



Regional Laboratory Network

2018 Annual Report

Acknowledgements

Thank you to the laboratory managers, chiefs and scientists in all 10 regions for contributing to this report. It is your dedication to the science of the agency that directly supports and ensures clean air, land, water and chemical safety for the American people.

A special thanks to the Region 4 Laboratory support team including Donnell Ward and Norma Stafford for all their efforts in compiling, formatting, reviewing and revising this report.

Table of Contents

ACKNOWLEDGEMENTS	1
TABLE OF CONTENTS	2
EXECUTIVE SUMMARY	3
INTRODUCTION.....	4
PURPOSE	7
OVERVIEW.....	7
2018 PROGRESS SUMMARY	8
SUCCESS STORIES.....	10
APPENDIX A : REGIONAL LABORATORIES CORE CAPABILITIES SUMMARY	35
APPENDIX B: REGIONAL LABORATORIES UNIQUE CAPABILITIES SUMMARY.....	46
APPENDIX C: REGIONAL LABORATORY METHODS IN DEVELOPMENT	82
APPENDIX D: ABBREVIATIONS.....	93

Executive Summary

The U.S. Environmental Protection Agency (U.S. EPA) Regional Laboratory Network (RLN) consists of state-of-the-art, full-service environmental laboratories delivering mission critical analytical services, field support, quality assurance and data reviews, and expert technical assistance. The analytical data produced by the Regional Laboratories is used regularly by EPA Regional Program offices as well as EPA's state, tribal, and local partners to make important public health and environmental decisions.

Regional Laboratories are responsive to specific regional needs. Services and expertise provided by each regional laboratory are tailored to meet the needs of their state, local and tribal partners to address complex and emerging environmental issues. Scientific communication and collaboration across the regional laboratory network leverages regional expertise and methods across the nation thereby maximizing efficiency and flexibility while assuring responsiveness.

In Fiscal Year (FY) 2018, Regional Laboratories performed over 100,206 lab analyses and 11,520 field analyses for agency programs and State/Tribal organizations to support agency priorities and to solve emerging environmental issues. Of these analyses, 1,830 were time-critical samples for Emergency Response efforts to environmental disasters, hazardous materials releases, priority contaminant removals, and other threats to human health and/or the environment. In keeping with prior years, the Superfund Program continued to be the largest volume requestor of lab analytical services amounting to 63%, followed by the Water Program (25%) and a combination of programs accounted for the remaining 12%.

Accomplishments presented in this report capture the primary types of support provided by the Regional Laboratories, but the full complement of services is much more complex. The accomplishments presented underscore the commitment of the RLN to be an integral part in protecting human health and the environment. This report highlights the diversity of support and capabilities, all of which reinforce EPA's mission and ongoing priorities.

Introduction

The Environmental Protection Agency's (EPA's) mission is to protect public health and the environment. The EPA is fully committed to delivering real results to the American people, enhancing shared governance with States, Tribes and local governments, and providing the technical support needed to meet statutory requirements.

To ensure the most efficient and highly responsive means of addressing complex and emerging environmental issues across the nation, EPA has a main office and a full-service environmental laboratory in each of its ten regions (Figure 1). These offices and laboratories are responsible for overseeing and responding to the environmental needs of the States, Tribes and local governments within their respective region.

Regional laboratory locations, directors and contact information are shown in Table 1. Each regional laboratory is fully committed to providing quality analytical services, and many provide additional quality assurance, field sampling and technical support services. These laboratories follow EPA administrative directives for high-performing organizations and are accredited by National or International Accreditation programs for ensuring effective quality systems, improved performance, and defensible data. Services and expertise provided by each regional laboratory are tailored to meet the needs of their respective regions (Appendix A).

To assure the EPA's mission is supported across the Nation in the most efficient, effective and consistent manner, EPA Regional Laboratories collaborate with each other to form the **Regional Laboratory Network (RLN)**. Maximizing partnerships across the RLN provides more effective communication among scientists for identifying emerging contaminants, developing methods to address emerging contaminants, responding to national emergencies and meeting program needs.

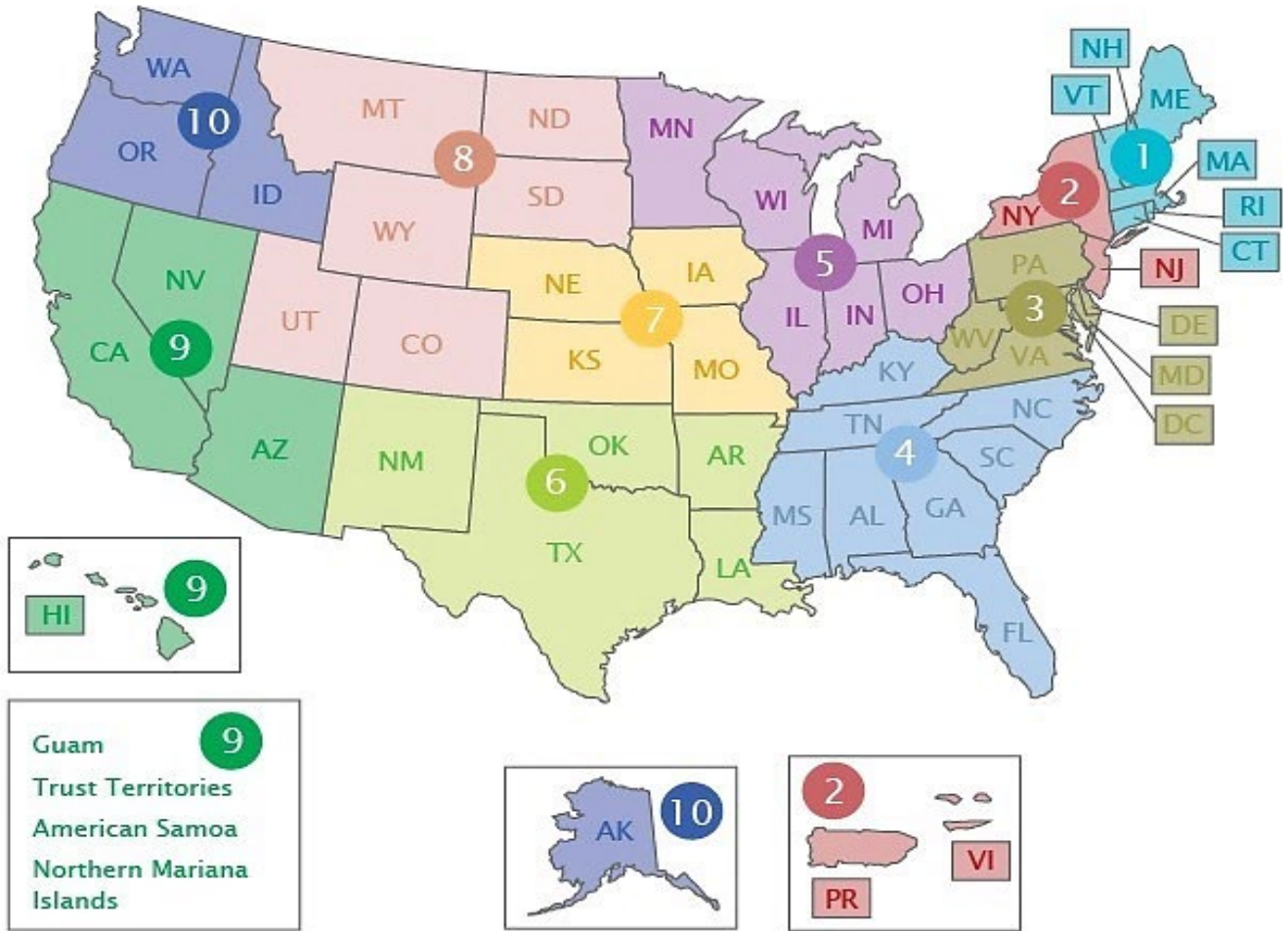


Figure 1. Map of the 10 EPA Regions

Table 1. Regional Laboratory Services and Applied Science Divisions Lab Contact Information

Region 1**Laboratory Services Branch**

Ernest Waterman, Chief
Waterman.Ernest@epa.gov
11 Technology Drive
N. Chelmsford, MA 01863-2431
Phone: 617-918-8632

Region 2**Laboratory Branch**

John Bourbon, Chief
Bourbon.John@epa.gov
2890 Woodbridge Ave.
Edison, NJ 08837
Phone: 732-321-6706

Region 3**Laboratory & Technical Services Branch**

Jeff Dodd, Acting Chief
Dodd.Jeff@epa.gov
701 Mapes Road
Ft. Meade, MD 20755-5350
Phone: 410-305-2654

Region 4**Laboratory Services Branch**

Sandra Aker, Chief
Aker.Sandra@epa.gov
980 College Station Road
Athens, GA 30605-2720
Phone: 706-355-8772

Region 5**Analytical Services Branch**

Carolyn Persoon, Chief
Persoon.Carolyn@epa.gov
77 West Jackson Blvd.
Chicago, IL 60604
Phone: 312-353-8290

Region 6**Laboratory and Applied Science Division**

Wes McQuiddy, LSASD, Deputy Director
Mcquiddy.David@epa.gov
10625 Fallstone Road
Houston, Texas 77099
Phone: 214-665-6722

Region 7**Laboratory Technology & Analysis Branch**

Margie St. Germain, Chief
Stgermain.Margie@epa.gov
300 Minnesota Ave.
Kansas City, KS 66101
Phone: 913-551-5154

Region 8**Laboratory Services Branch**

Mark Burkhardt, Chief
Burkhardt.Mark@epa.gov
16194 West 45th Drive
Golden, CO 80403
Phone: 303-312-7799

Region 9**Regional Laboratory**

Peter Husby, Manager
Husby.Peter@epa.gov
1337 S. 46th Street, Bldg. 201
Richmond, CA 94804-4698
Phone: 510-412-2311

Region 10**Laboratory Services Branch**

Barry Pepich, Chief
Pepich.Barry@epa.gov
7411 Beach Drive East
Port Orchard, WA 98366
Phone: 360-871-8701

Purpose

The purpose of this report is to present 2018 progress summaries and success stories that demonstrate how RLN services and products are used by programs, states and tribes to implement EPA's overall mission. Additionally, it is to share information about Regional Laboratory Network (RLN) resources and capabilities available across the agency.

Overview

Each of the RLN laboratories are state-of-the-art full-service environmental laboratories that produce high quality and reliable analytical results, and offers expert technical assistance to States, Territories, Tribes, and Regional Offices. The RLN laboratories support project-specific objectives, achieve quality management goals, provide analytical expertise, and produce high quality defensible data for Agency decision making. Some of the core and specialized capabilities that span the RLN are:

- Regional Laboratories analyze samples suspected to contain a variety of chemical constituents, including emerging contaminants as well as having microbiological/biological capabilities. Lists of core and unique laboratory capabilities that span the RLN are provided in Appendix A and B;
- Regional laboratory scientists are certification officers for the Drinking Water Laboratory Certification Program and participate in state drinking water audit programs;
- Laboratory scientists also provide management, technical, logistical, and oversight support to EPA, State and tribal programs, operate air monitoring quality assurance programs, and support field sampling functions;
- Regional Laboratories provide analytical support to emergency response events;
- The Regional Laboratories have the capability to support special or non-routine analytical needs that cannot be readily obtained from other sources, which fills a gap between basic research and commercially available analyses;
- While the Regional Laboratories generally provide routine data needed daily for supporting the Regional programs, they have the flexibility to quickly focus regional resources and capacity on the Agency's highest priorities at any time;

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

2018 Progress Summary

Regional Laboratories directly support analytical requests from the programs, states, and tribes. During FY 2018, the Regional Laboratory Network (RLN) conducted more than 100,206 lab analyses (Table 2 & Figure 2). Of these analyses, 1,830 were time-critical samples for Emergency Response efforts to environmental disasters, hazardous materials releases, priority contaminant removals, and other threats to human health and/or the environment. Direct support to EPA programs aids timely and cost-effective decision-making in the field to provide the American people with clean air, land, and water.

Table 2. Analytical Support to Programs

Program	Analyses*
Superfund	63,445
Water	25,425
Air	725
RCRA	1,703
Emergency Response	1,830
LUST	745
Pesticides	2
TSCA	23
Brownfields	981
External Orgs, Enforcement	5,327
Total	100,206

*For this report, an analysis is defined as the evaluation of a sample for single or multiple parameters by a single method/test; a volatiles or metals scan is an example of an analysis with multiple parameters.

In keeping with prior years, the Superfund Program continued to be the largest volume requestor of lab analytical services (63%), followed by the Water Program (25%) and a combination of programs accounted for the remaining 12% as shown in the pie chart below (Figure 2).

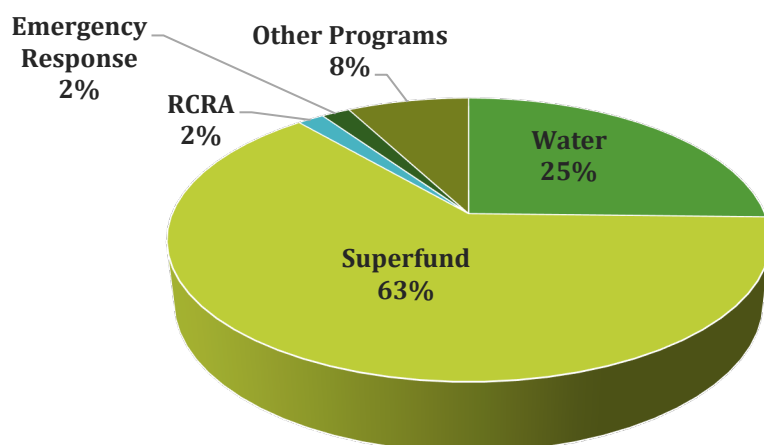


Figure 2. Laboratory analytical support to EPA programs FY 2018

The Superfund, Water and Emergency Response Programs were also the RLNs primary customer for field analytical services (Figure 3).

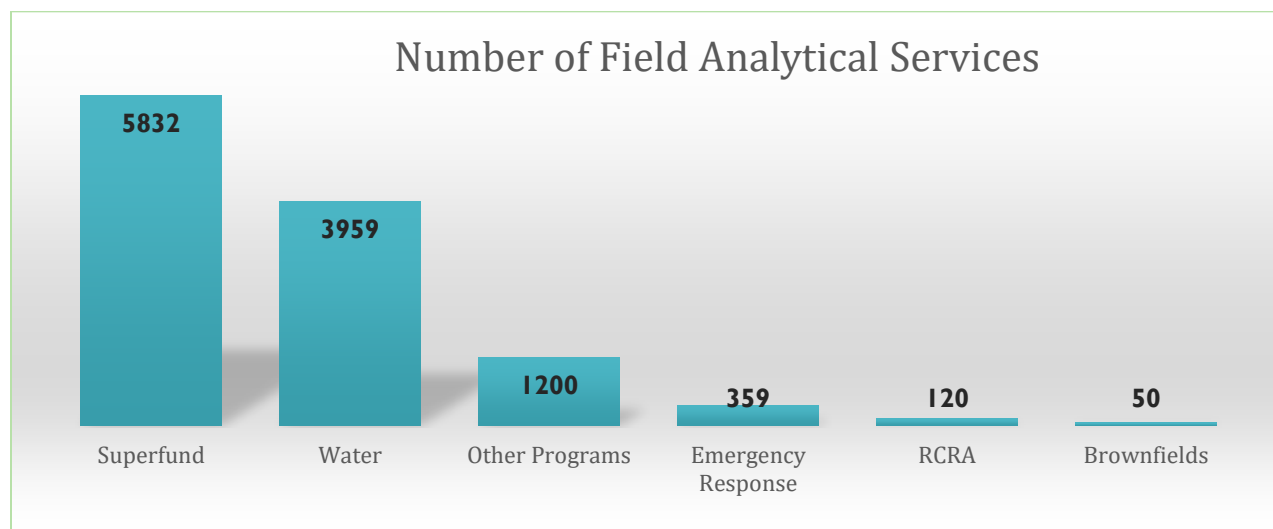


Figure 3. Field analytical support to EPA programs FY 2018

In addition to analytical support services, the RLN provides quality assurance and technical support services (Table 3). In 2018, scientists in the RLN reviewed more than 1,352 quality management & technical documents and validated more than 26,101 Contract Laboratory Program (CLP) analyses. RLN scientists in each region are also certification officers for the Drinking Water Laboratory Certification Programs and participate in drinking water laboratory and other program/laboratory audits (Table 3). Some RLN scientists specialize in air quality and provide support to the States (Table 3) as part of the Particulate Matter 2.5 (PM2.5) program.

Table 3. Quality Assurance Services		Number Completed
Reviews		
• Quality Management Plans (QMP) Reviewed		1352
• Quality Assurance Technical Documents Reviewed		511
• Contract Lab Program (CLP) Analyses Validated		26101
• Other Analytical Validations		519
Audits		
• Drinking Water Laboratories Audited		24
• Drinking Water Certification Programs Audited		19
• Other Audits		18
PM 2.5 Support to States		
• Number of filters weighed/analyzed		7270
• Number of PM2.5 audits		337
• Number of through-the-probe audits		322
• Other: PM2.5 & Lead PEP co-located samples		210

As mentioned earlier in this report, Regional Laboratories are full service analytical laboratories that support an extensive suite of core and unique capabilities (Appendix A and B). These laboratories also have the capability to support special or non-routine analytical needs that cannot be readily obtained from other sources, which fills a gap between basic research and commercially available analyses. Methods initiated, developed, or on-going in each region are described in Appendix C.

This brief summary highlights the RLN's diversity of support and capabilities, all of which reinforce EPA's mission and ongoing priorities. The next section presents some examples of projects that show how this data is used by project leaders in the programs, states and tribes.

Success Stories

This section provides a few examples of projects that demonstrate how the Regional Laboratory Network (RLN) services and products are used by programs, states, and tribes to implement EPA's overall mission to protect public health and the environment. These projects are grouped based on the current agency goals and objectives with which they most closely align, however, each project has components that cross over and support multiple goals and objectives.

Providing for Clean and Safe Water

EPA works with states, tribes, territories, and local communities to better safeguard human health; maintain, restore, and improve water quality; and make America's water systems sustainable and secure, supporting new technology and innovation wherever possible.

Emergency Response to Hurricanes

The **Region 4** Science and Ecosystem Support Division (SESD) Regional Laboratory supported the Bay County Florida residents during the devastation of Hurricane Michael. SESD deployed the regional mobile laboratory and provide field inspections to support local drinking water and wastewater plants. SESD engineers conducted Infrastructure Assessments for the wastewater facilities that were inoperable due to the hurricane and developed Assessment Reports that were used for FEMA and Bay County to estimate the cost of the damages. SESD microbiologists analyzed 411 drinking water samples for total coliform and E. coli to support the drinking water facilities that were unable to analyze samples. This support was critical to end the Boiling Water Alert in the area and ensure that residents had access to safe drinking water.



Ohio Watershed Pesticide Project

Region 5 partnered with the Ohio Environmental Protection Agency (OEPA) to analyze surface water samples for pesticides from an existing urban watershed water quality monitoring project. Samples were collected by OEPA staff from the Cuyahoga River Tributaries and Ship Channel 2018 Survey and shipped to the EPA Chicago Regional Laboratory (CRL) for analysis. Samples were collected from a random subset (approximately 36) of the 106 monitoring sites in the Survey and urban areas in Ohio. The Region 5 Water Quality Branch and Pesticides Section selected the monitoring sites from the Survey. The samples were collected during the sample schedule established by OEPA. Each site was sampled 4-5 times during the Survey. CRL analyzed the sample for 34 pesticide active ingredients and metabolites using Liquid Chromatography/Dual Mass Spectrometry (LC/MS/MS). The Region 5 Pesticides Section and the Region 5 Water Quality Branch provided further analysis of the data and forwarded the data to OPP to be used in the pesticide re-evaluation process and made available to Region 5 states.

This project helps the state ascertain if pesticides are impacting waters in Ohio, particularly in areas of the state where they are not currently being monitored and assist state partners with their aquatic community assessments by providing pesticide monitoring data, specifically to determine if pesticides are a significant stressor to aquatic life in these watersheds. Additionally, this data helps the Agency continue to evaluate pesticide concentrations and exposures used for Agency decisions in pesticide water quality criteria.

Protecting Children from Exposure to Lead in Drinking Water

The 3T's: Training, Testing, Telling

In 2018, **Region 6** started their "War on Lead" by creating a cross-program action plan to reduce human exposure to lead, especially to children, in the Region. The primary source of human exposure to lead is through consumption, such as through soil, dust, food, or drink. One potential source can be through drinking water when older service lines, plumbing materials, fixtures, and pipes made of lead or with lead solder start to corrode and break down.

In Region 6, the 3Ts program was started in order to protect children from exposure to lead in drinking water at schools, daycare facilities, and tribal facilities. These facilities can have areas or fixtures more prone to contamination due to the longer periods of inactivity as compared to a typical home, and as a result may expose the water for longer periods of time to a potential source of contamination.

This program is comprised of three primary components: Training, Testing, and Telling. Training is conducted with officials to raise awareness of the issues associated with lead exposure, Testing is conducted on various water sources to identify problem areas and Telling (or communicating with) those potentially affected by the outcome.

The Region 6 Houston Laboratory is the Testing part of the 3Ts program in Region 6. The Region 6 Laboratory is certified to perform analysis of drinking water for lead by EPA Method 200.8, utilizing an Inductively Coupled Plasma (ICP) instrument with a Mass Spectrometer (MS) detector. In 2018, the Region 6 laboratory analyzed 96 samples for lead at various facilities across the region. Some samples did have results above the treatment technique action level. Any result above the action level resulted in the source being immediately shut down until remediation and further testing could be done, thus protecting the children from any potential future exposure.

Improving Air Quality

EPA works with states, tribes and local governments to accurately measure air quality and ensure that more Americans are living and working in areas that meet high air quality standards.

Parkersburg, West Virginia Warehouse Fire

On October 24, 2017, the EPA **Region 3** Laboratory was asked to provide emergency assistance with ambient air analysis for samples to be collected at the Ames Warehouse Fire in Parkersburg, WV. The fire started burning on October 21, 2017 and continued through October 27, 2017, thus becoming national news. Working with Region 3 On-Scene Coordinator (OSC), the lab provided ten Summa canisters to sampling contractors on site to collect air samples for analysis. The analyses for 62 target compounds in EPA method TO-15 were performed within the week and the results provided to the On-Scene Coordinators by November 3, 2017.

Revitalizing Land and Preventing Contamination

EPA collaborates with other federal agencies, industry, states, tribes, and local communities to enhance the livability and economic vitality of neighborhoods.

Continuous Field Monitoring Associated with Acid Mine Drainage

Field monitoring performed by Regional Laboratories produces millions of data points that are used for environmental decision-making. In **Region 9**, field monitoring using simple multiparameter sensors has provided valuable data for the characterization of acid mine drainage and for the development of management protocols to control discharges from abandoned mine sites.

Acid mine drainage is caused when water (rain water, groundwater, snowmelt, pond water) flows over and through sulfur-bearing materials forming sulfuric acid. Heavy metals can be leached from rocks by contact with the resulting acidic waters. Ultimately, acid mine drainage causes environmental degradation that includes damaging impacts to aquatic resources in the receiving waters. In Region 9, over 1.5 million data points were collected at 23 monitoring stations associated with several acid mine drainage sites in 2018. Satellite and cellular telemetry connected to the stations allows real-time year-round water quality and flow monitoring by site Remedial Project Managers from their desktops.



collected at the Argonaut Mine in Jackson, CA was used to develop engineering controls to minimize acid mine drainage and prevent an environmentally catastrophic mine spill. The Argonaut Mine Site is a former hard rock gold mine in Jackson, CA. Portions of the site's soil have high levels of arsenic, lead, mercury, and other metals. Waste from the mine is held back by a concrete arch dam. The dam was determined to be unstable in 2015 with the potential for a catastrophic failure that could have resulted in loss of

- **Argonaut Mine** - Continuous monitoring data (12 locations, 505,520 data points)



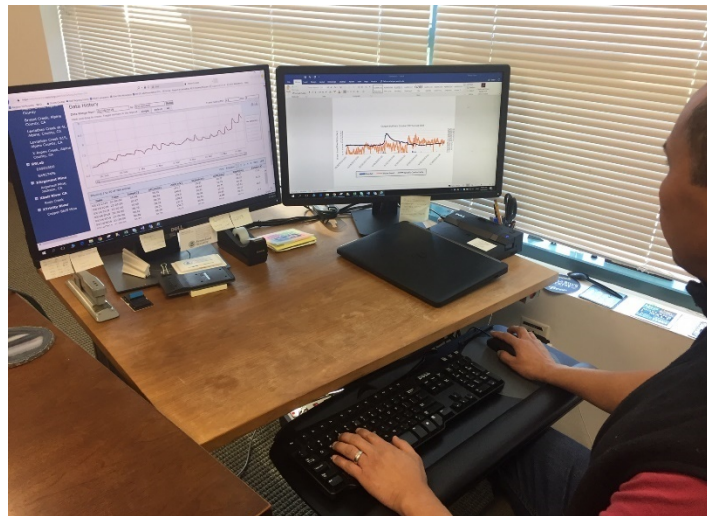
life and \$100 million in damages. EPA is coordinating with the California Environmental Protection Agency's (CalEPA) Department of Toxic Substances Control (DTSC) to stabilize the concrete arch dam and to construct a stormwater diversion system behind the dam, to prevent water from pooling and increasing the load on the dam. This site was listed on the National Priorities List in September 2016.

life and \$100 million in damages. EPA is coordinating with the California Environmental Protection Agency's (CalEPA) Department of Toxic Substances Control (DTSC) to stabilize the concrete arch dam and to construct a stormwater diversion system behind the dam, to prevent water from pooling and increasing the load on the dam. This site was listed on the National Priorities List in September 2016.

- **Copper Bluff** - In 2018, EPA proposed the addition of the Copper Bluff Mine Site to the National Priorities List. The continuous water level, flow and conductivity data (1 location, 70,080 data points) collected by the Region 9 Laboratory's field team was a key contributing element to the decision-making process. The Copper Bluff Mine is an abandoned copper, zinc, silver and gold mine located within the Hoopa Valley Indian Reservation. The mine's primary entrance, or adit, is 300 feet above the Trinity River. The Trinity River is federally recognized as a "Wild and Scenic River." Heavy metals released from the mine could be hazardous to the tribal subsistence fishery in the

Trinity River and the habitat for the threatened Coho Salmon. In addition, Tribal and non-tribal pedestrians are exposed to the acid mine drainage and the associated orange sludge on a variety of frequented paths within the Reservation.

- **Iron Mountain Mine** - Iron Mountain Mine (IMM) is a former iron, silver, gold, copper, zinc and pyrite mine. The installation and operation of a full-scale neutralization system and the construction and operation of the Slickrock Creek Retention Reservoir to collect contaminated runoff for treatment have significantly reduced acid and metal contamination in surface waters at the site. The continuous water quality and flow monitoring systems installed in the watershed by the Region 9 Laboratory provide real time data (5 stations, 525,600 data points) on the efficacy of the treatment systems and the variability of the quality of waters discharging from the site. The discharges, via Spring Creek, flow to the Sacramento River, the drinking water source for 35% of California. More recently, the stations have started monitoring increases in turbidity due to wildfire damage in the watershed.
- **Leviathan Mine** - Leviathan Mine is an abandoned open-pit sulfur mine on the eastern slope of the Sierra Nevada. The mine is 24 miles southeast of Lake Tahoe and acid mine drainage has contaminated a 9-mile stretch of mountain creeks. Continuous water quality and flow monitoring provided by the Region 9 Laboratory was initially used to characterize the variability of water quality leaving the site at various time scales: daily, monthly and seasonally. As in the case of IMM, after the implementation of treatment measures, the monitoring (4 locations, 420,480 data points) has been used to evaluate the efficacy and consistency of the treatment systems and to provide a check on the water quality of the receiving waters.
- **Sulphur Bank Mercury Mine** - The Sulphur Bank Mercury Mine is an abandoned open pit mercury mine that is located on the shoreline of Clear Lake in California. The mine introduced mercury to bottom sediments in Clear Lake, and the levels of mercury in fish from the lake led the State to issue an advisory to limit consumption of fish. Real time continuous depth data (1 location, 70,080 data points) collected by the Region 9 Laboratory in the Herman Impoundment, a flooded acidic open pit on the site, is monitored to check for potential overflow into Clear Lake during severe rain events. The monitoring enabled emergency response personnel to add a berm to the outflow structure that prevented such a discharge this past winter.



Challenging Analysis of Asphalt Samples

During a RCRA inspection in **Region 6**, several samples were collected from an asphalt producing facility for possible enforcement actions. These samples would be characterized as a tar/paste, oil and water type of materials. They displayed a hydrocarbon odor and contained numerous chlorinated compounds from the asphalt blending process. These characteristics led to difficulties in analyzing these samples for our normal target list of volatile organic compounds (VOCs) by EPA Method 8260.

The water samples, considered a traditional matrix, were analyzed routinely and performed as expected. The tar/paste and oil samples proved more challenging due to solubility and extraction procedure issues.

Initially the samples were extracted using methanol and analyzed using traditional (Method 5030/8260) purge and trap instrumentation. This technique appeared to be insufficient based on how the solvent was mixing and penetrating the material during the extraction step.

Subsequently, the samples were extracted using hexadecane, which has been rarely employed by the laboratory, and analyzed by direct injection (Method 3580/8260). This seemed to be the better choice based on the color of the extract. However, solvent purity affected the initial results due to an unexpected VOC contaminate in the extraction solvent. The procedure was repeated with a higher purity of solvent and resulted in better analytical results.

These different approaches presented distinct advantages and disadvantages in the areas of solvent choice, chromatography, and ease of preparation. Substantial time and effort were required to complete the extraction, analysis, and reporting of this project due to the difficult matrices.

Southside Chattanooga Lead Site



Region 4 SESD conducted a Remedial Investigation (RI) at the Southside Chattanooga Lead (SCL) Site in Chattanooga, Hamilton County, Tennessee. The site consisted of residential neighborhoods and communal areas (such as schools, parks, and daycare facilities) where lead-impacted foundry material has been used as fill material and topsoil. The investigation focused on eight neighborhoods in the downtown Chattanooga area: Alton Park, Cowart

Place, East Lake, Highland Park, Jefferson Heights, Oak Grove, Richmond, and Southside Gardens.

The investigation was conducted to define the nature and extent of lead contamination at the site. The collected data was utilized to assess the potential human and ecological risks that may be resulted from exposure to the contaminated materials. Additionally, soil XRF data were used by the On-Scene Coordinator to identify properties above the emergency response action level.

Ensuring Safety of Chemicals

Chemicals and pesticides released into the environment as a result of their manufacture, processing, use, or disposal can threaten human health and the environment. EPA gathers and assesses information about the risks associated with chemicals and pesticides to allow more rapid and accurate assessment.

Suspicious Cattle Deaths Associated with Coumaphos Application

Coumaphos (found in Co-Ral) is an effective pesticide that has been widely used in Texas to kill ticks on cattle which cause Cattle Fever (bovine babesiosis). Cattle had been quarantined in 8 counties in south Texas along the Mexican border due to the severity of Cattle Fever in the area. In order to treat these cattle, the animal is put into a small enclosure, called a spray box, so that the treatment spray (Co-Ral) can be administered and contained inside the box.

Several cattle died after receiving this treatment, which led to an investigation by the Texas Agriculture Commissioner (TAC) into the cause. One of the main suspects for the deaths

was improper formulation, dilution, or mixing of the Coumaphos pesticide, possibly leading to a much higher concentration than what was recommended on the label.

In conjunction with the TAC investigation, the **Region 6** Houston Laboratory was asked to analyze the liquid used in this application. The purpose was to determine if the concentration of the Coumaphos being sprayed on the cattle was at the recommended levels.

The Region 6 Laboratory received three samples of the liquid Coumaphos that was being sprayed directly on the cattle. Since these samples were much higher concentration than what would normally be found in an environmental sample, only 1 ml was used, and then diluted by various amounts before analysis. No extraction was necessary. The samples were analyzed using EPA method 8141, utilizing a Gas Chromatograph with a Nitrogen-Phosphorous detector.

The levels detected by the Region 6 Laboratory were consistent with the concentrations expected when Coumaphos (Co-Ral) is properly prepared. The TAC was grateful for the assistance and turned to other possibilities for the cattle deaths, such as inhalation of the Coumaphos by the cattle during the spray process.

Pesticide Establishment Inspection (PEI) and Analysis

PEI analysis (aka formulations analysis) for **Region 7** Laboratory evolved from the initial requests from Missouri and Nebraska concerning the potential contamination of Dicamba stocks and the Dicamba overspray reports into the active involvement in the Pesticide Program and the Pesticide Establishment Inspections (PEIs). The states had the ability to test the formulations at the high parts-per-million concentration but lacked the ability to detect trace level contaminants at the parts-per-trillion concentrations. In 2017, Missouri and Nebraska submitted three samples each for evaluation to the Region 7 Laboratory which encouraged the laboratory, the program and counsel to begin collaborating on the approach for this program.

In 2018, Region 7 chemists developed an analytical method for the detection of active ingredients using the current Pesticide method on the Liquid Chromatography/Triple Quadrupole Mass Spectrometer (LCTQ). The chemists then developed a sample preparation method with high precision and accuracy that was safe for the highly sensitive instruments, while detecting high level concentration in complex matrices. The chemists also developed an electronic report which produced the results needed by the Pesticide program and State to show whether the formulations met the standards. As a result, Missouri saw a benefit of \$9500 for 12 samples analyzed by EPA Region 7 for the state pesticide program. Region 7 chemists plan on expanding the ingredient lists so they can assist the remaining states in the region.

Region 7 is one of three regional labs able to perform formulation analysis, as well as assist with low level contaminants in high concentration mixtures.

Cooperative Federalism

EPA understands that improvements to protecting human health and the environment cannot be achieved by any agency acting alone, but only when the states, tribes, communities and the federal government work together in a spirit of trust, collaboration, and partnership.

San Juan Watershed Program

Water resources in the San Juan watershed, which encompasses the San Juan and Animas Rivers and Lake Powell, are essential for recreational, agricultural, cultural, and residential uses. Potential contamination sources within the watershed include historic mining activities that disturbed the land and exacerbated naturally occurring mineralization. In 2016, under the Water Infrastructure Improvements for the Nation Act, the U.S. Congress authorized appropriations of \$4 million per year in 2017–2021 for a long-term water quality monitoring program for the San Juan watershed. For more information on the San Juan Watershed Program, please visit <https://www.epa.gov/san-juan-watershed>.

Field and laboratory support focus on surface water and sediment analysis from 39 sites in the watershed. Analyses include trace-level metals, mercury, chromium, hardness in water, alkalinity, anions, total and dissolved organic carbon, total nitrogen, total phosphorus and total suspended solids. Additional support will focus on storm water sampling from a subset of 15 sites to be completed for the monsoonal season in 2018. It is estimated that over 5000 analytical results will be evaluated for this project. The following participants have key roles in this project:

Region 4

- Provide laboratory analysis support for low-level mercury samples

Region 6

- Provide overall direction for the water quality sampling including outreach and coordination with the regional laboratories
- Provide assistance with analysis of sediment samples
- Outreach and coordination with New Mexico
- Support for training contract team on field sampling techniques

Region 7

- Provide laboratory analysis support

- Perform approximately 5300 sample analyses in the first year
- Provide technical assistance with field sampling
- Provide quality assurance assistance with QAPP

Region 8

- Provide overall direction for the project
- Outreach and coordination with all states and tribes, with additional support provided to Region 8 states and tribes (Southern Ute Indian Tribe, Ute Mountain Ute Indian Tribe, Utah, and Colorado)
- Support for training contract team on field sampling techniques.

Region 9

- Provide Quality Assurance oversight
- Outreach and coordination with Navajo Nation and Arizona

EPA Headquarters OWGW

- Provide technical assistance and historical knowledge gained from Analysis of Biological Data Collected from the Animas and San Juan Rivers Following the Gold King Mine Release (https://www.epa.gov/sites/production/files/2018-11/documents/gkm_bio_report_181129-508-final.pdf).

ORD (Athens, GA)

- Provide technical guidance and support to EPA Regions, states and tribes
- Provide historical knowledge gained from development of Gold King Mine Fate and Transport study (<https://www.epa.gov/goldkingmine/fate-transport-analysis>) and analysis of biological data

ORD (Corvallis, OR)

- Provide technical assistance with sampling design

Wastewater Treatment Plant Operators Workshop for Central America

On August 2018, **Region 4** SESD engineers conducted the first Wastewater Treatment Plant (WWTP) Operators Workshop for the Dominican Republic- Central America Free Trade Agreement (CAFTA-DR). The workshop consisted of discussions concerning the design, maintenance, process control, operation and management factors limiting treatment performance on municipal wastewater treatment plants and provide recommendations to improve plant operation and performance. USEPA-SESD has been supporting the CAFTA-DR environmental projects with technical leads of wastewater regulations workshops and diagnostic evaluations of WWTPs.



The WWTP Operators Workshop provided training to WWTP operators from Honduras, El Salvador, Costa Rica, and Dominican Republic. The workshop also included visits to three wastewater treatment plants (Los Tajos WWTP, Lindora WWTP and Santa Ana WWTP) to perform field exercise activities (dissolved oxygen measurement profile, pH readings, settlometer tests, etc.). The workshop was part of an ongoing effort between USEPA and The United States Agency for International Development (USAID), under an USEPA-USAID Participating Agency Service Agreement (PASA), to support the environmental obligations under the CAFTA-DR and the Environmental Cooperation Agreement (ECA).

The workshop also helped develop the ability of local operators to address WWTP process control and operational activities effectively, thus supporting the protection of the water quality of the waterways. Several countries benefited from the workshop presentations and field activities. In addition, a network of professionals was developed to continue to support a joint effort to develop sustainable wastewater treatment systems and strengthening of the wastewater management in the Region.



Environmental Sustainability in CAFTA-DR and Panama

Note: Information referenced from *"The Regional CAFTA-DR Environmental Program from USAID, Building A Sustainable Future"* 2018 Brochure.

The people of the United States, through the United States Agency for International Development (USAID), using the framework of the Free Trade Agreement between Central America, Dominican Republic, the United States (CAFTA-DR), and Panama have contributed to the prosperity of the signatory countries and improved the environmental performance of the region. Based on this agreement, Central America and Dominican Republic are advancing towards reaching their goal of sustainable development, improving the environmental standards in order to favor economic growth and having the most minimal impact possible on the environment.

As a result of the environmental cooperation of the United States Environmental Protection Agency (USEPA- **Region 4** SESD) and The United States Agency for International Development (USAID) in the CAFTA-DR context, Central America and Dominican Republic are utilizing a regional Standard Waste Water Model as a template, which is a scientific methodology that established 12 basic elements for developing and implementing regulatory programs for the discharge of effluents. In this regard, the countries have initiated a process of discussion and socialization of the standard at the public-private levels, so they can slowly begin to lay the foundations in order to adapt this regional instrument to national regulations.



Cocabel, Wastewater Treatment Plant, Lempira, Honduras

USEPA – Region 4 developed technical reports for each treatment plant identifying opportunities for optimizing operations to improve treatment and energy use efficiency.

USEPA-Region 4 SESD helped to improve the scientific capacity of regional laboratories in accurately determining the quality of the wastewater discharge. This project strengthened the technical skills and knowledge of the staff from 12 laboratories from Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama and Dominican Republic. This made

it possible to develop an inter-comparison process among laboratories and to work with samples to determine the efficiency and assertiveness of the results from each of them. This work allowed for a pre-certification of laboratories and helped establish a wastewater reference network between the CAFTA-DR countries and Panama that will help to increase the sustainability of water resources in the region.

The laboratories were selected according to their high institutional commitment to train others, their operational quality control systems, their satisfactory participation in tests among different laboratories, the technical competency of their personnel, their adequate training and laboratory infrastructure, as well as their hierarchical organizational position that does not generate conflicts of interest.



Water and Physical-Chemical Services Laboratory,
Universidad de Chiriquí, Panamá.

7th Africa Water Week/ African Ministers Council on Water Conference

The Laboratory Capacity Building Team (**Region 4 LSASD and ORD Cincinnati**) composed 3 presentations for the 7th Africa Water Week/ African Ministers Council on Water Conference in Libreville, Gabon. These presentations described the results of a joint US Environmental Protection Agency/ The United States Agency for International Development (USAID)/Ghana Water Company Limited (GWCL) Drinking Water Laboratory Capacity program. The overall goal was to ensure the delivery of clean water in urban areas by building the capacity of laboratories for sampling and analysis of water. Ensuring the validity and reliability of data through a documented quality system protects public health by providing a sound scientific



basis for monitoring the effectiveness of water delivery services and water treatment. Our Laboratory Capacity program included a series of technical training sessions in both Chemistry and Microbiology that were attended by lab staff and managers from the 12 GWCL regions. The training focused on methods that fit the mission and budget of the laboratory with an emphasis on quality assurance practices designed to ensure the production of quality data. This training took place in both classroom and laboratory settings. The training also included the creation of a Quality Assurance Manual for use by all GWCL laboratories. This QA Manual, written by Ghana laboratory staff and managers, and approved by the senior management, details all aspects of laboratory operations, including a Quality Policy Statement, Manager and Staff Responsibilities, Records Management, Personnel Training and Internal Quality System Audits, among other important topics. Presentations described the technical exercises used in the training, an overview of the Manual and the impact of this program on the GWCL laboratory operations.

State Lab Director's Meeting and Drinking Water Table Top Exercise

A seminar and discussion-based exercise was held on October 16, 2018 at Fort Meade. Attendees included representatives involved in drinking water analysis in **Region 3** from Washington DC, Delaware, Pennsylvania, Virginia, and Maryland. Also, in attendance were representatives from the EPA representing Environmental Assessment and Innovation Division (EAID), Water Protection Division, and Emergency Response. The agenda was a full day composed of presentations in the morning and discussion-based exercises in the afternoon. Topics in the morning covered included drinking water laboratory incident response experience, EPA Region 3 Laboratory Response Plan, Water Laboratory Alliance Response Plan, and mobile lab capabilities. Objectives of the exercise were to determine needed communications between regional and state laboratories, define roles and responsibilities of regional and state labs, review how laboratory analysis is communicated to the end user, and discuss the role of regional and state labs in the development of a sampling plan during an incident involving drinking water. The States offered clear and thoughtful discussion on all afternoon scenarios showing their great experience and understanding of how to deal with incidents involving drinking water.

State Collaboration for Water Monitoring

In spirit of the Agency's initiative of cooperative federalism, **Region 7** management reached out to their state partners to see how the Regional Laboratory could better provide service to their state agencies. Through the course of building a relationship with their partners, the Nebraska Department of Environmental Quality requested laboratory support for their Surface Water Program with a focus on metals analyses.

The Region 7 chemists have been actively supporting this relationship by analyzing surface water samples each quarter in 2018 for the Nebraska Department of Environmental Quality Surface Water Program. To accommodate the state process, 13 separate sets of samples were submitted resulting in 110 surface samples per quarter. In 2018, Region 7 completed 440 sample analyses for 52 different Analytical Service Requests (ASRs). 100% of the sample data was delivered on time, while continuing to provide laboratory data of exceptional quality and timeliness.

Relationship-building and proactive collaboration was a necessity for this partnership to succeed. The state had to develop a schedule of sample collection activities, and coordinate sample receipt with the Region 7 Laboratory. The state learned how to ship samples within the Region 7 system to optimize results. The Region 7 chemists coordinated the sample digestions and analysis to ensure data were produced in a timely manner. The chemists worked diligently together to complete their individual components so that their finished data deliverables met the state's needs. Laboratory management maintained an open communication style that facilitated the collaboration.

This partnership has provided the state a much-needed cost savings of \$45,000 in 2018. It has also freed up resources which the state was able to utilize on other needed projects under the Clean Water Act. The hard work of the regional team has set the framework for continued laboratory support for our other state partners in the future.

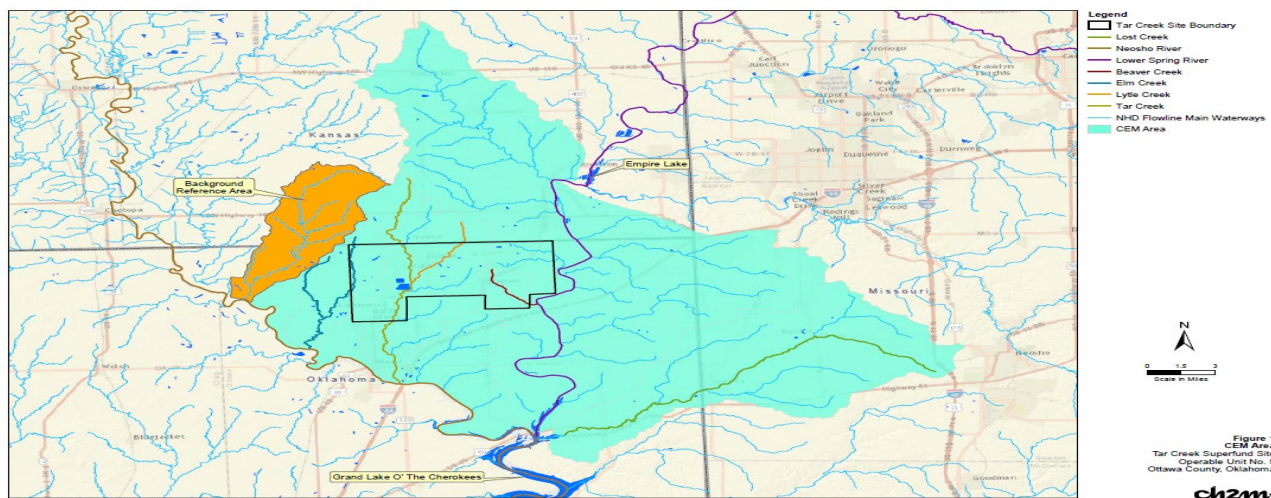
Tar Creek

In 2017 and 2018, the **Region 7** Laboratory provided data to support a multi-jurisdictional activity by providing analysis of samples associated with the Cherokee County -Tar Creek Watershed Superfund site located in Ottawa County, Oklahoma. The Tar Creek Superfund National Priorities List (NPL) site, Operable Unit (OU) 5, is defined by the United States Environmental Protection Agency (EPA) **Region 6** as sediments and surface water in perennially flowing creeks, streams, and rivers within the Oklahoma portion of the Tri-State Mining District (TSMD) that may be impacted by historical mining activities. The area includes seven specific watersheds that flow downstream from EPA Region 7 states (Kansas and Missouri) into EPA Region 6 (Oklahoma). This project included the support, coordination and involvement of 9 individual tribes, 2 regions, 3 states and 4 other agencies.

The first priority was to fill data gaps associated with a human health risk assessment of exposure to sediment and surface water for tribal use scenarios. The sampling events were a coordinated effort led by EPA Region 6, but involved sampling conducted by Region 7, Oklahoma State agencies, tribal members and others. Over 1400 samples were taken and analyzed resulting in 8,353 results from 14 sample sets for this site. There were 17 separate analytical methods requested, with a focus on metals (lead) and mercury. Region 7 chemists ground and analyzed the 400 tissue samples (plant, various mammals, fish, frogs, mussels) providing a service to the field teams and saving the agency money. Nine months later to meet the screening criteria for human health risk assessments, the Project Manager requested that all the results be modified to report down to the method detection limits instead of the originally reported limits.



The analyses performed by the Region 7 laboratory resulted in a \$104,700 commercial value per year. The data transmitted to the project managers provided the risk data for the states and tribes. Additionally, the data will be incorporated into a final Human Health Risk Assessment, then to a Remedial Investigation and further into remedy decisions for two watersheds and the four Superfund sites of the Tri-State Mining District (covering two EPA regions, three states, and several tribes).



Prioritizing Robust Science

EPA will apply the best available science to address current and future environmental hazards, develop new approaches, and improve the scientific foundation for environmental protection decisions.

Passaic River Pathogen/Microbial Source Tracking Study

The Second River, a major tributary of the Passaic River located in Northern New Jersey, flows through an Environmental Justice area that is largely urbanized and includes several large townships. The river has shown some of the highest levels of fecal bacteria in the New York-New Jersey Harbor and the source of these elevated levels was not clear. The **Region 2** program office, with the assistance of the Region 2 Regional Science & Technology field and laboratory staff, designed an intensive study with the primary objectives of 1) assessing bacteria levels at multiple key locations throughout the Second River and 2) identifying the sources of the bacteria, specifically whether they were of human origin. The initial comprehensive study was conducted in 2016 and identified “hot spots” on the Second River. In 2017 and 2018, the Region focused on the hotspots identified in the initial 2016 study. The 2018 follow-up study focused on the most persistent and problematic sites downriver, “SR-06” and “SR-07” and comprised five sampling events. Sampling at both sites revealed ongoing sources of human pathogens:

- Site SR-06 is the storm sewer outfall for the Meadowbrook Storm Sewer in Newark. The Meadowbrook Storm Sewer is a very large storm sewer system that receives storm water flows primarily from Newark, but also from adjacent municipalities, including Belleville and East Orange. EPA issued an administrative order to the city of Newark to track down, identify and eliminate illicit connections and discharges to the Meadowbrook Outfall. After an initial illicit connection was identified and remediated, Newark, in conjunction with PVSC, performed a closed-circuit TV inspection of the entire Meadowbrook storm sewer. Three additional illicit connections were identified and remediated. The City of Newark identified a large ongoing source of pathogens coming from Belleville and is in the process of taking a follow-up confirmatory sample.
- Site SR-07 is at the site where a small tributary enters the Second River in the town of Belleville, NJ. Immediately upstream of this confluence, several sewer lines cross the tributary. Two large sewer lines belonging to the Second River Joint Outlet Sewer pass above the tributary while a smaller abandoned sewer line was discovered by the sampling team passing underneath the tributary. Sampling in 2018 confirmed the abandoned sewer as the source of human pathogens to the tributary, and an underwater camera utilized by the sampling team revealed a large break in the vitrified clay pipe sewer. The Second River Joint Outlet Sewer group

arranged for cleaning and CCTV analysis of the sewer lines and confirmed the abandoned sewer as the source of pathogens into the tributary; remediation efforts are being scheduled.

The Region 2 Laboratory provided analytical support for the project, analyzing samples for conventional bacteria indicators followed by molecular DNA marker testing of the bacteria to identify the sources. This conventional bacteria analysis included testing for *Enterococcus*, *Escherichia coli*, and Fecal Coliforms; the molecular DNA analysis included testing for two Human DNA markers to assess if the sources were of human, e.g., sewerage, or non-human, e.g., water fowl, animals.

The laboratory provided a comprehensive analytical report to the program office, summarizing the conventional bacteria results and the molecular-based DNA results, for evaluation. The study data will directly assist in the development of management strategies to address major sources of contamination.

Microplastics

EPA's **Region 3** Laboratory at the Environmental Science Center (ESC) has been collaborating on a RARE project to identify and quantitate microplastics. The US EPA National Health and Environmental Research Laboratory, Gulf Ecology Division (GED) and Atlantic Ecology Division (AED), are conducting investigations into the number and types of microplastics found in open water, sediment, and marine and estuarine organisms. AED and GED labs are preparing samples for shipment to the ESC where microplastics will be analyzed using Fourier Transform Infrared (FTIR) Micro Analysis. Microplastic particles 20 to 5000 microns in diameter will be identified according to plastic type, size, and shape. The ESC's microplastics team will also provide feedback to AED and GED to optimize sample preparation procedures. The lab will utilize state-of-the-art FTIR microscopy instrumentation with automated stage and acquisition features and imaging technology.

Use of Portable GC/MS at Raymark SF Site

In the early part of FY 2018, the **Region 3** Laboratory purchased a Perkin Elmer Torion® T-9 portable Gas Chromatography-Mass Spectrometer (GC/MS) for field analysis and as a screening tool for high hazard samples. The first opportunity to test out this new instrumentation came in June of 2018 when Region 3 chemists were asked to help identify the possible contamination point sources at the Super Fund Site, Raymark. On June 6, working with the regional project manager, the portable Torion® T-9 GC/MS was evaluated for its ability to screen for air contamination containing trichloroethylene and tetrachloroethylene. After making a few adjustments to the instrumentation, the contaminants of interest were successfully detected. By pinpointing the areas where the contamination is present, the data allows the RPM to develop a more strategic sampling

plan, which will minimize collection efforts and cost associated with shipping samples for laboratory analysis. The Regional Laboratory benefited from this experience in many ways. Primarily giving the laboratory the chance to evaluate the effectiveness in the field of the Torion® T-9 GC/MS. Based on this effort, the Regional Laboratory is developing a field operating plan for future projects.

Lower Duwamish Waterway Arsenic Study

Consumption of inorganic arsenic in clams, chiefly *Mya arenaria* (*Mya*), contributes 40-50% of the total risk in the Reasonable Maximum Exposure seafood consumption scenario for tribal fishers in the Lower Duwamish Waterway (LDW) located in Seattle, WA. The LDW is part of the Muckleshoot Tribe's Usual and Accustomed tribal fishing areas. It has been a major industrial corridor since the early 1900s and as a result is contaminated with toxic chemicals such as arsenic from many sources, such as stormwater runoff, wastewater and industrial practices. The tribe has expressed interest in harvesting clams in the waterway, but they currently do not because of the chemical contamination. Understanding how and from which media *Mya* bioaccumulates arsenic is critical to make science-based decisions on remediating arsenic contaminated sediments so that clam consumption-based risk to Tribal members is minimized.

In developing a remediation plan of the contaminated sediments, a study was initiated to help ensure that cleanup plans can lead to overall risks from arsenic being reduced. This study involved planting of *Mya* at various strategic locations at the LDW and analyses of the clam tissue. Although reducing sediment arsenic concentrations is expected to decrease inorganic arsenic (the most toxic As(III) form) concentrations in tissue, it is not currently possible to reliably predict this decrease. The relationship between sediment and *Mya* arsenic concentrations are considerably variable. *Mya* retains approximately 50% of bioaccumulated arsenic in the inorganic form rather than transforming it to less toxic organometallic forms as it occurs in other clam species. The **Region 10** Laboratory has supported this study for the past few years with analyses of the *Mya* tissue for total arsenic and arsenic species (dimethylarsinic acid, monomethylarsonic acid, inorganic arsenic, arsenobetaine+cation and other species). Also involved in this study was the evaluation on the use of Diffusive Thin Film Gradient (DGT) disks to mimic shellfish uptake of the arsenic. The Region 10 Laboratory developed the analytical methods to analyze the DGTs and pre-conditioned them prior to being used at the site. The comparison data between the DGTs and actual *Mya* is under evaluation.

Laboratory Support of Analytical Methods Improvements

During this period, the **Region 10** Laboratory was a significant contributor in developing improvements to analysis methods that are critical toward evaluating hazardous soils, sediments, sludges and liquid wastes materials.

The **Regions 5, 7, and 10** participated in the workgroup that developed proposals to update the regulations for the identification of ignitable hazardous waste under the Resource Conservation and Recovery Act (RCRA) and to modernize the RCRA test methods that currently require the use of mercury thermometers. The proposed revisions provided greater clarity to hazardous waste identification, provide flexibility in testing requirements, improve environmental compliance and, thereby, enhance protection of human health and the environment. Acceptances by the Regional Assistant Administrators were acquired early FY 2019.

As part of its process to maintain current methods, the Office of Land and Emergency Management held workgroup meetings to discuss potential changes to metals digestion Method 3050B. Some changes in acid addition sequence and concentration were proposed in order to maximize digestion efficiency and simplify the subsequent analysis of the digestate.

The Region 10 Laboratory volunteered to perform proof-of-concept digestions on reference materials to verify that the proposed method was effective. However, the results indicated that the proposed method was not effective; therefore, additional studies being performed, along with other participating laboratories, to determine acid additions that would accomplish the workgroup goals. The further revised method will undergo a multi-lab study in the coming year.

The Region 10 Laboratory was a participant in a round robin study to test an In-vitro Bioavailability (IVBA) soil method for Arsenic. In addition, the Region 10 Laboratory staff contributed as validation study reviewers.

Kansas City Transportation and Local-Scale Air Quality Study (KC-TRAQS)

Region 7 scientists collaborated with scientists from ORD's NRML and NERL to design and execute a year-long field campaign in the Kansas City metro area to deploy novel sensors and measurement approaches to the Kansas City Transportation and Local-Scale Air Quality Study (KC-TRAQS). The objective was to characterize PM_{2.5} and Black Carbon (BC) emissions and air pollutant concentrations in a near source environment across a monitoring network of seven fixed sites. The field study focused on transportation sources including highway / roadway, trucking / hauling, scrap metal processing and hauling, and railroad operations.

The study had multiple unique characteristics including long duration, site-specific meteorology, measurement of multiple air pollutant species, and use of a wide variety of sampling methods and instrumentation including; traditional Federal Reference methods (FRM), lower-cost sensor packages, citizen science, and mobile monitoring techniques.

The six fixed monitoring sites employed FRM devices incorporating both Teflon and Quartz



fiber filters to measure both PM_{2.5} and elemental carbon/organic carbon (EC/OC). Non FRM sampling included a lower cost sensor package, called the P-POD, employing sensors streaming 1-minute PM_{2.5} and EC/OC concentration data. The P-POD adds particulate matter to the sensor pod (S-POD). Additionally, beta attenuation monitors (EBAMs) were incorporated at selected fixed

monitoring sites. The citizen science monitoring program used portable, battery powered units logging 10-second PM_{2.5} data, and the mobile monitoring campaign employed an instrumented electric vehicle, GMAP (Geospatial Measurement of Air Pollution), recording 1-second ultrafine PM and BC (black carbon) data.

The citizen science monitors were based on EPA's Air Mapper design. The original Air Mapper design/build concept was significantly modified and updated by Region 7 scientists incorporating 3-D printing technology to locally manufacture an inventory of Air Mappers sufficient to support multiple deployments of citizen scientists over several weeks. The Air Mappers employed rechargeable battery power, global positioning system, optical particle sensor estimating PM₁/PM_{2.5}/PM₁₀, CO₂, and other sensors including accelerometer, noise, temperature, and relative humidity.



In total, this one-year data collection and monitoring effort yielded over 385 million data points that will be used for instrument intercomparison and source characterization purposes. The collection of a large volume of data, coupled with high time and spatial resolution meteorology, PM and BC concentrations allows the researchers to document and ascertain the potential impacts from many source categories. Region 7 scientists will continue to collaborate with ORD researchers during the data analysis phase of this study to further elucidate the relative impact of a wide variety of transportation related sources in these Kansas City, KS neighborhoods.

Improving Efficiency and Effectiveness

EPA is working to modernize and improve business processes and operations to promote transparency, efficiency, and effectiveness, and improve the capabilities and cost-effectiveness of its information technology and information management systems.

Quality Assurance Guidance for Citizen Science

The **Region 1** Office of Environmental Measurement and Evaluation's Quality Assurance Unit, in conjunction with the Headquarters Office of Research and Development and Office of Mission Support, led a national initiative in developing quality assurance guidance for citizen science projects. The purpose of the guidance is to provide citizen scientists with tools and procedures that can help document the quality of data to achieve an intended purpose. The guidance should be released to the public in the Spring of 2019.



Lab Efficiencies and Effectiveness

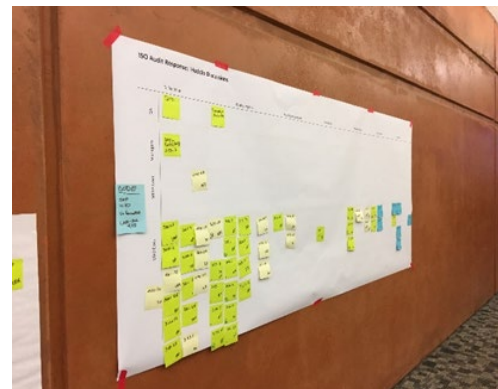
Region 7 chemists and support staff embraced LEAN and ELMS activities to improve laboratory performance while responding to customer needs. Their most notable accomplishment this year was to submit all sample data on-time with a standard 30 day turn-around. They improved their performance using lean tools, focusing on Program/State mission results, improving customer service, and being accountable resource stewards.

For the last four years, the team has conducted 2-3 mini-lean events annually to understand and improve operations resulting in a savings of \$30,000 per year on sample container procurement and streamlined data reviews to less than 10 days. They used an ELMS flow board to track and revise over 80 SOPs within a two-month period. They have begun the process to transition to electronic data review and analysis transmittals to save agency paper procurement to the tune of 600 boxes annually. Our laboratory chemists constantly look for ways to improve the analytical methods which reduce preparation times and hazardous waste costs. The team supported a new extraction for semi-volatile compounds which requires no solvents, and which has lower detection limits with smaller sample aliquots.

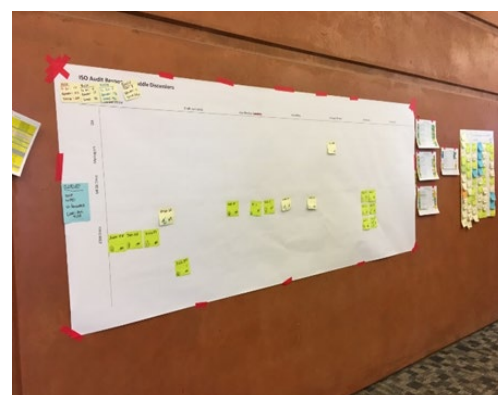
The team's analytical products are used by the programs for enforcement, monitoring, and human health evaluations. This year, 100% of the data generated by EPA was delivered to the customer on time with an average delivery of 12 days before the due date and with a standard delivery of 30 days. Over 50 of the 370 projects had shorter due dates of 3 or 7 days. This year, the chemists completed the analysis of 17,266 samples generating 262,255 results meeting all the agency required quality controls. 100% of the CLP sample data was reviewed for completeness and acceptability.

In each of the LEAN events, the team invited customers to participate so that their needs were incorporated. One improvement was to request one electronic survey to respond to RCRA disposal guidance and customer service, replacing two paper forms. Initial responses were low, and the team developed talking points to be shared with customers. At the end of the year, the team receives greater than 95% of the surveys with a single reminder. Any complaints were addressed quickly. Out of 433 responses, only 10 had complaints; less than 2% complaint rate.

Because the team is focused on the return on investments that the programs have made, they are looking for ways to be good stewards of EPA's resources while addressing the region's needs. Towards that end, they have eliminated 12 rarely used analytical methods. They have partnered with the states in the region, analyzing quarterly water samples saving Nebraska over \$45,000 annually. They have implemented sample analysis for Pesticide Enforcement Inspections with one new method incorporating many analytes. They continue to analyze fish tissue samples for health advisories, completing 875 samples



SOP huddle board in the first month



SOP huddle board after 2 months, completing 80 SOP revisions.

this year for mercury. They also partner with ORD assisting with sample analysis and field work within the region focusing on green infrastructure, research for vapor intrusion sites, and controlled field burns. Finally, they partner with other regions and the programs. This year, they worked with **Region 6** on a tissue and soil sample project focused on lead, producing 15,000 results on 26 different projects. They brought all the summa can air samples into the EPA laboratory, saving Superfund Program \$159,000. They have initiated work with **Region 8** to analyze samples as part of the follow-up activities for Gold King Mine.

The numbers speak for themselves; telling a story of a team of chemists who sought ways to improve laboratory operations without sacrificing detection limits and quality, while improving the timeliness to their customers. They performed these mission-required activities meeting the customer needs. They have promoted the capabilities of the laboratory while being cognizant of the dwindling Agency resources. As a result of these activities, Region 7 laboratory team won one of the Gears of Government Awards this year.

Radiation Training with Maryland State Lab

The **Region 3** Office of Analytical Services and Quality Assurance (OASQA) attended a week-long radiochemistry training at the Maryland State Lab in March 2018. The topics included the need for Radium-226 and Radium-228 method modification, flags and qualifiers for raw data and data package when QC parameters are out of acceptance range and criteria stated in the Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP), Drinking Water Certification Manual (DW Cert Manual) and Safe Drinking Water Act (SDWA) reference documents. Additionally, radiochemistry standard operating procedure (SOP) language inconsistencies, the ongoing effort to update Chapter VI of DW Cert Manual and EPA Series 900 methods to include QC and how the new method detection limit (MDL) rule applies to radiochemistry were reviewed. Method overview, sample preparation and observation of chemistry, preparation and use of attenuation and quench curves, quality control criteria, detector calibration and data promulgation, and result reporting were observed and discussed for EPA Methods 900.0, 904.0; 906.0, HASL-300 Ga-01r. Those methods addressed gross alpha, beta in drinking water by radon emanation, radium 228 in drinking water, tritium in drinking water and gamma isotope analysis. Waste removal, tracking in a radiation laboratory and radiochemistry safety were part of training.

Appendix A

Regional Laboratories Core Capabilities Summary

Regional Laboratories Core Capabilities Summary FY 2018													
Inorganic Chemistry													
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	REGIONAL CAPABILITY										
			1	2	3	4	5	6	7	8	9	10	
Acidity	Water	Titrimetric		•	•	•	•			•	•	•	•
Alkalinity	Water	Titrimetric	•	•	•	•	•	•	•	•	•	•	•
Anions	Water	IC	•	•	•	•	•	•	•	•	•	•	•
	Water	Titrimetric		•	•								
Asbestos	Soil/Sediment	PLM	•							•	•		•
	Solids/ Bulk material	PLM	•							•	•		•
Chromium, Hexavalent (Cr+6)	Soil/Sediment	Colorimetric											•
	Soil/Sediment	IC			•	•	•						
	Water	Colorimetric		•						•			•
	Water	IC			•	•	•	•	•	•		•	
Cyanide, Amenable	Soil/Sediment	Colorimetric	•	•						•			
	Water	Colorimetric	•	•			•			•		•	
Cyanide, Total	Soil/Sediment	Colorimetric	•	•	•	•	•	•	•				
	Waste	Colorimetric	•	•	•	•	•	•					
	Water	Colorimetric	•	•	•	•	•	•	•			•	
Fluoride	Water	IC	•	•	•	•	•	•	•	•	•	•	•
	Water	ISE	•	•			•						
Hardness	Water	Colorimetric											
	Water	ICP/Calculation	•	•	•	•	•	•	•	•	•	•	•
	Water	Titrimetric		•	•				•			•	

Regional Laboratories Core Capabilities Summary FY 2018													
Inorganic Chemistry													
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	REGIONAL CAPABILITY										
			1	2	3	4	5	6	7	8	9	10	
Mercury (TCLP)	Soil/Waste (oil, drum, etc.)	CVAA		•	•	•	•	•	•			•	•
	Soil/Waste (oil, drum, etc.)	Direct Hg Analysis					•		•				
Mercury, Total	Soil/Sediment	CVAA	•	•	•	•	•	•			•	•	•
	Soil/Sediment	Direct Hg Analysis	•				•		•			•	•
	Tissue (fish &/or plant)	CVAA	•	•	•	•		•			•	•	•
	Tissue (fish &/or plant)	Direct Hg Analysis	•						•	•		•	•
	Waste (oil, drum, etc.)	CVAA	•	•	•	•	•	•			•	•	•
	Waste (oil, drum, etc.)	Direct Hg Analysis								•			
	Water	CVAA	•	•	•	•	•	•			•	•	•
	Water	Direct Hg Analysis								•	•		
Metals (TCLP)	Soil/Waste (oil, drum, etc.)	GFAA											
	Soil/Waste (oil, drum, etc.)	ICP /AES		•	•	•	•	•	•	•	•	•	•
	Soil/Waste (oil, drum, etc.)	ICP/MS				•		•	•	•			•

Regional Laboratories Core Capabilities Summary FY 2018

Inorganic Chemistry

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

Regional Laboratories Core Capabilities Summary FY 2018

Organic Chemistry

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	REGIONAL CAPABILITY											
			1	2	3	4	5	6	7	8	9	10		
BNA	Soil/Sediment	GC/MS	•	•	•	•	•	•	•	•	•	•	•	•
	Tissue (fish &/or plant)	GC/MS				•								•
	Waste (oil, drum, etc.)	GC/MS	•	•	•	•	•	•	•	•	•	•	•	•
	Water	GC/MS	•	•	•	•	•	•	•	•	•	•	•	•
BNA (TCLP)	Solid/Waste	GC/MS		•	•	•	•	•	•	•		•	•	

Regional Laboratories Core Capabilities Summary FY 2018												
Organic Chemistry												
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	REGIONAL CAPABILITY									
			1	2	3	4	5	6	7	8	9	10
BNA (TPH)	Soil/Sediment	GC/MS or GC					•	•	•	•	•	•
	Water	GC/MS or GC					•	•	•	•	•	•
BOD	Water	Membrane Electrode		•	•	•	•	•	•		•	•
COD	Water	Colorimetric		•	•		•		•			
	Water	Photometric			•			•				
EDB & DBCP	Water	GC/ECD	•				•	•		•		
	Water	GC/MS				•				•		
Herbicides	Soil/Sediment	GC/ECD; GC/NPD						•	•			
	Tissue (fish &/or plant)	GC/ECD; GC/NPD							•			
	Waste (oil, drum, etc.)	GC/ECD; GC/NPD							•			
	Water	GC/ECD; GC/NPD						•	•			
	Water	LC/MS/MS				•			•			
Herbicides (TCLP)	Solid/Waste	GC/ECD						•	•			
	Solid/Waste	HPLC/UV Detection										
Oil & Grease	Soil/Sediment	Gravimetric							•			
	Water	Gravimetric		•	•		•		•			•

Regional Laboratories Core Capabilities Summary FY 2018												
Organic Chemistry												
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	REGIONAL CAPABILITY									
			1	2	3	4	5	6	7	8	9	10
PAHs	Air	GC/MS	•							•		
	Soil/Sediment	GC/MS	•	•	•	•	•	•	•	•	•	•
	Tissue (fish &/or plant)	GC/MS	•			•				•		•
	Waste (oil, drum, etc.)	GC/MS	•	•	•	•			•	•	•	•
	Water	GC/MS	•	•	•	•	•	•	•	•	•	•
Pesticides / PCBs	Soil/Sediment	GC/ECD	•	•	•	•	•	•	•	•	•	•
	Tissue (fish &/or plant)	GC/ECD	•	•		•				•	•	•
	Water	GC/ECD	•	•	•	•	•	•	•	•	•	•
	Water, Soil, Waste	GC/MS/MS				•				•		•
Pesticides (TCLP)	Solid/Waste	GC/ECD		•	•	•	•	•	•		•	
	Solid Waste	GC/MS/MS				•				•		
PFAS	Water	LC/MS/MS				•						
Phenolics	Soil/Sediment	Colorimetric			•					•		
	Water	Colorimetric		•	•					•		
TOC	Soil	Combustion / IR		•	•	•	•			•	•	•
	Water	Combustion / IR		•	•	•	•			•	•	•
	Water	UV/Persulfate							•	•	•	

Regional Laboratories Core Capabilities Summary FY 2018												
Organic Chemistry												
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	REGIONAL CAPABILITY									
			1	2	3	4	5	6	7	8	9	10
VOA	Air	GC/MS	•		•	•	•	•	•	•	•	
	Soil/Sediment	GC				•				•		
	Soil/Sediment	GC/MS	•	•	•	•	•	•	•	•	•	•
	Waste (oil, drum, etc.)	GC	•			•	•					
	Waste (oil, drum, etc.)	GC/MS	•	•	•	•		•	•	•	•	•
	Water	GC				•					•	
	Water	GC/MS	•	•	•	•	•	•	•	•	•	•
VOA (TCLP)	Solid/Waste	GC/MS		•		•	•	•	•			•
VOA (TPH)	Soil/Sediment	GC/MS or GC					•	•	•	•	•	•
	Water	GC/MS or GC					•	•	•	•	•	•

Regional Laboratories Core Capabilities Summary FY 2018													
Biology/Microbiology													
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	REGIONAL CAPABILITY										
			1	2	3	4	5	6	7	8	9	10	
Coliform, Fecal	Water, Soil &/or Sludge	Various	•	•	•				•	•		•	•
Coliform, Total	Water, Soil &/or Sludge	Various	•	•	•	•			•	•		•	•
E. coli	Water, Soil &/or Sludge	Various	•	•	•	•			•	•		•	•
Heterotrophic PC	Water	Various	•	•	•				•	•		•	•
Toxicity (Acute & Chronic)	Water	Fathead, Ceriodaphnia			•				•				

Appendix B

Regional Laboratories Unique Capabilities Summary

Region 1 Laboratory Summary of Unique Capabilities FY 2018				
Inorganic Chemistry				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
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	

Region 1 Laboratory Summary of Unique Capabilities FY 2018				
Organic Chemistry				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
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
	Water, Soil, Sediment, Waste (drum)	GC/ECD (EPA Method 680)	Superfund	Field Method

Region 1 Laboratory Summary of Unique Capabilities FY 2018

Organic Chemistry

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Pharmaceuticals and Personal Care Products (PPCPs)	Water	LC/MS/MS	Water	Endocrine disruptors, Illicit Discharge Detection
Poly Fluoroalkyl Substances (PFAS)	Water	LC/MS/MS (EPA Method 537)	Superfund/ Drinking Water	
VOCs	Air (mini-cans)	GC/MS (EPA Method TO-15)	Superfund	Air Toxics
	Water, Soil, Air	GC/ECD/PID	Superfund	Field Screening

Region 1 Laboratory Summary of Unique Capabilities FY 2018

Biology/Microbiology

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Chlorophyll a	Ambient water	EPA 445.0	Ambient monitoring	
<i>Enterococci</i>	Ambient water	Enterolert/ EPA Method 1600	Ambient monitoring	

Region 1 Laboratory Summary of Unique Capabilities FY 2018

Physical & Other Determinations

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Grain Size	Sediment	Sieve (Modified ASTM)	Superfund, Water	Region 1 SOP
Loss on Ignition (LOI)	Sediment		Water	
Percent Lipids	Tissue	Gravimetric		

Region 2 Laboratory Summary of Unique Capabilities FY 2018

Inorganic Chemistry

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
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	
Percent Sulfur	Fuel Oil	ASTM D4294	Air	
SO ₂	Air / N2	EPA Reference or Equiv. Method as in 40 CFR Part 58	Air	

Region 2 Laboratory Summary of Unique Capabilities FY 2018				
Organic Chemistry				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Methane, Ethane, Ethene	Water	GC/FID	SF/RCRA	
Ozone Precursors (hydrocarbons)	Air	GC/MS/FID	Air	
PCB Aroclors	PUF	GC/ECD	Air	EPA Method TO-10A
Pesticides	Wipes	LC/MS/MS and GC/MS	General	
Poly Fluoroalkyl Substances (PFAS)	Water	LC/MS/MS	Superfund, Water	EPA Method 537 (14 PFAS compounds) ; EPA Method 537.1 (18 PFAS compounds including GenX);
Total Petroleum Hydrocarbons	Water	Hexane Extraction (EPA Method 1664)	Water	

Region 2 Laboratory Summary of Unique Capabilities FY 2018				
Biology/Microbiology				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Cryptosporidium	Water	Fluorescent Microscopy (EPA Method 1623)	Water	
Colilert 18/Colilert w/Quantitray	Water	Defined Substrate Technology	Water	
DNA-qPCR E. coli	Water (Fresh & Marine)	EPA/CDC Protocols	Water	
DNA - qPCR (<i>Enterococcus</i>)	Water (Fresh & Marine)	EPA/Cepheid Methodology	Water	
DNA, Markers, Various	Water (Fresh & Marine)	Gen Bacteroidales	Water	
<i>Enterococcus</i> Group	Water	Membrane Filtration	Water	
Enterolert w/ Quantitray	Water	Defined Substrate Technology	Water	
<i>Giardia</i>	Water	Fluorescent Microscopy (EPA Method 1623)	Water	
mColibblue24	Water	MF/Hach	Water	

Region 2 Laboratory Summary of Unique Capabilities FY 2018				
Physical & Other Determinations				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Density	Ink, Paint	ASTM D1475	Air	
Grain Size	Solid	Pipet Method	Superfund, Water	
	Solid	Hydrometer Method (based on ASTM D422-63)	Superfund, Water	
Particulates (Fine)	Air	EPA Reference or Equiv. Method as in 40 CFR Part 58	Air	
Percent Volatile Matter		ASTM D2369	Air	
Percent Water	Ink, Paint	ASTM D4017	Air	

Region 3 Laboratory Summary of Unique Capabilities FY 2018

Organic Chemistry

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Chemical Warfare Agents	Water/Solid/Wipe	GC/MS	Emergency Response	
Nitroaromatics & Nitroamines	Water, Soil/Sediment	HPLC	Water	Method 8330
Nitroglycerine	Water, Soil/Sediment	HPLC	Water	Method 8332
Poly Fluoroalkyl Substances (PFAS)	Water	LC/MS/MS	Superfund	Method 537

Region 3 Laboratory Summary of Unique Capabilities FY 2018

Biology/Microbiology

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Benthic Macroinvertebrate	Freshwater	Identification	Water	
Marine/Estuarine Benthic Invertebrate Taxonomy	Invertebrate Specimens or Unsorted Sediment	EPA EMAP Protocols		Organisms identified to species or lowest taxonomy possible

Region 3 Laboratory Summary of Unique Capabilities FY 2018				
Physical & Other Determinations				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Alcohols	Water, Soil/Sediment	FTIR	RCRA	When necessary for Ignitability
ID Ozone Depleting Compounds	Propellants/ Aerosols	FTIR	Air Enforcement	
ID Unknowns	Bulk Mercury	Density	Superfund, RCRA	
	Soil/Sediment	FTIR		Screening it, identify unknowns
	Wastes	FTIR		Screening it, identify unknowns
	Water	FTIR	Water	Screening it, identify unknowns

Region 4 Laboratory Summary of Unique Capabilities FY 2018				
Inorganic Chemistry				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Chromium (+6)	Soil/Sediment	IC	Superfund	Std Method 3500 CrD
	Water	IC	Water, Superfund	Method 218.1
Lead bioavailability	Soil/Sediment	Acid Extraction/ ICP Analysis	Superfund, RCRA	
Mercury, routine level	Water/Soil/ sediment	ICP-MS 200.8	All	Lab efficiency
Mercury, Total - Ultra Low Detection Level	Soil/Sediment	CVAF	Water, Superfund	
	Tissue	CVAF	Water, Superfund	
	Water	CVAF	Water	Method 1631
NATTS Metals	Air	Hi-Vol Filters	Air	Method 200.8

Region 4 Laboratory Summary of Unique Capabilities FY 2018

Organic Chemistry

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
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
Toxaphene Congeners	Water/Soil	GC/NIMS (EPA Method 8276)	Water, Superfund	6 Parlars, 2 breakdown products

Region 4 Laboratory Summary of Unique Capabilities FY 2018

Biology/Microbiology

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

Region 5 Laboratory Summary of Unique Capabilities FY 2018

Inorganic Chemistry

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
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
Pb, As via IVBA SW846 1340	Soil	ICP-AES	SF	

Region 5 Laboratory Summary of Unique Capabilities FY 2018

Organic Chemistry

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Aldicarb, aldicarb sulfone, aldicarb sulfoxide, carbofuran, oxamyl, methomyl and thiofanox	Water	LC/MS/MS, ASTM7645-10	NHSRC	SAP Method
Aldicarb, bromadiolone, carbofuran, oxamyl, and methomyl	Water	LC/MS/MS, ASTM7600-09	NHSRC	SAP Method

Region 5 Laboratory Summary of Unique Capabilities FY 2018				
Organic Chemistry				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Bisphenol-A	Water	LC/MS/MS (ASTM D7574-09)	Water	Endocrine disrupter Low level method-(ppt)
Bromodiolone, brodifacoum, diphacinone and warfarin in water	Water	LC/MS/MS, ASTM D7644-11	NHSRC	SAP Method
Chlorothalonil	Water	GC/MS	FIFRA	Stream Survey
COD	Soil/Sediment	Colorimetric	Sediment	
Diethanolamine, triethanolamine, n-methyldiethanolamine and methyldiethanolamine	Water	LC/MS/MS, ASTM D7599-09	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

Region 5 Laboratory Summary of Unique Capabilities FY 2018				
Organic Chemistry				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
DIMP, EMPA, IMPA, MPA, PMPA	Soil	LC/MS/MS, ASTM WK34580	NHSRC	SAP Method
Diocetyl 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
Long chain NP, NPEOs (n=3-18)	Water	LC/MS/MS (ASTM D7742-11)	Water	Endocrine disrupter
Low Level Purgeable 1,4-Dioxane	Water	Method 624-Dioxane (Wide-Bore Capillary Column GC/MS)	Superfund	Specific analyte analysis method
Nonylphenol carboxylates	Water	LC/MS/MS	Water	Endocrine disrupter
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)

Region 5 Laboratory Summary of Unique Capabilities FY 2018				
Organic Chemistry				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Nonylphenol (NP), NP-1 and 2-ethoxylate, octylphenol & bisphenol-A	Water	GC/MS (ASTM D7065-11)	Water	Endocrine disrupter - High Concentration method (ppb)
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
Thiodiglycol	Soil	LC/MS/MS, ASTM E2787-11	NHSRC	SAP Method
	Water	LC/MS/MS, CRL SOP MS015	NHSRC	SAP Method
	Wipes	LC/MS/MS, ASTM E2838-11	NHSRC	SAP Method

Region 5 Laboratory Summary of Unique Capabilities FY 2018

Organic Chemistry

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Toxic Industrial Chemicals (TICs) & CWA degradants	Drinking Water	LC/MS/MS Library Screening	WSD, NHSRC	Library search routine developed under CRADA with Waters Corp. Now use NIST LC/MS/MS Library of over 2,000 analytes

Region 5 Laboratory Summary of Unique Capabilities FY 2018

Physical & Other Determinations

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Corrosivity by pH	Hazardous Waste	SW846 1110	RCRA	Waste characterization
Paint Filter Test	Paints and Coatings		RCRA, Superfund	
Particle Size	Soil/Sediment	Particle size analyzer provides continuum of sizes-CRL SOP	GLNPO, Water-Sediment	For modelling and soil migration calcs.

Region 5 Laboratory Summary of Unique Capabilities FY 2018				
Physical & Other Determinations				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Specific Gravity	Soil/Sediment	Appendix IV of the Corps of Engineers Engineering Manual (F10-F22)	Sediment	
Water Content	Hazardous Waste	SW846 -	RCRA, Superfund	Support for flashpoint

Region 6 Laboratory Summary of Unique Capabilities FY 2018				
Inorganic Chemistry				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Ammonia	Air (passive coated filter)	IC	CAA	Ogawa passive air collection device
Metals by X-Ray Fluorescence	Soil	portable XRF	Superfund, RCRA	Field screening
NO _x	Air (passive coated filter)	IC	CAA	Ogawa passive air collection device
Ozone	Air (passive coated filter)	IC	CAA	Ogawa passive air collection device

Region 6 Laboratory Summary of Unique Capabilities FY 2018

Inorganic Chemistry

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Perchlorate	Water	IC/MS/MS	Water	
SO _x	Air (passive coated filter)	IC	CAA	Ogawa passive air collection device
Trace level Hex Chrom	Water	IC/UV	Water	

Region 6 Laboratory Summary of Unique Capabilities FY 2018

Organic Chemistry

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Alcohols by headspace	Water	GC/MS	RCRA, Superfund	
Chemical Warfare Agents	Water/Solid/Wipe	GC/MS	Emergency Response	
Chemical Warfare Agents- Degradation products	Water	LC/MS/MS	Emergency Response	
Expanded 8270 list by GC/QQQ	Liquid	GC/QQQ; Method 8270	Superfund, RCRA	

Region 6 Laboratory Summary of Unique Capabilities FY 2018				
Organic Chemistry				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Incidental PCBs	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
	Water	GC/MS; Method 680 Homologue Series	TSCA, RCRA	Grouped by number of chlorine
Light Hydrocarbons (dissolved gases)	Water	GC/MS	RCRA, Superfund	
Organophosphorous Pesticides (OPPs)	Soil/Sediment	GC/NPD	RCRA, Superfund	
	Waste	GC/NPD	RCRA, Superfund	
	Water	GC/NPD	CWA, RCRA, Superfund	
PAHs (trace)	Water/Solid/Oil	GC/QQQ	RCRA, Superfund	
PAMS (C2s and C3s identified)	Air	GC/MS/FID (split)	CAA	C2s and C3s are individually quantitated

Region 6 Laboratory Summary of Unique Capabilities FY 2018

Organic Chemistry

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
PCBs (Aroclor)	Electrical Cable	GC; Separation, extraction, analysis of individual components. Mod of program specific technique.	TSCA	Toluene is extraction solvent
VOCs by OVM	Air	GC/MS	CAA	Passive air monitoring

Region 6 Laboratory Summary of Unique Capabilities FY 2018

Physical & Other Determinations

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Corrosivity by pH	Waste	Method 1110 - Corrosivity Toward Steel	RCRA	

Region 7 Laboratory Summary of Unique Capabilities FY 2018				
Inorganic Chemistry				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
CO	Air	40 CFR Part 58	Air	OAQPS Protocol Gas Verification Program
In-vitro Bioaccessibility Assays for Arsenic and Lead in Soil	Soil	ICP-MS / ICP-AES	Superfund / RCRA	SUPR Exposure / Toxicity Assessment
NO _x	Air	40 CFR Part 58	Air	OAQPS Protocol Gas Verification Program
O ₃	Air	40 CFR Part 58	Air	NIST Standard Reference Photometer
SO ₂	Air	40 CFR Part 58	Air	OAQPS Protocol Gas Verification Program

Region 7 Laboratory Summary of Unique Capabilities FY 2018				
Organic Chemistry				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Acid Herbicides	Water	LC/MS/MS	Water	Dicamba analysis
PAHs, Pesticides, Herbicides	Water	Twister GC/MS Stir Bar Sorbitive Extraction (solventless extraction)	Water	Use Attainability Analysis (UAA)
PCBs	Soil/Sediment, Waste	GC/ECD	Superfund / ORD	Rapid Site Screening
Pesticides	Water, Soil/Sediment, Tissue	GC/ECD	Water	Use Attainability Analysis (UAA)
Pesticide Formulation Analysis	Product	LC/MS/MS	FIFRA	Dicamba analysis
Pesticide/PCB/Chl ordane/Toxaphene	Water	Twister GC/MS Stir Bar Sorbitive Extraction (solventless extraction)	Water	Priority Pollutant List using Green Extraction Technique
Pharmaceuticals and Personal Care Products (PPCPs)	Water	LC/MS/MS	Water	Endocrine disruptors

Region 7 Laboratory Summary of Unique Capabilities FY 2018				
Organic Chemistry				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
SVOCs, Pesticides, Emerging Contaminants	Water	Twister GC/MS Stir Bar Sorbtive Extraction (solventless extraction)	Water	Low MDL for water monitoring
VOCs	Air Canister	GC/MS (EPA Method TO-14 & TO-15)	Air / Superfund	Air Toxics
	Air Sorbent Tube	GC/MS (EPA Method TO-17)	Air / Superfund	Air Toxics
	Water	GC/MS	Superfund / ORD	In-Situ Chemical Oxidation Site Support
	Water, Soil, Air	GC/MS Mobile Laboratory	Superfund	Rapid Site Characterization
VOCs from In-situ Chemical Oxidation Sites	Water	GC/MS	Superfund	Improved Precision of VOC Samples from In-situ Chemical Oxidation Sites

Region 7 Laboratory Summary of Unique Capabilities FY 2018				
Biology/Microbiology				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Anatoxin	Water	Immunoassay	Water	
Chlorophyll a	Ambient water	EPA 445.0	Ambient monitoring	
Cyanobacteria Taxonomy	Water	Microscopy and FlowCam Cyano	Water	
Cylindrospermopsin	Water	Immunoassay	Water	
Invertebrate Taxonomy	Invertebrates	EPA EMAP Protocols	Water	
Marine/Estuarine Benthic Taxonomy	Benthic Organisms		Water	Organisms identified to species or lowest taxonomy possible
Microbial Source Tracking	Water	qPCR, Microarray	Water	
Microcystin	Water	Immunoassay	Water	
Saxitoxin	Water	Immunoassay	Water	
Total Coliforms and E. coli by Colilert	Water (drinking/surface/waste)	Defined substrate technology	Water	
Total Cyanobacteria and Cyano Toxins	Water	qPCR	Water	

Region 8 Laboratory Summary of Unique Capabilities FY 2018				
Inorganic Chemistry				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Gadolinium	Water	ICP-MS	Water/ Superfund	Wastewater Indicator
Silica	Water	Colorimetric	Water/ Superfund	

Region 8 Laboratory Summary of Unique Capabilities FY 2018				
Organic Chemistry				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Alcohols	Water	GC/FID	Water/ Superfund	
Algal Toxins	Water	LC/MS/MS	Water/ Superfund	Monitoring for States and Tribes
Chlorophyll	Water	HPLC	Water/ Superfund	
Endothall	Water	GC/MS	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

Region 8 Laboratory Summary of Unique Capabilities FY 2018

Organic Chemistry

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Pharmaceuticals and Personal Care Products (PPCPs)	Water	LC/MS/MS	Water/ Superfund	Endocrine disruptors
Total Petroleum Hydrocarbons-Diesel Range Organics	Water, Soil	GC/FID	Water/ Superfund	Hydro-Fracking
TPH (VOA & BNA)	Water, Soil/Sediment	GC/MS or GC/FID	Water/ Superfund	
Waste Indicator Compounds	Water	GC/MS	Water/ Superfund	Monitoring for States and Tribes

Region 8 Laboratory Summary of Unique Capabilities FY 2018

Biology/Microbiology

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Bacteria (Arsenic-Reducing)	Water, Sediment	MPN	Water/ Superfund	
Bacteria (<i>Clostridium perfringens</i>)	Water	Membrane Filtration	Water/ Superfund	
Bacteria (Iron-Reducing)	Water, Sediment	MPN	Water/ Superfund	
Bacteria (Sulfate-Reducing)	Water, Sediment	MPN	Water/ Superfund	

Region 9 Laboratory Summary of Unique Capabilities FY 2018				
Inorganic Chemistry				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Acidity	Water	Titration	Superfund	
Ferrous Iron	Water	Colorimetric	Superfund	
In-vitro Bioaccessibility Assays for Arsenic and Lead in Soil	Soil	EPA 9200.1-86	Superfund	
Lead (Pb) in Air	TSP High-Volume filters	FEM EQL-0710-192, ICP/MS	Air	New Pb NAAQS
Low level hexavalent chromium	Drinking Water	IC with post column reaction/UV detection	Water	
Mercury, low level	Water	CVAF (Method 1631)	Superfund	
Mercury, Vapor, Particulate and Reactive	Ambient Air	Cold Vapor Atomic Fluorescence	Air, Water (TMDL)	Mobile laboratory
Metals	Soil	Portable XRF	Superfund, Criminal Investigation	
Metals (SPLP)	Soil, Sediment, Solid, Waste, Tissue	SW846 1312: ICP, GFAA, CVAA, ICP/MS	Superfund, RCRA	
Metals (with mercury)	Dust wipes, Ghost wipes	ICP, ICPMS, CVAA	Tribal Program	
Methyl mercury	Water	CVAF (EPA 1630)	Water	

Region 9 Laboratory Summary of Unique Capabilities FY 2018

Inorganic Chemistry

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Perchlorate	Water, Soil	LC/MS/MS (EPA Method 331.0)	Superfund / Water	
Platinum Group Metals	Catalytic converter washcoat	Portable XRF	Enforcement, Air	

Region 9 Laboratory Summary of Unique Capabilities FY 2018

Organic Chemistry

ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Diazinon	Water	ELISA	WQM	
1,4-Dioxane	Water, Soil, Sediment	GC/MS	Superfund, RCRA	
EDB/DBCP	Water	GC (EPA 504.1)	Superfund, RCRA	
Methane, Ethane, Ethene	Water	GC/FID (RSK-175)	Superfund, RCRA	

Region 9 Laboratory Summary of Unique Capabilities FY 2018				
Biology/Microbiology				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Benthic Taxonomic Identification	Sediment (Marine)	Taxonomic Identification	Water, WQM	
Chlorophyll/Pheophytin	Water/Periphyton	Standard Method 10200 H, Procedure 2b	Water, WQM	
<i>Enterococci</i>	Water	Enterolert	Water, NPDES, WQM	
Heterotrophic Bacteria	Water	Plate Count - Standard Methods	Water, NPDES, WQM	
Microcystin	Water	Immunoassay	Water	
Toxicity Test, Red Abalone (<i>Haliotis rufescens</i>) Larval Development	Water	EPA/600/R-95/136	NPDES	
Toxicity Test, Sea Urchin Fertilization [<i>Strongylocentrotus purpuratus</i>]	Water	EPA/600/R-95/136	Water, NPDES	

Region 10 Laboratory Summary of Unique Capabilities FY 2018				
Inorganic Chemistry				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Asbestos, Bulk	Solids	EPA 600/R93/116 - XRD	Superfund	
<i>Chlorophyll a</i>	Water	SM 1002H	Water	
Diffusive Thin-Film Gradient (DGT) preparation and Arsenic analysis	DGT	ICP/MS	Superfund	DGT samplers were used to mimic the uptake of arsenic by bivalves in sediment.
In-vitro Bioaccessibility Assays for Arsenic and Lead in Soil	Soil	Leachates by Method 1340, ICP/AES	Superfund	
Low Level Mercury	Water	CVAF, Method 1631E	Water, Superfund	0.2 to 0.5 ng/L reporting limits
Metals	Air filters	ICP/MS, ICP	CAA	
	Blood	ICP/MS	Superfund	
	Paint	Portable XRF	TSCA, Criminal	Lead in paint
	Soil	Portable XRF	Superfund, Criminal	Screening results for metals
	Solid	X-Ray Diffractometer (XRD)	Superfund	Characterizes the form metals exist in sample

Region 10 Laboratory Summary of Unique Capabilities FY 2018				
Inorganic Chemistry				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Metals - Arsenic speciation	Fish/shellfish/seaweed	IC/ICP/MS	Superfund, Water	Speciation data needed for risk assessment
Metals (SPLP)	Soil/Waste	ICP/AES, ICP/MS	Superfund	
Metals (TAL) + Total Uranium	Small mammals, invertebrates	Microwave Digestion, ICP/AES, ICP/MS	Superfund, RCRA	Biomonitoring projects
Methyl Mercury	Water	GC/CVAFS, Method 1630	Water, Superfund	
Perchlorate	Produce (fruits, milk)	IC/MS	Superfund	
Percent Water	Liquid Waste	Karl Fischer titration	RCRA	

Region 10 Laboratory Summary of Unique Capabilities FY 2018				
Organic Chemistry				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
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	
Formaldehyde	Water	Method 1667A/HPLC	Enforcement	
Herbicides	Water, Soil/ Sediment	GC/MS	Superfund	
Hydrocarbon Identification	Water, Soil/ Sediment	NWTPH-HCID	Superfund, Criminal	
Low Level Polyaromatic Hydrocarbons	Shellfish, Water	GC/MS-MS	Superfund, Brownfields	
Low Level Polyaromatic Hydrocarbons and Other Neutral Organics	Soil, Sediments	GC/MS-MS	Superfund, Brownfields, Water	
N-Nitrosodimethylamine	Water, Soil	Method 521	Superfund	

Region 10 Laboratory Summary of Unique Capabilities FY 2018				
Organic Chemistry				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Polybrominated diphenyl ethers (PBDEs)	Sediment/biosolids	GC/MS Low Resolution	Superfund, Water	
	Tissue (fish)	GC/MS Low Resolution	Superfund	
	Water	GC/MS Low Resolution	Water	
PCB aroclors	Wipes	GC/ECD	Brownfields, RCRA	
Total Petroleum Hydrocarbons-Diesel Range Organics	Water, Soil	NWTPH-Dx	Superfund, RCRA	
Total Petroleum Hydrocarbons-Gasoline Range Organics	Water, Soil	NWTPH-Gx	Superfund, RCRA	
VOA and SVOA	Industrial wastes, Solids, Tissues	Vacuum distillation, Methol 8261A	Superfund, RCRA	

Region 10 Laboratory Summary of Unique Capabilities FY 2018				
Biology/Microbiology				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
<i>Aeromonas spp</i>	Drinking Water	EPA Method 1605	SDWA - Unregulated Contaminant Monitoring Rule (UCMR)	EPA Approved
<i>Cryptosporidium and Giardia</i>	Water	EPA Method 1623 (Filtration/IMS /Staining)	SDWA, Water, Ambient Monitoring Rule - recreational waters	
<i>Enterococci</i>	Ambient Water	EPA Method 1600	Ambient Monitoring Rule	
Microbial Source Tracking	Water	qPCR MST - Human, Dog, Ruminant, Cow, Avian	Water	
Microscopy	Drinking/ Source Water	Microscopic Particulate Analysis	Surface Water Treatment Rule	Microscopic technique used to establish GWUDI characteristics of a drinking water

Region 10 Laboratory Summary of Unique Capabilities FY 2018				
Physical & Other Determinations				
ANALYTE / GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Increment Sampling Methodology (ISM) Preparation of Soil Samples for Organic and Inorganic Analyses	Soil	Described in Method 8330B Appendix	Superfund	
Fluidized Bed Asbestos Segregator (FBAS)	Soil	FBAS separates asbestos fibers from soil material for improved detection capability.	Superfund	
Variety of water quality tests	Water	Various probe-type measurements	Superfund	Flow thru cell system; performed in the field

Appendix C

Regional Laboratory Methods in Development

Regional Laboratory Methods in Development FY 2018

Region 1

PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
Cyanotoxins in water using modification of EPA Method 546: Determination of Total Microcystins and Nodularin's in Drinking Water and Ambient Water by Adda Enzyme-Linked Immunosorbent Assay (ELISA)	To support State & Federal entities in the region, and drinking water and recreational programs	SOPs in development	Expect by February 2019

Regional Laboratory Methods in Development FY 2018

Region 2

PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
Developed EPA Method 537 for 14 PFAS and GenX. Currently expanding method to include a total of 25 PFAS compounds: 24 PFAS compounds listed in draft SW-846 Method plus GenX	Need for additional PFAS compound capability to support to regional Superfund and Drinking Water programs.	In progress	FY 2019

Regional Laboratory Methods in Development FY 2018			
Region 3			
PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
PFAS in water by Method 537	Need for capability to support to regional Superfund and Drinking Water programs.	Completed	FY 2018
SIM Analysis for Volatiles in Air	Need for capability to achieve lower reporting limits	In progress	FY 2018
Microplastics in Water	Need for standard method for extracting microplastics from water and fish tissue	In progress	FY 2018
Dissolved Gases in Air by GC	Need for capability to support to regional Superfund programs.	On hold	FY 2018
Semi-volatiles in Drinking Water by EPA 525.2	Need capability to support Drinking Water program	Complete	FY 2018
Long Chain Alcohols by GC	Capability needed to support specific Superfund project request	On hold	FY 2020

Regional Laboratory Methods in Development FY 2018

Region 4

PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
Microbial Source Tracking by PCR	Develop capabilities for use in projects and emerging needs of the region and ORD.	In progress	FY 2020
PFAS (soil)	Support Regional analysis needs and support national method development	In progress	FY 2019

Regional Laboratory Methods in Development FY 2018

Region 5

PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
GenX (water)	Support ORD and method development	Writing Method and SOP	FY 2019
Microcystin (water/drinking water)	Support drinking water program and states	In progress	FY 2019
PFAS Precursors (water/soil)	Support ORD and method development	In progress	FY 2019
TOP Assay PFAS	Support ORD and method development	In progress	FY 2019

Regional Laboratory Methods in Development FY 2018

Region 6

PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
High Dissolved Solids /Modified Method/ Anions	Clean Water Act, RCRA, Superfund	Method being developed	October 2019

Regional Laboratory Methods in Development FY 2018

Region 7

PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
EPA Method 1694 for Pharmaceuticals and Personal Care Products by HPLC/MS/MS--Direct injection analysis.	Speciation data to be used for Risk Assessments in support of Clean Water Act and Superfund.	Performing method validation studies on surrogate compounds; developing SOP, expanded list of targets in 2015 and 2016. Complete list of over 50 analytes. Final screening method has over 60 analytes from multiple compound categories.	Completed

Regional Laboratory Methods in Development FY 2018			
Region 7			
PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
Pesticides by GC/MS/MS	Conformational analysis of pesticide analytes previously performed by GC/ECD	Instrument installed, method development and validation pending	Ongoing
Microbial Source Tracking Using qPCR	TMDL and Stormwater	Non-Human marker test completed. Technical guidance is published. Performing final testing.	FY 2020
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. Participated in multi-lab study	On hold
EPA Method 1694 for Pharmaceuticals and Personal Care Products by HPLC/MS/MS--Direct injection analysis.	Speciation data to be used for Risk Assessments in support of Clean Water Act and Superfund. Water Program	Sample analysis for Urban Stream Monitoring, continued improvements.	Ongoing

Regional Laboratory Methods in Development FY 2018			
Region 7			
PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
PAH/SVOC in Water by Stir Bar Sorbtive Extraction	Water Program	Sample analysis for Urban Stream Monitoring, continued improvements.	Ongoing
Airborne VOC by Solid Sorbent Tube (EPA Method TO-17)	Air Program	Air sample monitoring for ongoing sites with regular re-evaluations. Use three phased sorbent tubes for low to moderate humidity. Limited use at this time.	Ongoing
Phylochip Microbial Community Analysis	TMDL, Water Program, Microbial Source Tracking	Joint effort with ORD, and several regions. Region 7 is the lead.	FY 2020
KC Air Mapper	Air Program, Community involvement	Joint effort with ORD for developing and testing portable air quality monitors with citizen science and educational purposes.	FY 2020

Regional Laboratory Methods in Development FY 2018			
Region 8			
PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
Algal Toxins	Need for analysis of individual algal toxins in algal blooms.	In Progress	Utah Lake, Cherry Creek Reservoir, Ongoing
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 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
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

Regional Laboratory Methods in Development FY 2018

Region 8

PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
Pesticides by LC/MS/MS	Water	Progress continuing.	Ongoing
Hormones and Steroids by LC/MS/MS	Water and ORD	Progress continuing.	Ongoing

Regional Laboratory Methods in Development FY 2018

Region 9

PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
Perfluorinated Compounds by LC/MS/MS	Support to Superfund and Water programs	Instrumentation installed	FY 2019
Cyanotoxins by LC/MS/MS	Support to Water Programs	Instrumentation installed	FY 2020

Regional Laboratory Methods in Development FY 2018			
Region 10			
PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
Develop Commonly Used Pesticides Analysis Capability for Wipe and Soil Samples	Wipe and soil samples are planned to be collected at various tribal childcare facilities in WA and OR to test for organo phosphorus, pyrethrin and other commonly used pesticides during CY 2019.	GC/MS-MS conditions are being developed. Extr action studies of wipes and soils are in progress. The sampling schedule for the project was postponed to early CY2019.	FY 2019
Develop Analysis Capability for Anatoxin-a and Cylindrospermopsis in Waters	Support Water program's need to monitor and measure harmful algal bloom substances (HABs).	LC/MS-MS conditions being optimized.	FY 2019
Develop Analysis Capability for Microcystins in Drinking Water by ELISA	Support Drinking Water program needs to monitor and measure HABs	Initiated development of ELISA method.	FY 2019
Develop Analysis Capability for Anatoxin-a and Cylindrospermopsis in Surface Waters by ELISA	Support Water program's need to monitor and measure HABs.	Initiated development of ELISA method.	FY 2019
Analysis of Lead Deposits on Petri Dishes Deployed in Houses	This exploratory approach may prove to be an alternative to sample collection via HEPA-vacuums or sticky mats	Initiated and completed.	FY 2018

Regional Laboratory Methods in Development FY 2018			
Region 10			
PROJECT / METHOD	DEVELOPMENTAL NEED	STATUS	PROJECTED COMPLETION
Develop Analysis Capability for the Perfluorinated Alkyl Substances (PFAS) in Waters and Soils by LC/MS-MS	Support the Water program to evaluate levels and sources of PFAS in the region.	Initiated. LC/MS-MS conditions being optimized. Awaiting for the SW846 non-Drinking Water methods to be available to develop laboratory procedures.	FY 2020
Publish EPA Method for the Use of Fluidized Bed Asbestos Segregator (FBAS)	A published method was needed to make available procedures that use the FBAS for quantifying mineral fibers in soil and other solid media.	Initiated and completed. The method was published by the USEPA Air Emission Measurement Center (EMC) as Method OTM 42, "Sampling, Sample Preparation and Operation of the Fluidized Bed Asbestos Segregator."	FY 2018

Appendix D

ABBREVIATIONS

EPA REGIONAL LABORATORY NETWORK ANNUAL REPORT		
ABBREVIATIONS		
	BNA	Base/Neutrals and Acids Extractable Organics
	BOD	Biological Oxygen Demand
	COD	Chemical Oxygen Demand
	CVAA	Cold Vapor Atomic Absorption Spectrometry
	DBCP	Dibromochloropropane
	EDB	Ethylene dibromide
	EDC	Endocrine Disrupting Chemicals
	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
	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
	LC/MS	Liquid Chromatography/Mass Spectrometry
	LC/MS/MS	Liquid Chromatography/Dual Mass Spectrometry
	NO ₃	Nitrate
	NO ₂	Nitrite
	PAHs	Polynuclear Aromatic Hydrocarbons
	PCBs	Polychlorinated biphenyls
	PLM	Polarized Light Microscopy
	TCLP	Toxicity Characteristic Leaching Procedure
	TOC	Total Organic Carbon
	VOA	Volatile Organic Analytes/Analyses