERMINATIONS				
Multi=Increment Sampling (MIS) Preparation of Soil Samples for Organic and Inorganic Analyses	Soil	Described in Method 8330B Appendix	Superfund	
Variety of water quality tests	Water	Various probe-type measurements	Superfund	Flow thru cell system; performed in the field
BIOLOGY/MICROBIOLOGY				
Aeromonas spp	Drinking Water	EPA Method 1605	SDWA - Unregulated Contaminant Monitoring Rule (UCMR)	EPA Approved
Cryptosporidium and Giardia	Water	EPA Method 1623 (Filtration/IMS/ Staining)	SDWA, Water, Ambient Monitoring Rule - recreational waters	On approval list for LT-2 regulation
Enterococci	Ambient Water	EPA Method 1600	Ambient Monitoring Rule	
Microbial Source Tracking	Water	PCR	Water	
Microscopic testing	Drinking/Source Water	Microscopic particulate analysis	Surface Water Treatment Rule	Microscopic technique used to establish GWUDI characteristics of a drinking water

Appendix C: EPA Regional Laboratory Methods in Development



EPA REGION 1 LABORATORY SUMMARY OF DEVELOPING CAPABILITIES

PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
Chlorpyrifos & Chlorpyrifos oxon in wipes by LC/MS/MS	Emergency Response/Removals	Completed	FY2013
Enterococcus in Water by qPCR (EPA Method 1611 Capability Development	Water	In progress	FY2014

EPA REGION 2 LABORATORY SUMMARY OF DEVELOPING CAPABILITIES

PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
Microbial Source Tracking using qPCR	TMDL; Stormwater	Non Human marker test completed	FY2014
Microbial Source Tracking using non qPCR Techniques including Coliphage F+ and Optical Brighteners	Develop methods to complement qPCR MST program	Literature Search Initiated	FY2015
SIM Analysis for VOA and Semi VOA analysis	Drinking and Surface Water	Developing methods on current instrumentation	FY2014

EPA REGION 3 LABORATORY SUMMARY OF DEVELOPING CAPABILITIES

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: Conventional and Quantitative Source Tracking	Need for capability to determine source of E.coli contamination in support of Water Program.	Conventional PCR established; Quantitative PCR In-progress.	FY 2015
Glycols in Water	Need for capability to identify glycol compounds in groundwater using LC/MS/MS to achieve lower quantitation limits.	In-progress; SOP Complete; MDL/ DOC submitted	FY 2015
ELISA	Need for in-field testing of surface and drinking water for presence of estrogen and estrogen-like compounds.	Report completed	Done
1,4-Dioxane	Need for lower quantitation limits for determination of 1,4-dioxane in GW and DW.	Possible RM Project	FY2015

EPA REGION 4 LABORATORY SUMMARY OF DEVELOPING CAPABILITIES

PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
EPA Method 8261	VOCs in difficult matrices	Initial investigation	Unknown
Internal Method - GC/MS/MS	Low Level Pesticides w/MS Confirm	ITMEs in process	January 2015

EPA REGION 5 LABORATORY SUMMARY OF DEVELOPING CAPABILITIES

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.	FY 2014
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 2014
Fluorotelemer Alcohols in Water by LC/MS/MS	Water	Initiated.	FY 2014

EPA REGION 6 LABORATORY SUMMARY OF DEVELOPING CAPABILITIES

PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
Anions and Oxyhalides by IC	Remove dependence on State Lab for this test.	Method developed, need DOC/ MDL; SOPs.	September 2014
Asbestos	Superfund/RCRA/Enforcement	Training; DOC; SOP preparation.	program dependent
Alcohols by Headspace GC/MS Analysis	Energy Extraction	Completed during FY 2013	December 2013
Dissolved Gasses in Water by GC/ FID	Energy Extraction	Completed during FY 2013	December 2013
Direct mercury analysis (CVAF - Milestone)	Clean Water Act, RCRA, Superfund	DOC/MDL; SOP preparation.	Dec-14
PAHs by GC/QQQ	RCRA, Superfund	Continued method development	December 2014
Dinitrotoluene minor isomers	Superfund	Continued method development	December 2014
High Dissolved Solids /Modified Method/ Anion	Clean Water Act, RCRA, Superfund	Method being developed.	October 2014
High Dissolved Solids /Modified Method/ Cation	Clean Water Act, RCRA, Superfund	Method being developed.	October 2014
High Dissolved Solids /Modified Method/ OA	Clean Water Act, RCRA, Superfund	Method being developed.	October 2014
PPCP analysis	Water	Method being developed.	April 2014
Passive Formaldehyde	Clean Air Act	Method being developed.	Summer 2014
Induction Coupled Plasma Axial Method	Superfund. New technique to generate lower reporting limits for metals.	Method being developed. Performance studies are ongoing.	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
Low Molecular Weight Acids in Resource Extraction Analysis	Drinking Water	Method being developed.	Spring 2015
Haloacetic Acids in Resource Extraction Analysis	Drinking Water	Method being developed.	FY 2014

EPA REGION 7 LABORATORY SUMMARY OF DEVELOPING CAPABILITIES

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 2014
Improving Precision of Volatile Organics Analysis Samples from In-situ Chemical Oxidation Sites	Superfund	Publication in process.	FY 2013
PAH/SVOC in Water by Stir Bar Sorbtive Extraction	Drinking Water / Ambient Water / TMDL	Developing additional analytes.	FY 2014
Microbial Source Tracking Using qPCR	TMDL and Stormwater	Non Human marker test completed.	FY 2014
Airborne VOC by solid sorbent tube (EPA Method TO-17)	Trace Level VOC assessment for vapor intrusion studies	Method development currently underway.	FY 2014
Arsenic Speciation for Water, Soil/ Sediment & Tissue by IC or ICP/MS	Speciation data to be used for Risk Assessments in support of Clean Water Act and Superfund.	Method development currently underway.	FY 2014
Rapid Screening Method for PCBs	Superfund	Continued progress.	FY 2013

EPA REGION 8 LABORATORY SUMMARY OF DEVELOPING CAPABILITIES

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 LABORATORY SUMMARY OF DEVELOPING CAPABILITIES

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.	9/30/2014
Methyl Mercury in Environmental Samples	Address regional priority.	Instrumentation installed. Method development nearly complete with SOP drafted.	FY 2014

EPA REGION 10 LABORATORY SUMMARY OF DEVELOPING CAPABILITIES

PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
Develop Methyl Mercury Analysis Capability for Sediment Samples	Methyl mercury data needed to support regional mercury strategy toward characterizing levels in the environment and evaluate public health risks.	Some initial testing on instrument conducted. Based on the effort needed to develop the water method, capability for sediment analyses will likely require much experimentation with the Brooks-Rand instrument to acquire the needed accuracy and sensitivity for sediments.	FY 2015
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
Ultra-trace Concentration Phosphorus Method for Treated Wastewater Effluent and Surface Water	NPDES compliance monitoring at ultra low phosphorus levels.	Ultra-trace standard concentration measurements were achieved on a Lachat colorimetric instrument and an ICP-MS system. Testing on actual effluent samples still to be planned.	FY 2015
Low Level PAH Analyses of Soil and Sediments	Measure PAHs at low concentrations in marine sediments to assess against NW states clean-up standards with organic carbon normalization.	GC/MS-MS system being set-up for extract analyses at very low concentrations.	FY 2014
Bioavailability of Lead at the Bunker Hill Superfund Site	Human health risk assessment support for residences near mining sites.	Completed.	FY 2013

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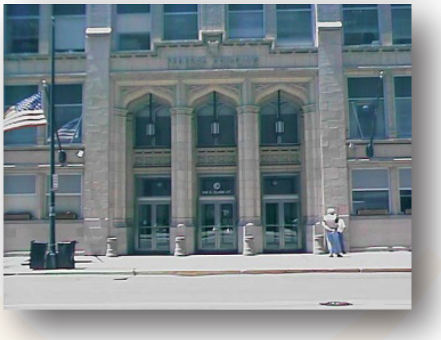

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