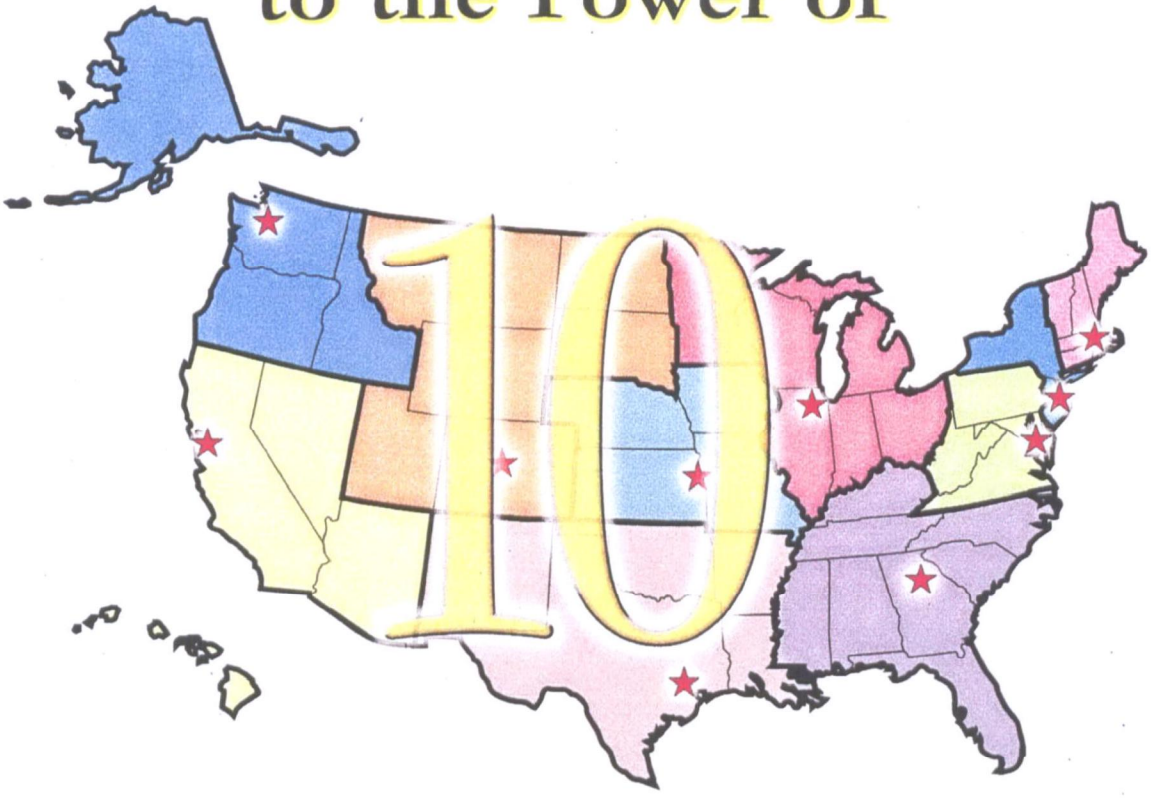
SCIENCE
to the Power of



Regional Laboratory System

Annual Report

Fiscal Year 2000

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EXECUTIVE SUMMARY

At its inception, the Agency recognized the critical need for analytical information to support regional and Agency decisions, and established laboratories in each of the ten regions. Since then, the regional laboratories have evolved into an interdependent network - the Regional Laboratory System. Each regional laboratory provides analytical and technical support to virtually all media programs, the Criminal Investigation Division and many Headquarters programs. Spanning a wide range of activities from pH analyses to interpreting and defending complex analytical and technical data during criminal prosecutions, the regional laboratories support the Comprehensive Environmental Response, Compensation and Liability Act (Superfund), the Clean Water Act, the Safe Drinking Water Act, the Resource Conservation and Recovery Act, the Toxic Substances Control Act, and the Clean Air Act, to name the most prominent. Core analytical functions common to all regional laboratories are supplemented in each region by specialized expertise required to support specific regional issues and initiatives, expertise that often represents the best knowledge of the discipline in the Agency.

The regional laboratories performed approximately 95,000 analyses during FY2000. The analytical capacity of the laboratories is enhanced by the presence of ESAT, a dedicated Superfund contractor. Accordingly, the Superfund program was the largest user of analytical services accounting for slightly more than 53% of the total analytical throughput.

In addition to traditional laboratory analytical support to these programs, the regional laboratories also provided valuable training, technical and analytical assistance to state, tribal and other public laboratories and programs. In a continuing effort to find better and more efficient ways to provide the environmental data foundation on which Agency decisions are based, regional labs developed new analytical methods and provided assistance to Headquarters programs as they also attempt to improve the state-of-the-art in laboratory science. Increasing the capability and capacity of state, local and tribal laboratories is a continuing emphasis for all regional laboratories.

Quality assurance was a particularly prominent feature of FY2000. Each regional laboratory received at least two major audits evaluating their quality management program and quality assurance practices. Some laboratories also received drinking water certification audits from EPA - Cincinnati. While all audits yielded findings that will help improve operations, all laboratories were generally characterized as well staffed, well equipped and well managed.

Each regional laboratory is a complex facility requiring investment in and attention to an abundance of other considerations such as health and safety, pollution prevention, environmental compliance, data management, energy conservation, and facility modifications and replacement to name a few. For this investment, the region and the entire Agency has a powerful tool with which to provide assistance to states and tribes and a particular proficiency for applying laboratory science to the issues confronting their region. Most importantly, the regional laboratory system provides an invaluable capability for dialogue with the environment that enables regional programs to determine the need for action and evaluate the effectiveness of actions taken. It is a vital niche uniquely the province of the regional laboratory.

The Annual Report is detailed. If time is limited, a general understanding of the activities that represent the work of the regional laboratories can be derived from reading the introductory paragraph in each section.

MISSION STATEMENT

The focus of the regional laboratories is on the application of science policies and methods in support of regulatory and monitoring programs and special projects. This is done through direct implementation, partnerships with state, local and tribal governments, private industry, the academic community, EPA program offices, ORD and the public. The regional laboratories are crucial to advancing the Agency's science agenda and have embraced the following to achieve this goal:

To integrate laboratory activities with those of field and quality assurance partners into a comprehensive, holistic, multi-media approach to solving ecosystem-based environmental problems.

To provide scientific data of known quality to support Agency decisions through partnerships with regional and national media program offices, state, local and tribal governments, academia, the private sector and the public.

To maintain a fully equipped laboratory to produce physical, chemical and biological data of known quality to be used for environmental decision-making at all levels of government.

To maintain and enhance a technically and scientifically skilled, dedicated an diverse staff through the excellence of our recruitment, career development, training, management and leadership.

To advance the Agency's science agenda at the point where decisions are made.

INTRODUCTION

The EPA regional laboratories were created at the inception of the Environmental Protection Agency in 1970. Originally a part of the Surveillance and Analysis (S&A) Divisions in the ten regional offices, the S&A Divisions provided the regions with the technical support necessary to carry out environmental control programs mandated by federal legislation. Specifically, the S&A Divisions were responsible for the collection, analysis and evaluation of environmental data; surveillance and enforcement activities; pollution source inventories; ambient monitoring activities; and analytical laboratory support. The regional laboratories, established to furnish analytical support, also provided advice and assistance to state and local agencies concerning analytical techniques, methodology and quality control.

In 1981, as a result of Agency wide restructuring, the S&A divisions were renamed the Environmental Services Divisions (ESDs). The ESDs continued to provide laboratory, field investigation and monitoring, quality assurance, data analysis, emergency response and pesticide sampling support. The regional administrators also had the option of placing responsibility for environmental assessments and State/EPA agreements with the ESDs.

During the 1990's, as part of the National Performance Review, all government departments and agencies examined how they did business, what changes were needed to reflect the needs of the next generation, and how to make government more efficient and responsive. EPA reviewed the organizational structures of many of its program and regional offices. Changes at the national level included the creation of a new Office of Enforcement and Compliance Assistance, and the realignment and functional reorganization of the Office of Research and Development (ORD).

All ten regions also were reorganized to reflect the new streamlined, risk- and ecosystem-based approaches to environmental protection. The effects of reorganization on regional laboratories varied. Some regions created new Science or Ecosystem Protection Divisions that perform the core functions of the traditional ESDs - field sampling and investigations, analytical support, and quality assurance of data - as well as other functions. Other regions placed these functions under their Management Divisions or Enforcement Divisions. Regardless of organizational structure, each of the ten regions endorsed the need for a strong regional laboratory capability.

The regional laboratories continue to offer a full range of routine and special chemical and biological testing in support of regional and national programs including air, water, pesticides, toxics, hazardous waste, ambient monitoring, compliance monitoring, criminal and civil enforcement and special projects. Other core functions include expert witness testimony; training to program staff and other organizations; audits of other laboratories; policy guidance and technical support to federal, state and local laboratories; and benchmarks for environmental laboratories in areas such as analysis, pollution prevention and environmental compliance. In addition, all regional laboratories conduct applied research for regional initiatives, support national program laboratory initiatives, ensure the quality of laboratory data generated in support of Agency programs, and provide technical support and transfer to internal and external organizations.

ANALYTICAL SUPPORT

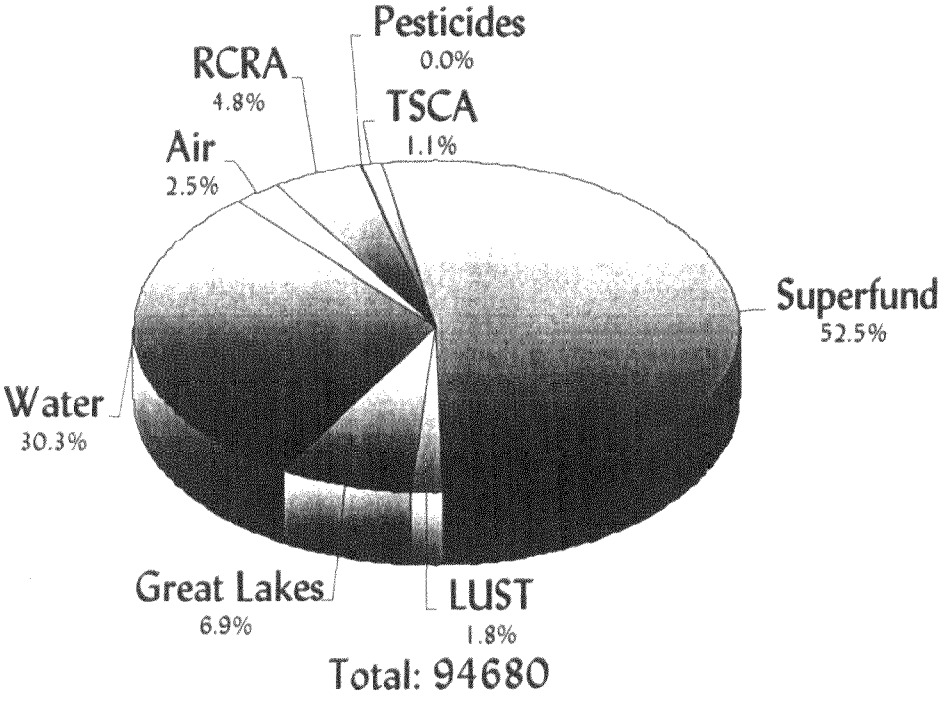
The regional laboratories exist primarily to supply quality analytical data to regional programs in support of a broad range of regional initiatives from routine monitoring to criminal enforcement.

When reviewing the graphs that follow, these points should be considered:

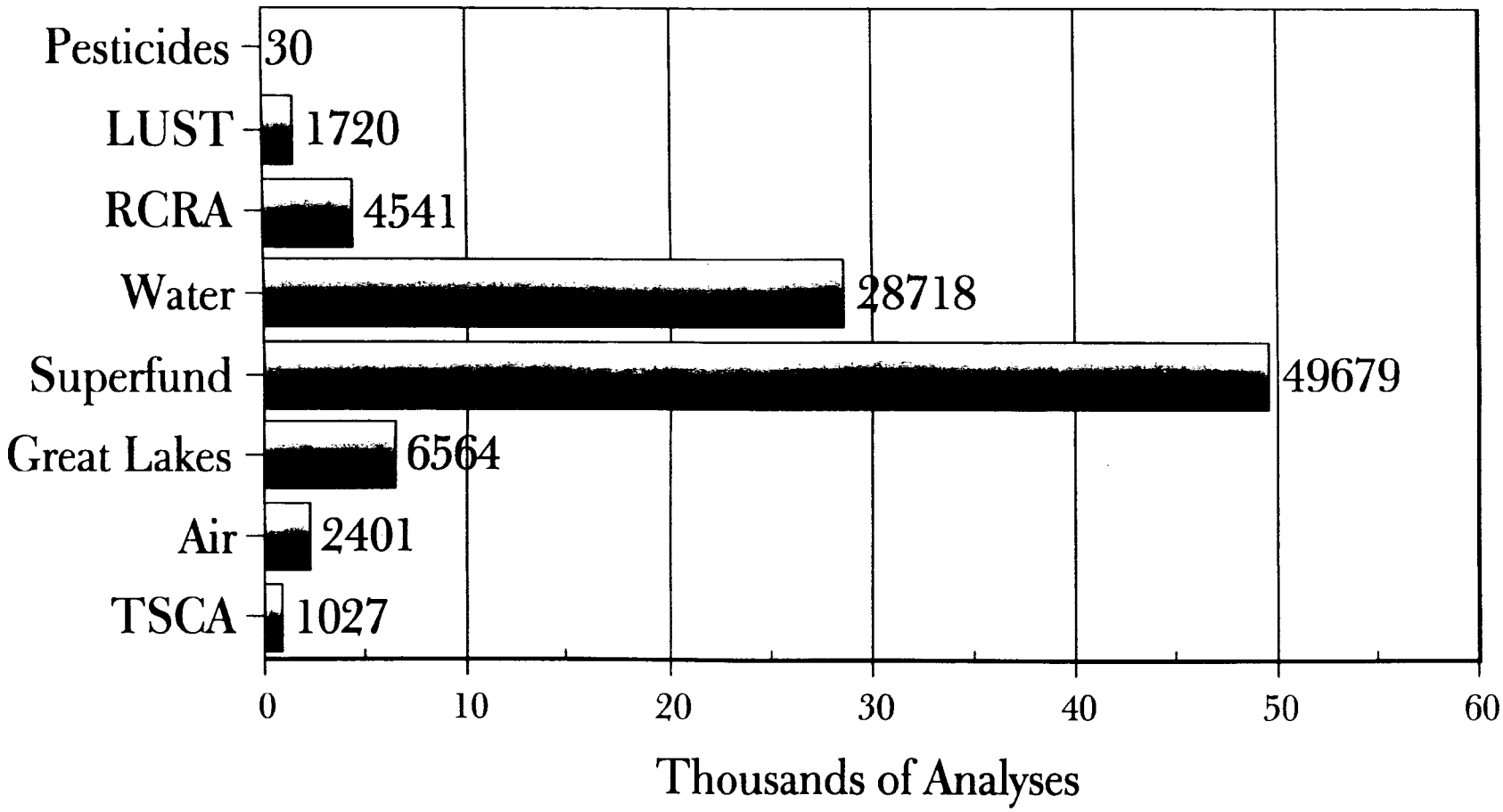
★ Superfund appears to dominate the work of the laboratories. Complementing EPA staff at the regional laboratories are Environmental Services Assistant Team contractors devoted almost exclusively to the analysis of Superfund samples.

★ Counting analyses does not accurately capture the level of effort necessary to provide the wide range of analytical capability represented by the regional laboratories. Some analyses, such as a conductivity measurement, may take only a few minutes. Others, such as herbicides in an oily matrix, may take 8 to 10 hours to complete.

The chart below shows the percentage of analyses by media program. The chart on the following page shows the number of analyses performed by regional laboratories by program. Neither chart includes analyses performed for quality assurance purposes, generally about 30% of the analytical effort.



ANALYSES BY PROGRAM - FISCAL YEAR 2000
Regional Laboratories



FIELD ANALYTICAL SUPPORT

The benefits of moving laboratory analysis to the field are clear. Quicker turnaround time for sample processing, real-time interaction between the analyst and the field staff for problem resolution and data interpretation and faster environmental decisions at the site. This service has particular relevance to Superfund cleanups and removals. Field analytical methodologies have expanded over the years from simple field tests to an impressive array of capabilities including GC/MS for VOAs; GC parameters including PAHs, PCP, TPH-D, BTEX; chlorinated volatiles; freons; dinoseb; PCBs; chlorinated pesticides; EDB and DBCP; hexavalent chrome; metals by AA and XRF; asbestos by optical microscopy; various immunoassay test kits for specific compounds or classes of compounds; and general probe type parameters such as pH, DO and turbidity. Sampling capability includes soil, sediment and water for surface samples and subsurface samples by direct push rod techniques.

★ This last year, to resolve vulnerabilities in the non-Superfund CAFO enforcement program, staff at a regional laboratory transformed a very old and unsuitable field laboratory originally designed to process fish samples to the rigorous specifications of a mobile microbiology laboratory. The mobile laboratory traveled to six geographic locations throughout the Northwest supporting numerous CAFO inspections. The mobile microbiology laboratory was also used in support of the BEACH program. Tests performed in the mobile lab included total and fecal coliform, *E. coli* and *enterococci* by several different techniques. Because of the success of these efforts, a new mobile laboratory is being purchased.

★ One regional Field Analytical Service Team (FAST) provided support for 31 individual surveys in 2000 offering rapid screening and survey analysis for VOAs, PCBs, bulk asbestos and metals. FAST support has been an extremely effective tool in supporting ongoing Superfund investigations aiding in the rapid identification and delineation of contamination. The soil gas survey around homes in the vicinity of the former Raymark manufacturing facility in Stratford, Connecticut is an excellent example of the utility of this service. The FAST team was able to identify specific VOAs in soil gas known to be associated with the nearby Superfund site triggering a more in depth investigation of soil gas and indoor air in nearby homes.

★ One field investigations team developed a passive vapor monitoring capability. This capability in concert with field analysis offers the ability to rapidly locate subsurface geological features associated with enhanced migration of contaminated plumes. This capability was employed at Brunswick Naval Air Station in Brunswick, ME to locate points where 1,1,1-Trichloroethane from a former fuel depot was thought to be entering tidal creeks, wetlands, and salt marshes.

★ A mobile microbiology laboratory was retrofitted to support metals toxicity studies in birds and mamilla. The laboratory was further upgraded to provide on-site flow-through aquatic toxicity studies to support FY 2001 Superfund program needs.

The mission of the EPA Criminal Investigation Division is to investigate the most significant and egregious violations of environmental laws under the purview of EPA. Each region supports the Criminal Enforcement Program by providing, among other things, analytical support to program activities. The laboratories analyze samples from sources such as un-permitted discharges, illegally stored hazardous waste, and illegal dumping. These data are then used by the Criminal Investigation Division and Assistant U.S. Attorneys (AUSA) for prosecution. Regional laboratory staff may provide expert testimony in these cases or provide technical training to criminal investigators and AUSAs related to the intricacies of the analytical methods used. Regional laboratories frequently interact with the National Enforcement Investigations Center for guidance on analytical methodologies to better support the criminal enforcement program.

★ One regional laboratory provided analytical support and expert witness testimony regarding the public health risks associated with illegal discharge of concentrated animal feeding operation wastes into waters of the United States.

★ An investigation was conducted in the Everglades National Park to determine the environmental damage to park wetlands resulting from the illegal dumping of domestic garbage into wetlands areas of the park.

★ An alleged conspiracy by individuals in Louisville, KY to steal Freon from two facilities was investigated by criminal investigators. Cylinders were seized and tested positive for Freon resulting in the arrest of several individuals. Cases are pending.

★ Several cases involving the illegal disposal of paint wastes and solvents were investigated and supported by regional laboratories. Cases are pending.

★ The regional laboratory assisted in the investigation of illegal disposal of contaminated walnut shells used for sand blasting. Laboratory analysis in this difficult matrix provided the factual supportable evidence for the case. More importantly, CID had access to a knowledgeable and local chemist to support the data and discuss analytical methodology.

★ EPA lacks methods to comprehensively characterize waste under RCRA. For example, methods do not exist for ignitability through 1) friction, 2) absorption of moisture or 3) spontaneous chemical changes. Nor do methods exist to classify a material for reactivity based on 1) violent chemical changes without detonating, 2) violent reaction with water, 3) generation of toxic gases, 4) explosion when subjected to a strong initiating force, 5) explosion if heated under confinement or 6) capacity to detonate under ambient conditions. The Laboratory has developed some methodologies and has modified other tests to improve the suite of methods addressing the RCRA characteristics of reactivity and ignitability. The goal is to publish methods that capture likely reactivity and ignitability scenarios.

In addition to common core laboratory functions, the regional laboratories have developed specific expertise in response to regional program needs. In many cases, this expertise represents the best knowledge of the discipline in the Agency, and perhaps the country. Each Center of Applied Science (CAS) project must have an annual work plan describing applied research and development activities, communications, documentation and training activities. Further, the sponsoring laboratory must contribute to the CAS annual report.

CAS projects currently underway include:

Environmental Chemistry

- ☆ Scanning Electron Microscopy
- ☆ Dioxin
- ☆ Explosives
- ☆ Endocrine Disruptors
- ☆ Primary Lead Intervention
- ☆ Xray Diffractometry
- ☆ Hydride Generation
- ☆ PCB Congeners (2 projects)
- ☆ Arsenic Speciation
- ☆ Fish Tissue Extraction/Cleanup
- ☆ Passive Vapor Monitoring

Environmental Microbiology

- ☆ Polymerase Chain Reaction
- ☆ *Giardia* and *Cryptosporidium*

Analytical Pollution Prevention

- ☆ Abbreviated Microwave Extraction
- ☆ Solventless Extractions
- ☆ Microextractions with Large Volume Injections

Ambient Air Monitoring

- ☆ Polar Hydrocarbon Compounds (2 projects)

Environmental Biology

- ☆ Benthic Invertebrate Taxonomy

The Regional Laboratory 2000 CAS Annual Report is included as an Appendix to this report.

Each regional laboratory has initiated, or has been asked to develop specialized expertise in response to specific regional needs that will improve a laboratory or management capability. These "special studies" may be as rigorous as development of a new analytical method or as routine as adaptation of an existing method for use on a different matrix. They may involve extensive review of technical documents or expedited review of analytical data from a high profile site.

Examples of special studies conducted during FY 2000 include:

★ In support of a proposed Superfund field investigation the regional laboratory ran a correlation study to evaluate the suitability of Enzyme Immunoassay Test Kits manufactured by CAPE Technology for generating rapid screening data for future investigations at suspected Dioxin/Furan contaminated sites.

★ A new sediment grain size method was developed for application in sediment characterization. The method utilizes settling and decanting techniques to determine the percent sand, silt, and clay in a sediment sample. This new method is more efficient and is as accurate as existing benchmark procedures for grain size determinations.

★ Regional laboratories have been working in conjunction with ORD in development of a modified sediment toxicity test using amphipods. The proposed modification involved reducing the volume of test material and shortening the exposure time of test organisms.

★ A procedure was developed to effectively remove ammonia interference in sediment toxicity tests. The behavior of ammonia in sediments during laboratory testing was characterized and a procedure to manage ammonia was proposed and published in a peer-reviewed scientific journal.

★ Automation of oil and grease analysis by utilizing an automated solid phase extractor system increased productivity and prevented the release of damaging chlorofluorocarbon emissions from Freon, required in the method it replaced.

★ A Performance Based Measurement System (PBMS) pilot study compared two similar Chemical Oxygen Demand methods. If techniques for statistically evaluating and comparing DQOs and MQOs are successful, PBMS will be an excellent framework for evaluating faster, safer, more effective or less expensive methods for comparable data.

★ A regional laboratory is working on a NASA-funded project combining satellite remote sensing, habitat mapping and an inventory of biodiversity off Andros Island, Bahamas. The objective is to determine how well shallow water habitat classifications, identified and mapped using remote sensing, reflect real differences in resident biological diversity.

★ Nonylphenol and alkylphenol ethoxylates are ubiquitous in municipal and industrial effluents, sediments, surface and ground waters. Three regional laboratories are working with ORD to

develop gas and liquid chromatography methods for detecting these toxic and endocrine disrupting compounds.

★ Concerned about air pollution from a large petrochemical complex at Lake Caclasieu, LA, a citizens group requested EPA assistance. The regional laboratory provided air monitoring equipment and analytical support to help the group evaluate air quality impacts.

★ The United States - Mexico Border Neural Tube Defect (NTD) Study is investigating the interaction of chemical and biological risk factors in the etiology of NTD births near the Texas - Mexico border. The regional laboratory is assisting the University of Texas School of Public Health in this study by performing metals analysis on hair samples from the mothers of affected children

★ A regional laboratory received a Federal Executive Board award for work in the development of a method to test for Quinclorac in air samples

★ In collaboration with the Water Division and the US/Mexico Border Team, the regional laboratory carried out the second phase of a comprehensive study of the Advanced Integrated Wastewater Pond System. The study was designed to evaluate the effectiveness of this treatment technology for use in new treatment systems being planned for the Border area.

★ A regional laboratory is collaborating with USGS and Monterey Bay National Marine Sanctuary (MBNMS) to conduct a benthic infaunal community analysis of intermediate depths within the 5,322 square mile Sanctuary. The objective of this study is to characterize benthic communities throughout the MBNMS and to match biological differences with underlying physical and chemical stressors.

★ In conjunction with RTP and Cincinnati, a regional laboratory is involved in a year long study to compare water quality before and after the installation of additional treatment of Seattle drinking water. Among other analytes, the laboratory is evaluating the use of heterotrophic plate count, Cryptosporidium and Giardia as indicators of the effect of the change in water treatment.

★ Six recreational waters in Washington State were evaluated for microbial contamination as part of the national BEACH Program. This study was done in conjunction with the Washington State Department of Health.

★ Based on a fish tissue project completed last year, a laboratory representative presented a paper on the analysis of metals in fish tissue at EPA's Annual Conference on Pollutants in the Environment. The work was also published in the July/August issue of "Atomic Spectroscopy."

★ Method development and field trials of using flow-through biosensor technology for the detection of TNT and RDX continues. This technology shows great promise for continuously monitoring ground water at contaminated defense sites. Improvements in both methodology and instrumentation have made this technique more reliable. The lack of a ready source of antibodies is becoming a concern.

★ Working with Anthony Veltri of Oregon State University, a laboratory has been participating in a pilot program to assess and measure life-cycle costs of chemicals used in the many analytical processes at the laboratory. The objective of the project is to provide managers with accessible, timely, objective, measurable and reliable information with which to make cost effective chemical management decisions.

★ Carbaryl is sprayed by air on portions of the Willapa Bay tideflats to control invertebrates which interfere with oyster production. The traditional method for detecting carbaryl allowing detection at the low parts per trillion level in sea water has been modified to provide better assessments of risk to neighboring human populations from overspray and other exposure pathways.

★ The Office Director for the Air Program requested that laboratory management conducted extensive review of the delivery of technical support to the Air Program. Twenty five individuals in the Regional Air Program, Office of Environmental Assessment and Headquarters were interviewed for the project. Conclusions based on the interviews resulted in recommendations that will improve technical aspects of the program.

★ An evaluation of the comparability of various *e. coli* methods used to test recreational waters for microbial contamination was conducted to assist state and local government agencies in method selection.

★ The 1996 SARA Title III Section 313 reports for facilities located in Hamilton County, Tennessee indicated that more than three million pounds of chemicals are released into the air by stack or fugitive emissions each year. In response to local citizen concerns, a year long air toxics study evaluating human exposure risks from metals, acidic aerosols for HCL and HF, and volatile organic chemicals was conducted.

★ In the environment, toxaphene weathers or degrades to its constituent compounds or congeners some of which may have environmental or health significance. A method for detecting toxaphene congeners was developed and used in a Florida community where toxaphene was a concern. It was also used to evaluate a mysterious mortality in another area of the state. This capability will assist a national effort to develop risk levels for these congeners.

★ Phase II of a comprehensive multi-year study of the Florida Everglades was completed. Phase II is part of a larger restoration project comparing the risks due to mercury contamination with risks due to hydroperiod modification, habitat alteration, nutrient enrichment and exotic species introduction. The study required ultra-low level analysis of mercury in water, fish and other media as well as low level nutrients and sulfates analysis.

★ The hexavalent chromium method was modified to eliminate an unnecessary and time-consuming step, improving laboratory efficiency and timely reporting of data. This modification will benefit all environmental laboratories tasked with analyzing for this toxic form of chromium.

★ One regional laboratory completed programming and field testing of field/laboratory bar coding system to streamline sample tracking.

TECHNICAL SUPPORT

Integral to their functions, regional laboratories provide an essential service in the area of technical support. In this context, technical support encompasses the spectrum of diverse areas relating to the operations of the laboratory. These include, but are not limited to, quality systems; analytical methodology; data quality and/or interpretation; analytical instrumentation; proficiency testing; audits; analytical data records management; health and safety; environmental compliance; pollution prevention; and facility design and management. Support is provided to a multitude of EPA customers from regional and national programs to other EPA laboratories and entities; customers from other Federal agencies, state and tribal agencies and laboratories; the regulated community; industry; service and non-profit organizations; academia; and the general public. Some of the noteworthy examples of technical support performed by the various regional laboratories over the last fiscal year are as follows:

★ Provided expert witness testimony in support of enforcement proceedings. In one instance, a municipality contended that analytical data indicating violations of the Clean Water Act were inaccurate due to laboratory errors. With the assistance of expert testimony relating to the analytical results, the violations were upheld and the municipality was found liable.

★ Provided support to EPA's Office of the Inspector General and Criminal Investigations Division on matters relating to laboratory fraud. Specifically, mechanisms in which laboratories could manipulate data to produce fraudulent results were described in detail as a means of preparing investigators in detecting fraudulent practices.

★ Participated in public meetings in support of regional programs and on national technical workgroups, such as the Superfund Field and Analytical Services Teaming Advisory Committee (FASTAC), Contract Laboratory Program (CLP), Regional Project Officers (RPOs)/Regional Sample Control Coordinators (RSCCs), Office of Solid Waste Organic Methods Work Group, and Standing Committees for the National Environmental Laboratories Accreditation Committee (NELAC).

★ Provided assistance to EPA's Office of International Activities on laboratory design and equipment for the Government of Thailand's Pollution Control Department. Consultation was also provided to scientists in Honduras and Nicaragua on metals analysis.

★ Provided support to EPA Headquarters in developing future challenge scenarios facing the Agency (i.e., potential chemicals in the environment) as part of a strategic planning effort.

★ Provided technical consultation to regional programs in planning and implementing projects involving the collection and analysis of environmental samples.

★ Provided for the overview, tracking and validation of data packages generated through the Contract Laboratory Program (CLP). Also, performed audits of CLP laboratories to ensure laboratories were in compliance with contract requirements.

★ Performed method and data reviews of data generated for regional programs by external sources to evaluate the reliability of the data.

★ Provided review and evaluation of data (both chemical and biological) submitted by private companies interested in acquiring dredging permits through the Army Corps of Engineers as part of the New York/New Jersey Harbor Dredging Program. The data must conform to very specific QA/QC guidelines to ensure dredged material is accurately classified.

★ Mediated disputes between state and private laboratories on analytical results.

★ Coordinated and processed Alternate Test Procedure (ATP) applications and disseminated information relating to this process authorized by Clean Water Act and Safe Drinking Water Act regulations.

★ Conducted performance audit inspections of laboratories performing analyses for National Pollutant Discharge Elimination System (NPDES) permits as a means of enhancing the reliability of permittee reported data.

★ Participated in or performed on-site evaluations of state primacy laboratories for certification under the Safe Drinking Water Act for the analysis of chemical, radiochemical and microbiological parameters for public water supplies.

★ Provided technical experts for conducting Technical Systems Audits of all of the EPA regional laboratories as part of the audit program established by the Regional Science and Technology Directors.

★ Participated in methods development, review and validation for EPA National Program Offices.

☆ Conducted peer reviews of the following analytical methods:
Method 528, Detection of Phenols in Drinking Water
Method 1605, Detection of *Aeromonas hydrophila* in Drinking Water
Method 6300, Compound Identification by X-Ray Diffraction Analysis

☆ Participated in validation studies for EPA Method 1638, Determination of Trace Elements in Ambient Waters by Inductively Coupled Plasma-Mass Spectrometry, for the Office of Water.

☆ Assisted in the revision of EPA Method 8000 and other methods and documentation for inclusion in SW 846.

★ Provided technical assistance to state, tribal and local governments, private entities, and the public relating to analytical methodology and their use. Also, responded to numerous inquiries originating via telephone, Internet, e-mail and FOIA requests, and distributed a multitude of information relating to analytical methods to a wide spectrum of customers.

Producing data of known and documented quality is essential to any credible laboratory operation. The regional laboratories try to go farther and produce excellent data that can withstand the harshest scrutiny. While sample and instrument limitations occasionally prevent universal success, striving to generate the best data possible has always been an ethic fundamental to the regional laboratory system. As good as we try to be, improvement is always possible and the discipline of quality assurance continues to evolve as we develop more techniques to ensure a higher quality product.

Quality does not come without a price. Approximately 30% of the analytical capability of the regional laboratories are devoted to insuring the quality of the remaining 70% of the data that support Agency decisions. Further, the regional laboratory community audits and is audited to insure that quality systems are developed and used. This commitment to quality insures that the data that provide the foundation for decisions affecting public health and our environment are sound and scientifically defensible.

Quality Systems Verification

During CY2000 the regional laboratories underwent two extensive audits: A Management Systems Audit and a Technical Systems Audit. The Management Systems Audit, conducted by each region's Office of Quality Assurance, reviewed their laboratory's quality management program to determine its effectiveness and the level of implementation. The Technical Systems Audit evaluated each laboratory's ability to produce data of known quality.

The audits involved exhaustive examinations of the laboratory's quality management plans, methods, standard operating procedures, instrumentation and related documentation, quality control/quality assurance practices, data management and the staff. The Technical Systems Audits were conducted by teams of laboratory staff from other regions and other programs considered experts in their respective analytical or quality assurance areas. Additionally, many of the regional laboratories also underwent the Drinking Water Certification audits conducted by NERL-Cincinnati. Although each of the regional laboratories had findings, several of which were common, overall the data being produced was of good and well-documented quality. Each laboratory has developed or is developing a corrective action plan to address their findings.

In spite of a major resource drain as laboratory staff were diverted to prepare for and participate in audits of their own and other laboratories, regional laboratory personnel continued to provide analytical and other necessary support to the mission of the Agency.

Quality System Oversight

Regional laboratories audit state and tribal laboratories for Safe Drinking Water Act (SDWA) certification at least every three years. They also provide audit support for the quality requirements of other EPA programs, conduct performance audit inspections, serve as referee laboratories, provide

program or specific technical assistance in Quality Assurance, and review performance testing (PT) data, providing advice and assistance for corrective action plans when necessary.

NELAP

The "National Environmental Laboratory Accreditation Conference" (NELAC) is sponsored by EPA as a voluntary association of State and federal officials. The purpose of the organization is to foster the generation of environmental laboratory data of known and documented quality in a cost-effective manner through the development of nationally accepted standards for environmental laboratory accreditation. NELAC encompasses all fields of testing associated with compliance with EPA regulations. The program will be administered by State and federal accrediting authorities in a uniform, consistent fashion nationwide.

During CY 2000, the Agency prepared its application for NELAC accreditation. This application will soon be reviewed by a team of laboratory experts from state organizations. Once the Agency receives accreditation, each regional laboratory will be applying for accreditation under various fields of testing. Recently, the Regional Science and Technology Directors agreed that all the regional laboratories would apply for drinking water accreditation. There are some regional laboratories that intend to apply for accreditation under other fields of testing in the future, such as those used in the CWA and RCRA programs. As the only regional laboratory with a RCRA TSD permit, the Region 7 laboratory is required by the State of Kansas to become NELAP accredited. The Region 7 laboratory will apply for NELAP accreditation in 2001.

A prominent function of regional laboratories is providing assistance to state, tribal and local laboratories as well as other federal agencies to improve the capability, capacity, and quality of their laboratories and environmental programs. Assistance typically includes direct analytical support; technical assistance in the areas of analysis, quality assurance and method development; pollution prevention; hazardous waste management; health and safety and program management. Some of the assistance provided in FY 2000 is detailed below:

★ Microbiological analysis was provided to the State of New Jersey as part of the National Shellfish Sanitation Program.

★ Quality assurance split sample analysis of water quality chemistry analytes was provided as part of New Jersey's Ambient Surface Water Network Monitoring Program.

★ Dissolved oxygen and microbiological analyses was provided for inner NY/NJ harbor stations and coastal stations as part of NJ's Tidal Surface Water Monitoring and Assessment Program.

★ Air monitoring and analysis support was provided to a citizens group in Lake Caclasieu, LA.

★ A study to determine the effectiveness of the installation of additional treatment for Seattle drinking water is currently underway.

★ Six recreational beaches were evaluated for microbial contamination for the State of Washington Department of Health as part of the national BEACH program.

★ Peer reviews of technical documents and methods were provided for EPA, other federal agencies, state, tribal and local entities.

★ Assistance was furnished to various tribes to establish certified drinking water laboratories at remote reservation locations.

★ Technical assistance and drinking water on-site evaluations for all 13 state and commercial laboratories in the non-primacy state of Wyoming were provided.

★ Quality assurance audits were conducted at several state and tribal laboratories.

★ Technical training to colleagues within the state and federal sector, the private sector and the international community was furnished. Specifically, the Puerto Rico Environmental Quality Board; the US Fish and Wildlife Service, the Bureau of Land Management; Native American tribal communities; various colleges and universities; state environmental and health programs; the Ministry of the Environment, Madrid Spain; the Department Eaux et Environment, Institut Pasteur

de Lille, France; the Republic of Kazakhstan, and the Pollution Control Department, Bangkok, Thailand.

★ Coordinated and hosted meetings of state laboratory directors, state QA certification officers and laboratory staff.

★ Provided laboratory space and services for the entire Washington Department of Ecology laboratory function.

★ Technical assistance was provided to a volunteer community group to establish an effective monitoring program. The laboratory provided supplies, training and assistance in producing effective sampling plans and quality assurance project plans.

With modern facilities, well trained and experienced staff and current technologies, regional laboratories are valuable sources of capability and knowledge. Regional laboratory staff are frequently called upon to provide training and consultation to EPA colleagues, and laboratory staff in federal, state, tribal, local and private laboratories. Training may amount to simple briefings and poster presentations, serving as adjunct faculty at local area colleges, lecturers in a variety of workshop and academic settings or hands-on training at the regional laboratory or at the laboratory requesting the assistance.

Some examples of these activities performed in FY 2000:

★ Technical training was provided to professional colleagues in the state and federal sector, the private sector, and the international community. This included hosting visiting scientists as well as traveling to locations to provide lectures and seminars. Some specific examples of this activity include: the Puerto Rico Environmental Quality Board; the US Fish and Wildlife Service, the Bureau of Land Management; Native American tribal communities; various colleges and universities; state environmental and health programs; the Ministry of the Environment, Madrid Spain; the Department Eaux et Environment, Institut Pasteur de Lille, France; the Republic of Kazakhstan, and the Pollution Control Department, Bangkok, Thailand.

★ Regional laboratories coordinated annual meetings of state laboratory directors, state QA certification officers and laboratory staff to discuss issues concerning environmental laboratories and laboratory certification. Technical presentations included experiences and guidance on analytical methodology, emerging technology and common issues such as lab accreditation and environmental management for laboratories.

★ Some laboratories provided lecturers at local colleges, universities, and high schools concerning a variety of topics related to the environment, analytical chemistry and analytical data.

★ Training was furnished to peers and colleagues on such topics as: laboratory data integrity; advanced laboratory methods (implementation of specific EPA methodologies); quality assurance/quality control; and drinking water certification.

OUTREACH

Each regional laboratory reaches out in many ways to those individuals and organizations that we serve. These efforts help provide information about the basic mission of the Agency, the laboratory, the role of good science within the Agency and in decision-making in general, and the fundamental importance of protecting and preserving the environment.

Outreach activities in FY 2000 included:

★ Serving as judges in local and state science fairs.

★ Sponsoring environmental contests and special Earth Day activities.

★ Providing science demonstrations at local schools and other organizations.

★ Conducting laboratory tours, demonstrations of laboratory operations, and lectures for high school and college students, peers and colleagues, and private citizens.

★ Forming continuing partnerships with local area schools, mentoring students at all levels, and working cooperatively with students on science projects.

★ Providing seminars to the public on special topics and participating in public meetings to share information concerning laboratory data.

★ Serving as active participants in professional organizations that include regional, national, and the international community. This effort often includes making special presentations and providing key leadership to these organizations. Among the organizations benefitting from EPA participation are AOAC, ACS, and the Greater Boston Mass Spectroscopy Discussion Group.

EPA's regional laboratories are full service environmental laboratories that must comply with the same environmental laws EPA is charged with enforcing. Each regional laboratory must address issues of hazardous waste storage and disposal, maintenance of Emergency Response Plans, Chemical Hygiene Plans, Hazardous Materials Inventories and employee training requirements for hazardous materials handlers. Each regional laboratory also has an ongoing commitment to pursue energy savings opportunities and to develop and implement strategies to reduce solvent use and laboratory waste. Accordingly, the regional laboratories implement recycling programs that variously include glass, paper, cardboard, plastic, aluminum and batteries. Several regional laboratories operate in-house solvent recycling units to reuse solvent and reduce waste disposal. In addition, the regional laboratories continue to implement equipment and method changes that reduce chemical usage such as switching to accelerated solvent extractors that reduce per sample solvent use from 500 ml to 40 ml. Some highlights in FY 2000 related to environmental management and pollution prevention include:

★ Region III occupied its new, energy-efficient, state-of-the-art laboratory facility at the Environmental Science Center in Ft. Meade, MD, and will be establishing and implementing an Environmental Management System (EMS) that conforms to ISO 14001, the international standard for EMS.

★ Three solar photovoltaic (PV) arrays totaling 2100 watts have been installed and hooked up at the Region 10 Laboratory. This PV system will return power to the grid whenever PV electrical supply exceeds laboratory needs.

★ Some regions are paying a power surcharge which funds the construction of a wind turbines sized to offset their laboratory's entire power demand.

★ The Region 1 Laboratory, now under construction and to be commissioned in the spring of '01, has been designed literally from the ground up to be a model of efficiency. Incorporating numerous energy efficiency and environmental features, the building will be powered with 100% wind power and is projected to achieve a silver rating from the U.S. Green Building Council's Leadership in Energy and Environmental Design program.

HEALTH & SAFETY

The health of laboratory staff is the most important laboratory management imperative. The extensive use of glassware, solvents (some of which are suspected carcinogens), compressed gases and potential exposure to contaminated environmental samples all conspire to make laboratories inherently more risky than office environments. All of EPA's regional laboratories have invested heavily in their health and safety programs and have an excellent safety record as proof of these efforts. The following are highlights from our health and safety activities for the last year:

★ Two regional laboratories underwent comprehensive safety, health, fire protection, security and security audits by Headquarters. The few findings identified were quickly resolved.

★ Two regional laboratories underwent Environmental Management Reviews in preparation for beginning work toward development of a facility Environmental Management System (EMS). The review revealed that one laboratory had excellent EMS practices but will be required to enhance documentation and measurement systems to achieve certification.

★ Training on several aspects of health and safety is continually provided to laboratory employees:

- ☆ All Regional Laboratories provided an annual refresher health & safety training course for laboratory personnel.
- ☆ Twenty-four hour health and safety training was offered for new employees working in the laboratories. Some are using the Safety Health and Environmental Management Division (SHEMD) computer based training CD-ROM enabling this valuable training to be provided on a timely basis.
- ☆ Training on a new Automatic External Defibrillator (AED) was conducted in one regional laboratory.
- ☆ Many laboratory employees attended fire extinguisher training classes, some through their local fire districts.

★ The Laboratories' Safety, Health and Environmental Management Committees met throughout the year, some as often as once a month. These committees also conducted inspections of their respective laboratories, some as often as monthly.

★ Medical monitoring was provided for those laboratory personnel who work with, or who have a potential exposure to, toxic materials.

★ All regional laboratories maintained Chemical Hygiene and Occupant Emergency Plans.

FACILITIES MANAGEMENT

The EPA regional laboratories comprise a varied array of facility types - from converted World War I buildings to recent architectural designs engaging energy efficiencies and alternative fuel sources. Some of the facilities are U.S. Government owned; however, most are operated under lease agreements through the General Services Administration. These facilities house the core laboratory functions and additional disciplines, and often other program activities of the region. Facilities management involves not only the day-to-day oversight activities for proper maintenance, but also the planning, budgeting, and implementation of needed modifications, such as building expansions and upgrades of servicing equipment. At times, the regions are engaged in planning of new laboratories. Because of this infrastructure, the regional laboratories are able to provide outstanding support to regional and national programs. The following are some of the facility highlights for FY 2000:

Many of the regional laboratories are engaged in renovations.

★ Design of Phase I of the Region 10 Laboratory Modernization Project was completed and bids were solicited. Phase I provides for the construction of a new 7,000 ft^2 metals/microbiology wing and a 3,400 ft^2 mechanical room expansion. Due to budget limitations, the complexity of laboratory construction and rigorous program demands that require ambitious engineering solutions, not all laboratory modules will be fully outfitted during Phase I. Funds to complete the wing and begin overhauling the existing wings are anticipated in FY2002.

★ Region 10 laboratory staff coordinated and provided oversight for rerouting primary water and sewer lines serving the laboratory in preparation for remediation of the Superfund site.

★ The Region 9 Laboratory investigated the possibility of energy retrofits that would significantly reduce energy consumption and make the laboratory more efficient. The projects researched include consolidating the fume hoods, replacing the oversized boiler with two smaller units, installing a co-generation unit and upgrading the building control system. Implementation of these retrofits are contingent on future funding.

★ Phase I was initiated for renovation for a new suite of biology laboratories in Region 5. Other phases over the next three year will complete the project for this and the administrative area.

★ Modifications were completed in the Region 6 Laboratory for (1) new Inductively Coupled Plasma Atomic Emission Spectroscopy instrument; (2) provision of emergency power to Battery Room exhaust fan; and (3) exhaust duct work in the Hazardous Storage Room

Facilities management requires the development, updating, and review of certain plans:

★ A Continuity of Operations Plan was developed for the Region 10 Laboratory in the event of natural disaster or other event that could compromise the ability of the Laboratory to function.

★ During FY2000, an update of the Master Plan for the Region 2 Environmental Center was completed. This involved meetings with members of the facilities staff from EPA Headquarters and

its contractor with members of the Region's management and facilities staff. The outcome was the agreement on a new updated Master Plan. Once funding is secured, implementation of the Master Plan will begin.

★ Representing EPA as the land owner, Region 10 staff reviewed the Beaver Creek Restoration Plan and provided comments to the Corps of Engineers. The Beaver Creek restoration effort is in mitigation of the loss of seasonal wetlands that will occur when the Superfund site adjacent to the laboratory site is remediated.

Planning for new facilities is underway in two regions.

★ During 2000, the laboratory team in Region 1 was fully engaged in the review of final plans for construction of a new regional laboratory facility now scheduled to be completed in May, 2001. The new 40,000 square foot facility will provide Region 1 with a state-of-the-art environmental science facility including a metals clean room, a containment laboratory, environmental chambers, and an aquatic sediment toxicity testing laboratory which will add significantly to the existing regional capability.

★ The Region 7 Laboratory worked with the General Services Administration, EPA Headquarters, and Regional personnel on a selection process for a contract to design and build new regional laboratory. Laboratory staff contributed key insights to the design process for new laboratory.

FUTURE CHALLENGES

Each regional laboratory is a center of applied scientific support that meets the unique needs of its geographical region, states and tribes. Since all ten organizations are environmental analytical laboratories, they share some common needs and must address some common challenges as well as individual challenges in both the short and long term. The following represent a summary of those needs and challenges identified by the regional laboratories separated into common and unique issues.

Common challenges:

★ Complete new and renovated laboratory facilities while continuing to provide analytical support to clients.

★ Meet increasing demands for scientific support with static or decreasing staff, while providing for an adequate mix of scientific skills in a time of accelerated staff turnover due to retirements of senior scientists.

★ Maximize productivity and minimize costs through full utilization of new technologies such as Laboratory Information Management Systems (LIMS) and the cross training of staff.

★ Address the resources needed for National Environmental Laboratory Accreditation Program (NELAP) application, audits and implementation.

★ Improve and expand capacity building, partnering and scientific support to states and tribes.

★ Expand participation in the environmental laboratory community through scientific papers and workgroups.

★ Develop low detection limits for selected analytical methods to meet program needs such as pesticides for TMDL efforts.

★ Assist ORD in field testing recently developed methods.

Unique challenges:

★ Develop analytical capabilities in diverse and specialized areas such as fish and plant tissue, PCB congeners in various matrices, immunoassay detection of pesticides and analysis of endocrine disrupting compounds such as alkylphenols.

★ Expand and develop the uses of specialized instrumentation such as mobile analytical units for field gas chromatography, x-ray refraction and air toxics as well as scanning electron microscopy and energy dispersive x-ray detector instrumentation for speciation of PM 2.5/PM 10 particulates.

★ More emphasis on the development and utilization of molecular techniques as a screening tool for

rapid identification of pathogens in drinking water.

★ Effect the migration of microorganism testing from convenient, surrogate organisms to organisms associated with human illnesses. For example, current tests for fecal coliform and *E. coli* in environmental waters will change to testing for *Enterococci*.

★ Develop the capability to speciate metals in waters and soils in order to differentiate the more toxic forms.

★ Improve mobile laboratory testing capabilities.

★ Provide indoor air quality monitoring of fungal spore culturing identification capabilities.

★ Validate and implement a method for the analysis of ambient waters for specific pesticides associated with mosquito spraying (Sumithrin, Piperonyl Butoxide and Resmethrin) to control the spread of the West Nile virus. The pesticides of concern are based on the pesticide products that will be used for the spraying this summer.

★ Implement PCB congeners via high resolution GC/MS (Method 1668) for ambient water and sediment quality determinations.

APPENDIX

CENTERS OF APPLIED SCIENCE

Annual Report
Fiscal Year 2000

At its inception, the Agency recognized the critical need for analytical information to support regional and Agency decisions, and established laboratories in each of the ten regions. Since then, the regional laboratories have evolved into an interdependent network - the Regional Laboratory System. Each regional laboratory is now comprised of core functions common to all regional laboratories and specialized expertise developed to support the geographic-specific issues of the region.

Through its comprehensive core analytical capability each region assesses the condition of the environment to determine the need for action and to evaluate its effectiveness. The suite of chemical and biological tests included in the core capability is used to support ambient monitoring, compliance monitoring, criminal and civil enforcement and special projects. Other core functions include expert witness testimony, training to program staff and other organizations, audits of other laboratories, policy guidance and technical support to other federal, state and local laboratories. The regional laboratories also serve as benchmarks for other environmental laboratories in areas such as analysis, pollution prevention and environmental compliance.

Each regional laboratory has also developed specialized expertise in response to specific regional needs. These capabilities, collectively called the Centers of Applied Science (CAS), have broad application and frequently constitute the best knowledge of the subject in the country. Through these CAS, the regional laboratories are committed to advancing the state-of-the-art and sharing that information through training and other appropriate forums. Regional laboratories have developed work plans for projects in the different Center disciplines and will be reporting on work plan progress annually. Because development work is unpredictable and is frequently displaced by the more traditional work of the region, schedules reflected in work plans are only tentative.

Relevant GPRA goals are identified in each work plan. Nearly all work represented in this report is associated with at least one media program goal. Additionally, all work in this report supports:

> Goal 8: Sound Science, Improved Understanding of Environmental Risk, and Greater Innovation to Address Environmental Problems
>
> Objective 804: By 2006, develop and verify improved tools, methodologies, and technologies for modeling, measuring, characterizing, preventing, controlling, and cleaning up contaminants associated with high priority human health and environmental problems.
>
> Subobjective 80401: By 2006, develop and verify improved tools, methodologies, and technologies for modeling, measuring, characterizing, preventing, controlling, and cleaning up contaminants associated with high priority human health and environmental problems.

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Status of Work Plans

Scanning Electron Microscopy (Region 9): Laboratory staff have been trained on the operation of both the Environmental Scanning Electron Microscope (SEM) and the Energy Dispersive X-ray Detector (EDX). Investigation has begun on a variety of sample media, preparation techniques and SEM sample chamber environments that will provide optimal conditions for ambient air particle analysis. In FY2000, a microbalance for filter weighing and a Sputter/Carbon Coater for sample preparation were acquired. The laboratory also purchased a CCD camera for sample chamber observation and a Peltier cooled stage that will eliminate charging effects previously observed with particle filter samples. In FY2001, the CCD camera and the cooled stage will be installed and staff will be trained on their use. Development of methodology related to observation of hydrated samples will begin immediately subsequent to installation and training.

Hydride Generation (Region 10) - Methodology developed by a Region 10 chemist in Cincinnati is being adapted to Regional instrumentation. Required equipment modifications have been made and the membrane has been selected and ordered. The hydride method is being developed to analyze arsenic in seawater. Initially, it was hoped that the method could be adapted to other difficult elements such as selenium. Given the difficulty of adapting the hydride method to selenium, no clear program need to be able to detect selenium in seawater and the promise of new technology, DRC-ICP/MS, it is unlikely that the hydride method will be adapted to selenium.

Toxaphene Congeners (Region 4) - Instrumentation has been installed and necessary supplies have been procured. GC analysis conditions to separate 18 of 22 congeners have been determined. The reference congeners have been, and continue to be, used as a guide for the identification of (degraded) toxaphene and as a standard for the analysis of the congeners in biological tissue, soil, and water. Work that remains: 1) Develop conditions and column selections to resolve the 4 remaining congeners and 2) Conduct a complete validation study to analyze and quantitate the congeners as separate entities. Currently, risk assessment and toxicological data are defined using the toxaphene mixture and not individual congeners. Lack of a current practical application for congener analysis and competing analytical demands have resulted in a decision to suspend further developmental work for the foreseeable future.

Dioxin and Furans (Region 7) - Extraction technique for fish and shellfish were improved and tested on corn oil, triolein and crab hepatopancreas. Appropriate laboratory standard operating procedures were developed. Support continued to Region 7, other regions and headquarters on special projects involving trace level detection of dioxin and furans. The purchase of a new High Resolution Mass Spectrometer will enhance capability and capacity through higher sensitivity, lower detection limits and the installation of an autosampler.

PCB Congeners (Region 2) - Method for the cleanup and analysis of approximately 100 PCB congeners in sediment samples by GC/ECD has been developed and peer reviewed. A new GC/MS-MS with a negative chemical ionization sample introduction system was installed in 2000. A method for the determination of PCB Congeners in sediment samples using this instrument will be developed in 2001. This new method will enable the determination of approximately 100 PCB congeners at detection levels equivalent to those produced using the GC/ECD technique, but with mass spectral identification.

PCB Congeners (Region 10) - The laboratory experimental plan has been developed. PCB congeners and appropriate columns were acquired. Retention time tables for 158 congeners have been completed. MDLs in soil have been determined and preliminary samples are being evaluated.

Explosives (Region 3) - An SOP for analysis of nitroaromatics, nitramines and nitroglycerine in soil and aqueous samples has been prepared and is undergoing peer review. The SOP includes both the salting-out and solid phase extraction (SPE) method for aqueous samples and a spectral matching method for a photodiode array detector in lieu of dual column confirmation. Chromatographic separation of Method 8330A analytes as been improved by modifying solvent gradients and using a new column, allowing more efficient separation of previously coeluting analytes. IDCs have been completed for solid and aqueous matrices for SW846 Methods 8330A and 8332. The IDC for Method 8330A via solid phase extraction is currently in review.

Arsenic Speciation (Region 10) - NERL procedures have been tailored to regional laboratory equipment and facility. CRM has been analyzed to verify method performance. Method will be optimized based on CRM and split samples will be run with NERL to determine precision and accuracy.

Endocrine Disruptors (Region 5) - A work plan was developed that includes development of SOPs for alkylphenols in water and sediment, synthesis of some alkylpenol ethoxylates and carboxylates for use as standards, and gaining experience in performing analyses on water and sediment. QA criteria for soil/sediment and water were completed and analysis of environmental samples is underway. A source of EDC standards has been established and standards have been acquired. Region 5 and Region 3 will be partnering with ORD through a Regional Methods Initiative on Alkylphenol Ethoxylates to fully accomplish the elements in the performance plan.

Fish Tissue Extraction (Region 10): An extraction procedure used to isolate and measure guaiacols in pulp and paper wastewater in conjunction with Jordi Gel column clean up techniques was adapted to overcome difficulties associated with the analyses of many acidic and some neutral analytes in fish tissue. Detection limits for most of these analytes have been substantially improved through these adaptations. Work associated with GC/MS analysis for PAH and neutral analytes is being assembled for publication. A detailed experimental plan has been developed for further refinement of the analysis of PCBs and pesticides using GC/AED.

X-ray Diffraction (Region 10): A mineralogy laboratory has been established with an X-ray diffractometer, magnetic separation apparatus and polarizing light microscope. A qualitative XRD method has been developed and applied to the identification of compounds for the purpose of assessing metals mobility. A variety of materials examined so far include mine tailings, waste rock, smelter slag, treatment sludge, air filters and abandoned drums. Development of a quantitative XRD method and a scanning electron microscopy capability are planned.

Primary Lead Intervention Research and Support (Region 1): A handbook for the public is being prepared to help homeowners evaluate their risk to lead exposure and identify sources of assistance in remediating lead contamination. The Region is working with several federal, state and local agencies in assessing and resolving contamination issues at specific home sites.

Passive Vapor Diffusion Monitoring (Region 1): An SOP for passive vapor monitoring is nearly complete. The technique will be used to monitor two Superfund sites in FY 2001.

Training

Fish Tissue Extraction -

Two Region 2 scientists spent 3 weeks at Manchester learning techniques for the preparation and analysis of fish tissue for pesticides and PCBs.

Information Transfer

Scanning Electron Microscopy -

An oral presentation on the SEM project was made at the annual meeting of the Regional Laboratories' Technical Information Group which included scientists from all ten regional laboratories.

Toxaphene Congener Analysis -

A poster presentation entitled "Toxaphene Congener Analysis by GC/ECD" was given at a Science Days conference held in Atlanta, GA in April of 2000.

The method was presented to representatives of the Georgia Environmental Protection Division and the private sector. The technique is to be used at a project within Region 4.

Dioxin and Furans -

An oral presentation entitled "Hexachloroxanthene Analysis with TCDD" was delivered at the 2000 International Dioxin Symposium held in Monterey, CA on August 13-17, 2000.

PCB Congeners -

A paper was presented at the Pacific Northwest Section, AOAC International 2001 summer meeting entitled, "PCB Congener Separation and Analysis by GC/ECD (micro)."

Endocrine Disruptors -

Data on sediment from the North Branch of the Chicago River, analyzed for n-nonylphenol, octylphenol, and the nonylphenol mono- and di-ethyoxylates using the draft regional method, was presented to alkylphenol investigators from USGS Boulder, CO; USDA, Bethesda, MD; and Metropolitan Sewer District of Chicago. Data on other river systems and fish tissue were also discussed.

Contacts

Scanning Electron Microscopy - Barbara Bates (R9) - (510) 412-2325

Hydride Generation -	Isa Chamberlain (R10) - (360) 871-8706
	Katie Adams (R10) - (360) 871-8748
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	Dr. Larry Zintek (R5) - (312) 886-3894
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	Peggy Knight (R10) - (360) 871-8713
	Bob Rieck (R10) - (360) 871-8719
	Steve Reimer (R10) - (360) 871-8718
	Randy Cummings (R10) - (360) 871-8707

X-ray Diffraction - David Frank (R10) - (360) 871-8708

Primary Lead Intervention - Paul Carroll (R1) - (781) 860-4306
Research and Support

Passive Vapor Diffusion - Scott Clifford (testing) - (781) 860-4631
Monitoring Jerry Keefe (sampling) - (781) 860-4376

Status of Work Plans

Polymerase Chain Reaction (Region 10) - Efforts to evaluate current methodologies for *Cyclospora cayetanensis* and their application to the drinking water matrix were not possible due to the inability to acquire a sufficient quantity of the parasite to develop and evaluate the test. *Eimeria tenella*, an organism of comparable size and activity, has been acquired and will be used for development and evaluation of the test with modification for *Cyclospora* to follow.

Giardia and Cryptosporidium (Region 2) - The capability for Giardia and Cryptosporidium analysis by Method 1623 has been established and routine monitoring is underway. This CAS project has been completed.

Contacts

Polymerase Chain Reaction -	Stephanie Harris (R10) -	(360) 871-8711
Giardia and Cryptosporidium -	Irwin Katz (R2) -	(732) 321-6725
	Stephanie Harris (R10) -	(360) 871-8711

Status of Work Plan

Abbreviated Microwave Extraction (AMAE) (Region 6) - The purchase of a microwave with new features (such as magnetic stirring and new vessel design) was completed in FY2000. Installation occurred in October 2000. Consequently, development with the new equipment was moved to FY2001.

Microextraction with Large Volume Injection (LVI) (Region 6) - Three totally new LVI inlets and one LVI inlet upgrade were purchased in FY2000. This allowed the laboratory to compare four separate state-of-the-art designs in Large Volume Injection techniques. Collaborative work is continuing on improving these designs with all companies involved. Papers were presented at the 2000 Pittsburgh Conference and the 2000 Waste Testing and Quality Assurance Symposium. An article was published in *Environmental Testing & Analysis*. Focus on coupling microextraction techniques with LVI is planned for FY2001.

Solventless Extraction Techniques (Region 6) - This project started in FY2000 as a collaborative project with Los Alamos National Laboratory (LANL) combining hot water extractions with solventless phase-coated extractions. Region 6 laboratory is focusing on the solventless solid phase extraction and LANL is pursuing the hot water extraction development. Equipment has been purchased and installed to evaluate phase-coated extractions and preliminary evaluations have begun.

Information Transfer

Microextraction with Large Volume Injection -

An article was published in *Environmental Testing & Analysis*, Jan/Feb issue 2000, Volume 9, Number 1, page 17-20, on "Large Volume Injections", as part of a larger article on "Advances in Chromatography."

A paper was presented at the 2000 Pittsburgh Conference entitled "Comparison of Techniques for Injecting Large Volumes into Gas Chromatographs Using PTV Inlet, COC Inlet and Precolumn Inlet," #101.

A paper was presented at the 2000 Waste Testing and Quality Assurance Symposium entitled "Comparison of Four Large Volume Injection Techniques."

Contacts

Abbreviated Microwave Extraction	David Spencer (R6) - (281) 983-2125 Meredith Clarage (R6) - (281) 983-2129 Diane Gregg (R6) - (281) 983-2120 Rick McMillin (R6) - (281) 983-2107
Microextraction with - Large Volume Injection	Diane Gregg (R6) - (281) 983-2120 Rick McMillin (R6) - (281) 983-2107
Solventless Extraction Techniques -	Barbara Schuppener (R6) - (281) 983-2117 Diane Gregg (R6) - (281) 983-2120 Rick McMillin (R6) - (281) 983-2107

Status of Work Plans:

Polar Hydrocarbon Compounds (Region 2) - Standards have been acquired. Standard operating procedures and the QA plan for method development will be completed in FY2001.

Polar Hydrocarbon Compounds (Region 1) - Standards have been purchased. TO-15 will be optimized in FY2001.

Source Apportionment (Region 10) - The instrument supplier has not been able to deliver a working instrument. A substantial reduction in project priority, loss of critical personnel and instrument difficulties have postponed this project for the foreseeable future.

Contacts:

Polar Hydrocarbon Compounds -	Avi Teitz (R2) -	(732) 906-6160
	Dan Boudreau (R1) (testing) -	(780) 860-4340
	Pete Kahn (R1) (sampling) -	(780) 860-4392
Source Apportionment -	Michael Johnston (R10) -	(360) 871-8701

Status of Work Plans

Marine and Estuarine Benthic Invertebrate Taxonomy (Region 3) - Two electronic bibliographic databases, *Zoological Record* published by BIOSIS and a bibliography dealing with polychaete worms published by the Smithsonian Institution, have been acquired. SOPs addressing the removal and identification of benthic invertebrates have been completed and distributed via website. Training in the identification of oligochaete worms was obtained at a two day workshop associated with the annual meeting of the New England Association of Environmental Biologists.

Training:

Marine and Estuarine Benthic Invertebrate Taxonomy

Provided two half-day training sessions for biologists from the Maryland Department of the Environment.

Contacts

Marine and Estuarine Benthic Invertebrate Taxonomy - Dr. David Russell (R3) - (410) 305-2656.

WORK PLAN FOR ENVIRONMENTAL CHEMISTRY

Fine Particulate Speciation by Scanning Electron Microscopy

Goal 1: Clean Air

Objective 101: By 2010, improve air quality for Americans living in areas that do not meet the National Ambient Air Quality Standard (NAAQS) for ozone and particulate matter (PM).

Subobjective 5: By 2001, provide measurements, modeling, source emissions, and control information for PM by species and size to guide risk assessment and PM risk management options; and by 2003, develop a biologically plausible, quantitative health risk model for particulate matter based on epidemiological, toxicological, and mechanistic studies.

Regional Goal: By FY 2001, develop methodology for quantitative and qualitative analysis of fine particulate matter using Scanning Electron Microscopy coupled with energy dispersive x-ray analysis.

Projection Description: On July 18, 1997, EPA revised the National Ambient Air Quality Standard (NAAQS) for particulate matter (PM) by adding new standards for $PM_{2.5}$ (particles with an aerodynamic diameters lower than 2.5 micrometers) and adjusting the form of the PM_{10} (particles with an aerodynamic diameters lower than 10 micrometers) 24-hour standard. $PM_{2.5}$ chemical speciation is included in the monitoring requirements. While core $PM_{2.5}$ speciation sites will follow an established analysis program, EPA encourages the use of alternative speciation approaches for non-routine speciation sites and for "Super Sites" which will be established to conduct special detailed chemical and physical characterization studies. Scanning Electron Microscopy (SEM) coupled with energy dispersive X-ray analysis (EDX) under the control of image analysis software is a powerful tool that can provide very detailed information on individual particles. In order to support non-routine speciation sites and research-level "Super Sites", the Region 9 Laboratory is currently developing the capability to do quantitative and qualitative analysis of fine particulate matter using Scanning Electron Microscopy coupled with energy dispersive x-ray analysis. In addition to providing chemical speciation of individual particles, this technique will provide information on particle morphology, particle size and distribution.

FY 2000 PERFORMANCE PLAN
(Year 2)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2002, develop methodology for quantitative and qualitative analysis of fine particulate matter using SEM coupled with energy dispersive x-ray analysis	1. Establish a functioning SEM laboratory	1. Procure and install SEM/EDX system: December 1999	.45	.5	$261,500	$300,497	
	2. Become proficient in SEM/EDS operation	2. Staff trained by manufacturer and current methods evaluated: March 2000	.5	.75	$2000	$0	

FY 2001 PERFORMANCE PLAN
(Year 3)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2002, develop methodology for quantitative and qualitative analysis of fine particulate matter using SEM coupled with energy dispersive x-ray analysis	3. Develop methodology for particle sample preparation	3. SOP drafted, reviewed and finalized: June 2001	1.0		$10,000		3. (ORD) AREAL and (OA) OAQPS
	4. Develop procedures for qualitative and quantitative particulate analysis	4. SOP drafted, reviewed and finalized: September 2001	1.0		$10,000		4. (ORD) AREAL and (OA) OAQPS

FY 2002 PERFORMANCE PLAN
(Year 4)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2002, develop methodology for quantitative and qualitative analysis of fine particulate matter using SEM coupled with energy dispersive x-ray analysis	5. Develop procedures for evaluating qualitative and quantitative analysis	5. Procedures adopted: February 2002	1.0		$500		5. (ORD) AREAL and (OA) OAQPS
	6. Capability operational	6. Begin accepting samples for analysis on a limited basis: April 2002	1+		$1,000		

WORK PLAN FOR ENVIRONMENTAL CHEMISTRY

Metals Detection by Hydride Generation

Goal 2: Clean and Safe Water

Objective 201: By 2005, protect human health so that 95 percent of the population served by community water systems will receive water that meets drinking water standards, consumption of contaminated fish and shellfish will be reduced, and exposure to microbial and other forms of contamination in waters used for recreation will be reduced.

Subobjective 20105: By 2005, consumption of contaminated fish and shellfish will be reduced and the percentage of waters attaining the designated uses protecting the consumption of fish and shellfish will increase.

Discussion: Many of the available EPA methods for trace metals determination do not meet regional needs. Arsenic levels in seawater must be accurately measured to determine the source of arsenic burdens in the tissue of fish and shellfish. This information will allow better understanding of arsenic pathways in the marine environment and more accurate ecosystem and human health risk assessments.

Regional Subobjective 20105R1: To assess the potential contaminant exposures and risks from fish and shellfish consumption. Identify levels of contaminants in fish and shellfish in the Pacific Northwest and Alaska. Project includes development of sampling and analytical methods, completion of exposure analyses, evaluation of cumulative risk, and the conduct of case studies...

Project Description: Arsenic is one of the metals of greatest concern in the environment due to its toxicity. However, it is also one of the most difficult to analyze in a seawater matrix, because the most sensitive method of analysis (ICP-MS) is unable to accurately measure arsenic in samples containing high levels of chloride ions. This notorious interference can be circumvented using hydride techniques. With these techniques, the arsenic present in a sample converts to arsine gas, which is swept away from the chloride-containing sample. Once free of the matrix, arsenic can be measured without interference at trace levels. In Region 10, with the proximity of Puget Sound and the Pacific Ocean, the ability to analyze arsenic in seawater is of particular concern. Implementation of the method also supports the initiative of the Chemical Exposure Research Branch of NERL, to propagate measurement methods for coastal and estuarine waters. Once the hydride generation is established for arsenic in seawaters, similar methods may be possible for other elements plagued by interferences such as selenium, which are also capable of forming hydrides. In addition, it may be possible to use the technique on other difficult, highly-interfering matrices such as soils.

FY 2000 PERFORMANCE PLAN
(Year 1)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2003, have in operation in Region 10 and available for export to other interested laboratories, a hydride generation method for determining arsenic and selenium in seawater samples.	1. Develop the work plan	1. Work plan completed: May 2000					

FY 2001 PERFORMANCE PLAN
(Year 2)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2003, have in operation in Region 10 and available for export to other interested laboratories, a hydride generation method for determining arsenic and selenium in seawater samples.	2. Establish the hydride generation system	2. Select and procure membrane. Complete installation of components: December 2000	.04		$300		2. NERL-Cincinnati
	3. Tune system for arsenic	3. Optimize chemistry for arsenic determination: April 2001	.02				
	4. Test the method	4. Perform analyses on reference materials to validate the method: June 2001	.03				

WORK PLAN FOR ENVIRONMENTAL CHEMISTRY

Analysis of Dioxin and Furans in Aquatic Tissue

Goal 2: Clean and Safe Water

Objective 01: By 2005, protect human health so that 95% of the population served by community water systems will receive water that meets drinking water standards, consumption of contaminated fish and shellfish will be reduced, and exposure to microbial and other forms of contamination in waters used for recreation will be reduced.

Subobjective 05: By 2005, consumption of contaminated fish and shellfish will be reduced and the percentage of waters attaining the designated uses protecting the consumption of fish and shellfish will increase.

Description: Participate in ongoing stream survey in the Midwest monitoring PCDD/PCDFs in fish tissue. These data along with historical fish data will help indicate trends in the Midwest. This total study should aid in modeling, controlling and cleaning up environmental problems.

Goal 5: Better Waste Management, Restoration of Contaminated Waste Sites, and Emergency Response

Objective 01: By 2005, EPA and its partners will reduce or control the risks to human health and the environment

Subobjective 02: By 2005, EPA and its partners will reduce the risks that Superfund sites pose to public health and the environment

Description: Help emergency response teams in the identification of potentially responsible parties by helping identify possible marker compounds. To protect human health by continual monitoring and providing data for risk assessment purposes.

Dioxin contamination continues to be a concern for the agency in virtually all matrices. Specific concerns in Region 7 have prompted the regional laboratory to develop capabilities for the extraction and analysis of trace levels of dioxins and furans in several matrices. Additional work is in progress to improve the current extraction and cleanup techniques along with adding additional matrices to the list of capabilities.

FY 2000 PERFORMANCE PLAN

(Year 2)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2003, have in operation in Region 7 and available for export to other interested laboratories methods improved methods for the detection of dioxin and furans in aquatic tissue.	1. Improve extraction technique for dioxins/furans in fish tissue and shell fish. 2. Demonstrate the performance of the method. 3. Extract and analyze tissue from Region 1 (Fish from Regional Ambient Fish Tissue Monitoring Program)	1. Improved techniques in place: March 2000 2. Initial precision and recovery studies complete for corn oil, triolein, and crab hepatopancrease: July 2000 3. Final Report sent: April 2000					

FY 2001 PERFORMANCE PLAN
(Year 3)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2003, have in operation in Region 7 and available for export to other interested laboratories methods improved methods for the detection of dioxin and furans in aquatic tissue.	4. Report summarizing various extraction techniques in different aquatic tissues. 5. Extract and analyze tissue from Region 2 (Blue Crab in San Juan Bay). 6. Comprehensive report on aquatic tissue extraction and analysis methods. 7. Enhance capabilities to detect dioxin and furans through procurement of new instrumentation	4. EPA Region 7 Laboratory Tissue Extraction Method approved: October 2000 5. Analysis completed and results provided to participating regions: October 2000 6. Presentation of aquatic tissue dioxin / furan method at a professional conference: 2001 7. Install, receive training on and make operational a new High Resolution Mass Spectrometer: 2001					

WORK PLAN FOR ENVIRONMENTAL CHEMISTRY

PCB Congeners

Goal 02: Clean and Safe Water

Objective 201: By 2005, protect human health so that 95 percent of the population served by community water systems will receive water that meets drinking water standards, consumption of contaminated fish and shellfish will be reduced, and exposure to microbial and other forms of contamination in waters used for recreation will be reduced.

Subobjective 20105: By 2005, consumption of contaminated fish and shellfish will be reduced and the percentage of waters attaining the designated uses protecting the consumption of fish and shellfish will increase.

Objective 202: By 2005, conserve and enhance the ecological health of the nation's (state, interstate & Tribal) waters and aquatic ecosystems -- rivers and streams, lakes, wetlands, estuaries, coastal areas, oceans, and ground waters--so that 75% of waters support healthy aquatic communities.

Subobjective 20201: By 2005, restore and protect watersheds so that 75% of waters support healthy watersheds as shown by comprehensive assessment of the nation's watersheds.

Description: There is an increasing need throughout the country to assess the concentration of PCB Congeners in sediment matrices (from lakes, streams, and estuaries). The Region 2 Laboratory has developed a method to analyze a representative subset of the most environmentally significant congeners (approximately 20). There is a need to expand the method to include a more comprehensive list of approximately 100 congeners. In addition, there is a need to improve the sensitivity of the method in order to properly detect at levels normally found in the environment for many of these congeners. This will be accomplished by using improved extract cleanup procedures as well as new instrument technology.

FY 1999 PERFORMANCE PLAN
(Year 1)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By FY 2002, develop the capability to detect PCB congeners in sediment and soil	1. Develop a work plan for the cleanup and analysis of PCB congeners by GC/ECD	1. Work plan developed: April 1999	.01				
	2. Develop method for use in Region 2 laboratory	2. Method developed, validation report complete: September 1999	.6				

FY 2000 PERFORMANCE PLAN
(Year 2)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By FY 2002, develop the capability to detect PCB congeners in sediment and soil (continued)	3. Analytical method accepted for use in Region 2	3. Internal peer review complete: December 1999	.01				
	4. Install new Gas Chromatograph Mass Spectrometer-Mass Spectrometer (GC/MS-MS) with a chemical ionization sample introduction system	4. Installation: January 2000	0				

FY 2001 PERFORMANCE PLAN
(Year 3)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By FY 2002, develop the capability to detect PCB congeners in sediment and soil (continued)	5. Develop a work plan for the measurement of PCB Congeners in soil/sediment using GC/MS-MS with a negative chemical ionization sample introduction system	5. Work plan developed: April 2001	0.01				

FY 2002 PERFORMANCE PLAN
(Year 3)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By FY 2002, develop the capability to detect PCB congeners in sediment and soil (continued)	6. Develop the GC/MS-MS analytical method	6. Method developed: December 2001	0.6				
	7. Validate the GC/MS-MS analytical method.	7. Method validation report complete: January 2002	.05				
	8. Analytical method accepted for use in Region 2	8. Internal peer review complete: March 2002	.05				

WORK PLAN FOR ENVIRONMENTAL CHEMISTRY

Coplanar PCB Congener Separation and Analysis

Goal 2: Clean and Safe Water

Objective 201: By 2005, protect human health so that 95 percent of the population served by community water systems will receive water that meets drinking water standards, consumption of contaminated fish and shellfish will be reduced, and exposure to microbial and other forms of contamination in waters used for recreation will be reduced.

Subobjective 20105: By 2005, consumption of contaminated fish and shellfish will be reduced and the percentage of waters attaining the designated uses protecting the consumption of fish and shellfish will increase.

Regional Subobjective 20105R1: To assess the potential contaminant exposures and risks from fish and shellfish consumption. Identify levels of contaminants in fish and shellfish in the Pacific Northwest and Alaska. Project includes development of sampling and analytical methods, completion of exposure analyses, evaluation of cumulative risk, and the conduct of case studies...

Description: PCB analysis has traditionally been performed by Arochlor, the grouping of PCB congeners by PCB product description. As our understanding of how PCBs are configured and their effect on human physiology has grown, it has become clear that more accurate risk assessments require individual PCB congener determinations. Some PCB congeners, especially those with a chemical configuration similar to dioxin, are of particular concern. The regional laboratory is developing a separation technique to isolate and concentrate the coplanar PCB congeners of special interest to enable their detection and quantification using instrumentation currently in the laboratory. The study will target the 15 PCB congeners on the World Health Organization list as well as the 20 congeners in the EPA Congener Calibration Standard.

FY 1999 PERFORMANCE PLAN

(Year 1)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 12/31/99, complete initial and follow up experimental laboratory work and prepare an article for publication describing the extraction and clean up of tissue and soil extracts for analyses of Coplanar PCB Cogeners.	1. Conduct literature search	1. Literature search completed: February 1, 1999	.1	.1			
	2.Order PCB congener standards, capillary columns	2. Supplies received: January 15, 1999.	.1	.1		$4550	
	3. Identify information needed to complete project and develop an experimental plan	3. Finalize laboratory experimental plan: February 1, 1999	.1	.1			
	4. Develop congener retention time tables on Tracor GC	4. Retention time tables complete: February 28, 1999	.7	.5			
	5. Evaluate Florisil Elution pattern for congeners	5. Florisil elution pattern for congeners completed: April 1, 1999	.7	.7			

FY 2000 PERFORMANCE PLAN
(Year 2)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 6/31/00, complete initial and follow up experimental laboratory work and prepare an article for publication describing the extraction and clean up of tissue and soil extracts for analyses of Coplanar PCB Congeners.	6. Develop retention time tables for Hewlett-Packard GC	6. Retention time tables completed: January 15, 2000	.3	.3			
	7. Repeat Florisil elution pattern analysis with H-P GC	7. Florisil elution pattern analysis completed: February 29, 2000	.2	.2			
	8. Determine congener MDLs in soil	8. Congener MDLs completed: March 15, 2000	.5	.5			

FY 2001 PERFORMANCE PLAN
(Year 3)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 6/31/00, complete initial and follow up experimental laboratory work and prepare an article for publication describing the extraction and clean up of tissue and soil extracts for analyses of Coplanar PCB Congeners	9. Extract 21 sediment samples by Soxhlet and compare congener values with those previously determined by the Ecology lab 10. Prepare method for distribution article for SW-846	9. Congener comparison completed: January 31, 2001 10. Method submitted to SW-846 organics committee: March 31, 2001	1 .8				9. Washington State Department of Ecology

WORK PLAN FOR ENVIRONMENTAL CHEMISTRY

Explosives Analysis by HPLC and LC/MS

GOAL 5: America's wastes will be stored, treated and disposed of in ways that prevent harm to people and to the natural environment. EPA will work to clean up previously polluted sites and restore them to uses appropriate for surrounding communities, and respond to and prevent waste-related or industrial accidents.

Objective 501: By 2005, EPA and its partners will reduce or control the risks to human health and the environment at over 375,000 contaminated Superfund, RCRA, UST and brownfield sites. (Total comprises 1,200 NPL and 480 non-NPL sites; 2,475 RCRA facilities; 370,000 LUST cleanups initiated or completed; and 1,500 brownfield properties).

Subobjective 50104: By 2005, EPA will have in place all Interagency Agreements (IAGs) at current Federal Facility National Priority List (NPL) sites.

Project Description: Region III has numerous Department of Defense sites dating from pre-World War I to the present. Many of these sites manufactured, stored, used or disposed of ammunition and other ordnance. Accordingly, many of these sites are contaminated with explosives waste and require cleanup. This capability is specifically intended to assist states in the assessment and cleanup of abandoned explosives waste dumps, mostly at these former or operational DOD sites.

FY 2001 PERFORMANCE PLAN
(Year 2)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2002, develop the capability to detect and quantify nitroaromatic and nitramine explosives in soil and water using HPLC and LC/MS	1. Explore various extraction techniques	1. Compare solid-phase extraction (SPE) with salting out techniques for aqueous extraction: April 2001	.3		$3,500		
	2. Establish HPLC and LC/MS capability for Methods 8330 and 8332 on all new instruments	2. Complete Method Detection Limit studies on all new instruments: May 2001	.3		$2,000		
	3. Finalize the SOP	3. Finalize the SOP including peer review: June 2001	.3				3. OASQA

FY 2002 PERFORMANCE PLAN
(Year 3)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2002, develop the capability to detect and quantify nitroaromatic and nitramine explosives in soil and water using HPLC and LC/MS	4. Explore the application to other organic compounds of concern not readily separated by gas chromatographic methods	4. Consult with other regions and develop a work plan for new analytes: December 2001	.1				

WORK PLAN FOR ENVIRONMENTAL CHEMISTRY

Arsenic Speciation

Goal 2: Clean and Safe Water

Objective 201: By 2005, protect human health so that 95 percent of the population served by community water systems will receive water that meets drinking water standards, consumption of contaminated fish and shellfish will be reduced, and exposure to microbial and other forms of contamination in waters used for recreation will be reduced.

Subobjective 20105: By 2005, consumption of contaminated fish and shellfish will be reduced and the percentage of waters attaining the designated uses protecting the consumption of fish and shellfish will increase.

Discussion: Some culture-groups consume substantially more seafood than current human exposure models accommodate. Existing analytical methods for some pollutants do not achieve the detection limits or specificity required for credible risk assessments.

Regional Subobjective 20105R1: To assess the potential contaminant exposures and risks from fish and shellfish consumption. Identify levels of contaminants in fish and shellfish in the Pacific Northwest and Alaska. Project includes development of sampling and analytical methods, completion of exposure analyses, evaluation of cumulative risk, and the conduct of case studies...

Project Description: Currently approved methods for the determination of arsenic do not distinguish among the several species of arsenic that are typically present in the environment, but rather measure the total amount of arsenic present. The drawback to this approach is that the different arsenic species have different levels of toxicity. Inorganic forms (As III and As V) are highly toxic, while organic forms (monomethyl arsenic, dimethyl arsenic) are more benign. Seafood generally contains high levels of arsenic. However, designing a risk model based on the total arsenic content is not practical because in many cases the arsenic is present in the less toxic organic forms. Region 10 has a particular interest in establishing the arsenic levels and species in seafood because the per capita consumption of seafood in the region is higher than the national average. In addition, some local populations may consume seafood of different varieties and from different sources than the norm. For this reason, the Region 10 laboratory has been collaborating with NERL-Cincinnati to develop and implement extraction methods for various seafoods, as well as an IC-ICP-MS technique which can determine the arsenic species in the extracts. When the methods are in place, they will be used to analyze representative, locally obtained fish, shellfish and seaweed to provide data on which risk assessment models can be based.

FY 2000 PERFORMANCE PLAN
(Year 1)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2002, have in operation in Region 10 and available for export to other interested laboratories, a method for determining arsenic species at trace levels in fin fish and shellfish.	1. Develop a working method for fin fish	1. Tailor NERL procedures to Manchester equipment and facility: September 2000	.015				1. NERL-Cincinnati

FY 2001 PERFORMANCE PLAN
(Year 2)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2002, have in operation in Region 10 and available for export to other interested laboratories, a method for determining arsenic species at trace levels in fin fish and shellfish.	2. Test the method	2. Analyze CRM to insure method performs: October 2000	.025				2. NERL - Cincinnati, Roseanne Lorenzana - Region 10
	3. Adust the method based on CRM evaluation	3. Optimize separation and measurement parameters: January 2001	.05		$400		
	4. Determine precision and accuracy of fin fish method	4. Analyze split samples in conjunction with NERL- Cincinnati: May 2001	.3				
	5. Establish extraction methods for shellfish	5. Modify fin fish method for shellfish: September 2001	.05				5. NERL-Cincinnati

WORK PLAN FOR ENVIRONMENTAL CHEMISTRY

Endocrine Disrupting Compound Analysis

Goal 5: Better Waste Management, Restoration of Contaminated Waste Sites, and Emergency Response

Objective 501: Reduce or Control Risks to Human Health

Sub-objective 50102: Respond to Superfund Hazardous Waste Sites

Project Description: The occurrence of potential endocrine disrupting compounds (EDCs) in the environment is of growing concern. An important source of EDCs is treated municipal and domestic wastewater. Municipal wastewater is a complex mixture of natural and synthetic organic chemicals. These compounds include hormones, plasticizers and degradation products of nonionic surfactants. An important group of nonionic surfactants are alkylphenol polyethoxylates (APEOs), which consist of an alkylphenol moiety with 1 - 100 ethylene oxides with most cleaning products having 9 - 10 ethoxylate units. When APEO surfactants are discharged into the environment, they undergo biodegradation during wastewater treatment to produce short chain APEOs (1 - 4 EO units), alkylphenol ethoxycarboxylic acids (APEC) and alkylphenols. The most common surfactant formulations use nonylphenol and octylphenol. Method validation studies are needed on the potential EDCs in water, soil and tissue matrices using existing analytical instruments, such as gas chromatography/mass spectrometry (GC/MS). The target compounds of interest for this work plan are bisphenol A, octylphenol, and isomers of nonylphenol (NP), nonylphenol monoethoxylate, nonylphenol diethoxylate, and nonylphenol monoethoxy and diethoxy carboxylic acids.

FY 2000 PERFORMANCE PLAN
(Year 1)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2002, implement a validated method for the extraction, cleanup and analysis of selected endocrine disrupting compounds in various matrices by GC/MS. Begin acute and chronic toxicity studies using pure EDCs	1. Establish best instrument conditions for detecting selected EDCs	1. Conditions established: May 2000	.05	.05			
	2. Apply developed SOPs to real-world samples	2. Started August 2000 and will be ongoing.	.5	.7		$10,000	
	3. Establish QA Criteria for Soil/Sediment method	3. Spiked lab blank soil used to determine MDLs and P&A: September 2000	.2	.1			

FY 2001 PERFORMANCE PLAN
(Year 2)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2002, implement a validated method for the extraction, cleanup and analysis of selected endocrine disrupting compounds in various matrices by GC/MS. Begin acute and chronic toxicity studies using pure EDCs.	4. Establish sources of non commercially available EDCs and acquire standards	4. Standard synthesized, characterized and available: November 2000	.05	.05		$46,000	4. Aldrich & Cambridge Isotope Lab, Environment Canada, USGS, USDA
	5. Establish QA Criteria for water method	5. MDLs and P&A established: January 2001	.2	.1			
	6.Develop SOP for water and soil for EDCs	6. SOP for water and soil finalized: March 2001	.1				
	7. Develop SOP and QA criteria for NP carboxylates in water	7. Repeat steps 1, 2, 4 & 5 - completed: June 2001	.25				

FY 2002 PERFORMANCE PLAN
(Year3)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2002, implement a validated method for the extraction, cleanup and analysis of selected endocrine disrupting compounds in various matrices by GC/MS. Begin acute and chronic toxicity studies using pure EDCs.	8. Plan and perform toxicity studies	8. Begin toxicity studies: October 2001	.75				
	9. Develop method for large volume water samples for some EDCs	9. Repeat steps 1, 2, 4 & 5 - completed: December 2001	.25				
	10. Develop method for some EDCs in fish tissue	10. Repeat steps 1, 2, 4 & 5 - completed: June 2002	1.0				

WORK PLAN FOR ENVIRONMENTAL CHEMISTRY

Fish Tissue Extraction, Clean Up and Analyses of Semi-Volatile Organic Compounds

Goal 2: Clean and Safe Water.

Objective 201: By 2005, protect human health so that 95 percent of the population served by community water systems will receive water that meets drinking water standards, consumption of contaminated fish and shellfish will be reduced, and exposure to microbial and other forms of contamination in waters used for recreation will be reduced.

Subobjective 20105: By 2005, consumption of contaminated fish and shellfish will be reduced and the percentage of waters attaining the designated uses protecting the consumption of fish and shellfish will increase.

Description: Available EPA methods for extraction and clean up for the analyses of semi-volatile organic compounds do not meet regional needs. Semi-volatile Organic compounds must be accurately measured to determine the total organic compound burden of fish and shellfish. This information will allow better understanding of organic compound pathways in the aquatic environment and more accurate ecosystem and human health risk assessments.

Regional Subobjective 20105R1: To assess the potential contaminant exposures and risks from fish and shellfish consumption. Identify levels of contaminants in fish and shellfish in the Pacific Northwest and Alaska. Project includes development of sampling and analytical methods, completion of exposure analyses, evaluation of cumulative risk, and the conduct of case studies.

Project Description: Several semi-volatile organic compounds are of concern in the environment due to their toxicity. However, it is extremely difficult to analyze many of these analytes in a tissue matrix because of the type and degree of interferences present. Most naturally occurring interferences, including amines and fats, should be removed using extraordinary clean up techniques. Once free of matrix interferences, almost organic targets are measurable at trace levels. In Region 10 with its many lakes and rivers as well as the Pacific Ocean and Puget Sound, nearly all of which support fish and/or shellfish life, the ability to analyze organic compounds in tissue is a particular concern.

FY 1998 PERFORMANCE PLAN

(Year 1)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 3/30/01, complete initial and follow up experimental laboratory work and prepare an article for publication describing the extraction and clean up of tissue extracts for analyses of esoteric semi-volatile organic compounds	1. Conduct literature search	1. Complete literature search by Feb 1, 1998	.1	.1			
	2. Identify information needed to complete project and develop an experimental plan	2. Finalize laboratory experimental Plan by March 31, 1998	.1	.1			

FY 1999 PERFORMANCE PLAN
(Year 2)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 3/30/01, complete initial and follow up experimental laboratory work and prepare an article for publication describing the extraction and clean up of tissue extracts for analyses of esoteric semi-volatile organic compounds	3. Conduct laboratory experiments using CRITFC fish samples	3. Complete laboratory work: December 31, 1998	.5	.5			
	4. Review existing experimental data	4. Complete review of experimental data: February 28, 1999	.1	.1			
	5. Prepare draft of article for publication	5. Complete draft article: June 1, 1999	.2	.2			

FY 2000 PERFORMANCE PLAN

(Year 3)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 3/30/01, complete initial and follow up experimental laboratory work and prepare an article for publication describing the extraction and clean up of tissue extracts for analyses of esoteric semi-volatile organic compounds	6. Review existing experimental data and previous publication draft	6. Complete review by August 18, 2000	.05	.05			
	7. Update literature search	7. Complete literature search by September 15, 2000	.05	.05			

FY 2001 PERFORMANCE PLAN

(Year 4)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 3/30/01, complete initial and follow up experimental laboratory work and prepare an article for publication describing the extraction and clean up of tissue extracts for analyses of esoteric semi-volatile organic compounds	8. Identify information gaps and develop an experimental plan to supply this information	8. Finalize laboratory experimental Plan by October 2, 2000	.05	.05			
	9. Conduct laboratory experiments identified in item 3 above	9. Complete laboratory work by February 28, 2001	.3				
	10. Prepare final draft of article and submit to scientific journal	10. Submit article for publication by March 30, 2001	.1				

WORK PLAN FOR MINERALOGY

X-ray Diffractometry

Goal 5: Better Waste Management, Restoration of Contaminated Waste Sites, and Emergency Response

Objective 501: Reduce or Control Risks to Human Health - By 2005, EPA and its partners will reduce or control the risks to human health and the environment at over 375,000 contaminated Superfund, RCRA, UST and brownfield sites. (Total comprises 1,200 NPL and 480 non-NPL sites; 2,475 RCRA facilities; 370,000 LUST cleanups initiated or completed; and 1,500 brownfield properties).

Subobjective 50102: Respond to Superfund Hazardous Waste Sites - By 2005, EPA and its partners will reduce the risks that Superfund sites pose to public health and the environment by: 1) completing construction at a total of 1,200 National Priorities List (NPL) sites; 2) conducting 2,400 additional removal actions; 3) determining if Superfund cleanup is needed at 85% of the sites entered into the Superfund site data base (CERCLIS); 4) maximizing Potentially Responsible Party participation in conducting/funding response actions; 5) meeting statutory deadlines for Federal facility activities.

Goal 2: Clean and Safe Water

Objective 202: Conserve and Enhance Nation's Waters - By 2005, conserve and enhance the ecological health of the nation's (state, interstate & Tribal) waters and aquatic ecosystems -- rivers and streams, lakes, wetlands, estuaries, coastal areas, oceans, and ground waters-- so that 75% of waters support healthy aquatic communities.

Subobjective 20201: Restore and Protect Watersheds - By 2005, restore and protect watersheds so that 75% of waters support healthy watersheds as shown by comprehensive assessment of the nation's watersheds.

Project Description: Knowing the mobility of metal-bearing contaminants in the environment is essential to identifying the public health and environmental risks associated with a contaminated site. The particular compound in which a toxic metal occurs and the compounds which make up the surrounding matrix are critical factors in assessing metal mobility. Regional laboratories are adept at identifying element specific contamination in traditional environmental matrices. However, they are not good at evaluating the interaction of the compound the element is in with the surrounding matrix. Compound identification is an important complement to chemical analysis for evaluating the mobility of

metal-bearing contaminants in the environment and bioavailability of the element to organisms. A qualitative method of compound identification by X-ray diffraction (XRD) has been developed and, coupled with chemical analysis, has been valuable in determining fate and transport of compounds in the environment. This information is important to the selection of remedies at several Superfund sites and to the assessment of water quality impacts from proposed or operating mineral resource facilities. Development of a quantitative XRD method would improve the ability to characterize samples and predict metal mobility. Acquisition of an analytical scanning electron microscope with the capability of chemical analysis by energy dispersive x-ray fluorescence (SEM/EDS) would allow imaging and chemical analysis of individual particles in bulk specimens that were also analyzed for compound identification by XRD. Such a combination of tools would better allow combined characterization of elemental content, compound identification, and morphological and chemical texture, all of which improve the ability to predict the mobility of metals in the environment and improve remedy selection at contaminated sites.

FY 2000 PERFORMANCE PLAN

(Year 1)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2002, have in Region 10 a capability to perform quantitative XRD analysis, and an improved capability for combined mineralogical, chemical, and textural analysis.	1. Acquire training in SEM/EDS analysis	1. Training completed at NERL/RTP lab - December 1999	.15	.15	$600 travel	$360 travel	1. NERL/RTP SEM/EDS laboratory
	2. Assemble a problem set of reference samples analyzed internally by XRD, ICP, AA and externally by SEM/EDS for purpose of developing and demonstrating combined mineralogical/chemical analysis	2a. Abstract for paper on mine waste: December 1999			$350 material	$350 material	2a. Zabowski, University of Washington
		2b. EPA memo on preliminary set of analyses completed: January 2000	.3	.3			2b. NERL/RTP SEM/EDS laboratory

FY 2001 PERFORMANCE PLAN

(Year 2)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2002, have in Region 10 a capability to perform quantitative XRD analysis, improve the capability for combined mineralogical, chemical, and textural analysis. (continued)	3. Acquire hardware for sequential XRD/XRF method development	3. Procure portable XRF: May 2001	.02		$45,000		3. Vendor, R10 Field Analytical
	4. Develop sequential XRD/XRF method	4. Method developed: September 2001	.1				4. R10 Field Analytical Facility-Dodo
	5. Revise qualitative XRD-QL method per peer review	5. XRD-QL revision complete: September 2001	.2				5. NEIC review
	6. Set-up remote SEM/EDS capability to further develop combined analysis	6. Remote SEM/EDS capability demonstrated: September 2001	.05				6. NERL/RTP SEM/EDS laboratory
	7. Acquire training in Rietveld method of quantitative XRD	7. Rietveld training completed: September 2001	.1		$4000		7. vendor

FY 2002 PERFORMANCE PLAN

(Year 3)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2002, have in Region 10 a capability to perform quantitative XRD analysis, improve the capability for combined mineralogical, chemical, and textural analysis. (continued)	8. Develop method for combined XRD/XRF/SEM/EDJ analysis	8. Procedure sent for review: Operators trained: February 2002	.05				8. OEA-QA unit, NEIC
	9. Develop quantitative XRD-QT method	9. Draft XRD-QT method - May 2002	.2				
	10. Acquire Scanning Electron Microscope	10. Instrument installation: May 2002	.1		$150,000		10. Vendor
	11. Acquire sample polishing and other preparation materials	11. Sample preparation materials purchased: May 2002	.02		$3,000		11. Vendor
	12. Acquire reference samples	12. Reference samples purchased: May 2002	.02		$3,000		12. Vendor
	13. Review and revision of XRD-QT method	13. Review and revision complete - September 2002	.1				13. NEIC

WORK PLAN FOR ENVIRONMENTAL CHEMISTRY

Primary Lead Intervention Research and Support

Goal 7: Americans' Right to Know About their Environment

Objective 701: By 2005, EPA will improve the ability of the American public to participate in the protection of human health and the environment by increasing the quality and quantity of general environmental education, outreach and data availability programs especially in disproportionally impacted and disadvantaged communities.

Subobjective 70102: By 2005, via the Internet and improved technology, the Agency will provide the public with increased access to integrated, comprehensive environmental data.

Discussion: Over the past few decades, blood lead levels in children have declined dramatically. However, lead poisoning remains a serious environmental health threat for children today. The legacy of lead-based paint and leaded gasoline will be with us for many years to come. Without further action, large numbers of young children, particularly in older, urban neighborhoods, will continue to be exposed to lead in amounts that could impair their ability to learn and reach their full potential.

Regional Strategic Objective: Healthy Communities 0102: To improve the environmental health of communities, particularly for children, through enhanced Pb outreach and Education.

Project Description: Wide spread lead contamination in New England, with its prevalence of old homes and centuries-long history of lead-based paint, is of particular concern. The Region 1 lab has used X-Ray Fluorescence (XRF) to determine the levels of metals contamination in residential soils. Based on elevated lead levels, a pilot project utilizing XRF and primary intervention measures has been established to reduce risk to children from Pb contaminated residential soils. This pilot project has already lead to the initiation of several technical transfer projects in other regions, an interagency funded research project to evaluate efficacy of low level yard intervention, and the development of a technical handbook on the lead safe yard project. It is expected that with completion of the project, the Agency will have a practical template for remediating contaminated residential soil sites.

FY 1998-2000 PERFORMANCE PLAN
(Year 1-3)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2002, develop a tested comprehensive low cost template for evaluating and remediating Pb contaminated residential soils to reduce risk to inner city children.	1. Completed initial EMPACT Pilot Lead Safe Yard Project at 25 residences in Bowdoin Street Community	1. Completed outreach, testing, mapping and primary intervention of Pb contaminated residential soils: December 1998					1. Boston U, Bowdoin Street Health Dept., Garden Futures
	2. Completed Tool Box	2. Available to public: Fall 1999					2. Boston U.
	3. Prepared and submitted technical papers to professional journal	3. Two papers submitted for publication in Journal of Urban Health, New York Academy of Medicine: January 2000.					3. Boston U.
	4. Completed Phase II Pilot Lead Safe Yard Project at 20 residences in Bowdoin Street Community	4. Completed outreach, testing, mapping, and primary intervention of Pb contaminated residential soils: May 2000					4. Boston U., DGL, Bowdoin Street Health Dept.

FY 2001 PERFORMANCE PLAN
(Year 4)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2002, develop a tested, comprehensive, low cost template for evaluating and remediating Pb contaminated residential soils to reduce risk to inner city children.	5. Publish handbook "Lead Safe Yards - Developing and Implementing a Monitoring, Assessment and Outreach Program for Your Community"	5. Handbook available to public: CDROM/hardcopy - April 2001 RI Web page: March 2001	.05	.9	$180K	$160K	5. ORD
	6. Complete Phase III EMPACT. Finish two Phase II properties (DGL)	6. Signed construction forms from 20 properties: June 2001	.1	.1	$175K	$130K	6. Boston U., DSNI, DGL
	7. Complete data collection for efficacy study.	7. All dust, soil and wipe data for 54 properties collected: December 2001	.2	.03	$10K	$5K	7. Natl Center for Pb Safe Housing, HUD
	8. Provide technical assistance to new projects.	8. Training for Providence, RI and Syracuse, NY project teams completed: June 2001	.05				8. Region 2 and Syracuse Team, Providence Team
	9. Submit RARE proposal to Regional Science Council	9. Complete and submit RARE proposal for garden soil study: January 2001	.01				9. ORD /NERL - Cincinnati, Food Project

FY 2002 PERFORMANCE PLAN
(Year 5)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2002, develop a tested comprehensive low cost template for evaluating and remediating Pb contaminated residential soils to reduce risk to inner city children.	10. Complete low level intervention research study	10. Final report drafted: February 2002	.2	.2	$180K	$180K	10. National Center for Pb Safe Housing, HUD
	11. Continue support for technical transfer projects	11. Projects running smoothly	.05	.05	$10K	$10K	11. Region 2 and Syracuse Team, Providence Team
	12. Initiate RARE study (if awarded)	12. Study begins:	.2		$125K		12. ORD /NERL - Cincinnati, Food Project

WORK PLAN FOR ENVIRONMENTAL CHEMISTRY

Passive Vapor Diffusion Monitoring

Goal 5: Better Waste Management, Restoration of Contaminated Waste Sites, and Emergency Response

Objective 501: By 2005, EPA and its partners will reduce or control the risk to human health and the environment at contaminated Superfund, RCRA, UST and Brownfield sites.

Subobjective 50102: By 2005, EPA and its partners will reduce the risks that Superfund sites pose to the public.

Discussion: Many water bodies in New England are impacted by volatile organic contaminated groundwater intrusions. To determine the health and ecological impacts of these intrusions, it is important to locate fracture zones that transport groundwater contaminated with volatile organic compounds into surface water, delineate the extent of contamination, and define concentration gradients within the contamination plume. To help define these transport zones, EPA-NE and USGS have developed and employed passive vapor diffusion samplers.

Regional Strategic Objective 0501/03: *Complete Superfund NPL and removal cleanups using efficient cost effective monitoring and* assessment tools.

Project Description: Passive vapor diffusion monitors provide a low cost simple technique to locate volatile organic plume discharges into rivers, lakes, water supplies, and tidal areas in New England. Passive vapor diffusion samplers consist of an uncapped VOA vial located inside a polyethylene bag, and operate on the principal that volatile organic compounds (VOCs) in the groundwater/surface water interface will partition and diffuse through the semipermeable membrane (polyethylene bag) until concentrations in the air inside the vapor diffusion samplers reach equilibrium with concentrations of VOCs in the environment outside the sampler. Samplers are placed into the water body bottom sediment about 6-12 inches deep, with the VOA vial mouth pointed down, and left to equilibrate over a one to two week time period. Samplers can then be retrieved, capped, and rapidly analyzed using gas chromatography. Typically 100-200 diffusion samplers are placed in the study area to get a clear picture of where contamination plumes are located. Placement can be done by statistically gridding the area or by probing the sediments to find temperature variation that indicate ground water up-welling.

FY 2001 PERFORMANCE PLAN

(Year 1)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
During calendar year 2001, develop SOP for vapor diffusion sampling and complete vapor diffusion sampling at 2 major superfund sites within New England. Provide technical assistance to site managers and hydro-geologist implementing remedial investigations.	1. Develop Vapor Diffusion Sampling capability	1. SOP for Vapor Diffusion Sampling completed: March 2001	0.1	0.1	N/A	N/A	1. USGS, Gannett Fleming
	2. Establish project/sampling plans for proposed superfund sites.	2. Data packages and GIS maps completed for two sampling programs: Spring/Summer 2001	0.3	0.2	$15-20k	$5k	2. USGS
	3. Technical Assistance.	3. Offer training to other NE state agencies and tribes through Superfund Office, run trial presentation with OSCs: September 2001	0.05	0.02	$5-10k	$1k	3. USGS, OSRR

FY 2002 PERFORMANCE PLAN
(Year 2)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
During calendar year 2001, develop SOP for vapor diffusion sampling and complete vapor diffusion sampling at 2 major superfund sites within New England. Provide technical assistance to site managers and hydro-geologist implementing remedial investigations	4. Establish a definitive relationship between vapor concentration in samples and actual pore water concentrations, over varying temperatures. 5. Coauthor technical paper with USGS. Draft title of paper "Compilation of Field Testing of Polyethylene-Membrane Samplers for Characterization of VOAs in Sediments"	4. Establish relationships through laboratory experimentation: October 2001 5. Publish Joint USGS/US EPA Investigations Report: December 2001					5. USGS

WORK PLAN FOR MICROBIOLOGY

Polymerase Chain Reaction

Goal 2: Clean and Safe Water

Objective 01: By 2005, protect human health so that 95% of the population served by community water systems will receive water that meets drinking water standards, consumption of contaminated fish and shellfish will be reduced, and exposure to microbial and other forms of contamination in waters used for recreation will be reduced.

Subobjective 07: By 2003 provide a stronger scientific basis for future implementation of the Safe Drinking Water Act.

Regional Objective R01: Center of Applied Science - Microbiology - Develop analytical methods that allow the accurate identification and quantification of microbial contaminants.

Description: Current methods for the detection of microbial contaminants in drinking water, where they exist at all, are inefficient and difficult to perform. To adequately protect public health, new methods are needed to insure that microbial contaminants can be easily identified and quantified.

Regional Subobjective R0101: By 2002, Develop polymerase chain reaction (PCR) as an analytical tool for the detection of microbial contaminants in drinking water.

Description: Current techniques for the detection of protozoan parasites require several steps, each of which decreases the recovery efficiency of the analytical process. PCR is based on enzymatic amplification of detectable levels of target nucleic acid sequences that may be present in the environment in low numbers. By reducing the number of steps necessary to process the sample and employing a technique that can identify minute amounts of DNA within the sample, our ability to detect target organisms in environmental samples should markedly improve. Further, PCR coupled with ribotyping and other genetic fingerprinting techniques has the capability for high sensitivity detection and differentiation of specific species and strains of both bacterial indicators and viruses in the water environment. In addition to the collaborating laboratories mentioned within, work would be coordinated with the Office of Research and Development and the Office of Water where appropriate.

FY 1999 PERFORMANCE PLAN

R0101 (YEAR 1)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2002, have in operation in Region 10 and available for export to other interested laboratories PCR methods for the detection of several drinking water microbial contaminants such as *Cyclospora cayetanensis*, *Cryptosporidium parvum*, Microsporidia, *Toxoplasma gonii* and *Giardia lamblia*	1. Establish clean room and amplification areas	1. Established: December 1998	.25		$25,000	$16,500	
	2. Evaluate current *Cyclospora cayetanensis* PCR methodologies and their applicability to the drinking water matrix	2. Evaluation complete: June 1999 (Completed August 1999)	.5		$10,000		2. US FDA Lab, Bothell, WA; U of Arizona, Tucson

FY 2001 PERFORMANCE PLAN

R0101 (YEAR 2)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2002, have in operation in Region 10 and available for export to other interested laboratories PCR methods for the detection of several drinking water microbial contaminants such as *Cyclospora cayetanensis*, *Cryptosporidium parvum*, Microsporidia, *Toxoplasma gonii* and *Giardia lamblia*	3. Modify "best use" method to achieve highest recovery efficiency in reagent water	3. Surrogate method using *Eimeria tenella* available for reagent waters: February 2001	.2		$5,000 to 10,000		
	4. Test the method	4. Round robin testing using surrogate reagent water complete; report sent to participants: April 2001	.25		$10,000		4. US FDA; U of Arizona; 8-10 round robin labs (fed, state, utility & private)
	5. Modify method for recovery of *Cyclospora cayetanensis*	5. Method for *Cyclospora* available for reagent waters: June 2001	.2		$5,000 to 10,000		
	6. Round robin testing using modified method	6. Round robin testing complete; report sent to participants: September 2001	.2		$10,000		6. US FDA; U of Arizona; 8-10 round robin labs (fed, state, utility & private)

FY 2002 PERFORMANCE PLAN

R0101 (YEAR 3)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2002, have in operation in Region 10 and available for export to other interested laboratories PCR methods for the detection of several drinking water microbial contaminants such as *Cyclospora cayetanensis*, *Cryptosporidium parvum*, Microsporidia, *Toxoplasma gonii* and *Giardia lamblia*	7. Publication of method	7. Method sent to NTIS or EPA for publication: December 2001	.1				7. Method sent to NTIS or EPA for publication.
	8. Test and optimize method performance for finished drinking waters. Round robin testing	8. Optimization complete, method available for finished waters: April 2002	.3		$10,000		8. Round robin labs
	9. Test and optimize method performance for source waters. Round robin testing	9. Optimization complete, method available for source waters: June 2002	.2		$10,000		9. Round robin labs

FY 2003 PERFORMANCE PLAN
R0101 (YEAR 4)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2002, have in operation in Region 10 and available for export to other interested laboratories PCR methods for the detection of several drinking water microbial contaminants such as *Cyclospora cayetanensis*, *Cryptosporidium parvum*, Microsporidia, *Toxoplasma gonii* and *Giardia lamblia*	10. Evaluate and incorporate new or established techniques of collection into the method. Vortex flow filtration, continuous gradient centrifugation and flow cytometry are among those that will be examined	10. Collection techniques evaluation complete, report distributed to participating laboratories:	.5		$40,000 to $50,000		10. Other interested and qualified laboratories.
	11. Evaluate and incorporate new or established techniques of separation into the method. Immunomagnetic separation and flow cytometry with stains are among those that will be examined	11. Separation techniques evaluation complete report distributed to participating laboratories:	.5		$40,000 to $50,000		11. Other interested and qualified laboratories

FY 2004 PERFORMANCE PLAN
R0101 (YEAR 5)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2002, have in operation in Region 10 and available for export to other interested laboratories PCR methods for the detection of several drinking water microbial contaminants such as *Cyclospora cayetanensis*, *Cryptosporidium parvum*, Microsporidia, *Toxoplasma gonii* and *Giardia lamblia*	12. Incorporate detection for other pathogenic organisms into PCR methodology. Evaluate *Cryptosporidium parvum, Toxoplasma gondii, Giardia lamblia* and *Microsporidia* for applicability to the method	12. Method modified for the detection of multiple organisms, distributed to laboratories participating in the round robin:	.5				12. Other interested and qualified laboratories
	13. Conduct round robin testing of the method	13. Round robin testing complete and report sent to participating laboratories:	.5				13. Other interested and qualified laboratories
	14. Publication of method	14. Method sent to NTIS or EPA for publication:	.2				14. Method sent to NTIS or EPA for publication

FY 2005 PERFORMANCE PLAN

R0101 (YEAR 6)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2002, have in operation in Region 10 and available for export to other interested laboratories PCR methods for the detection of several drinking water microbial contaminants such as *Cyclospora cayetanensis*, *Cryptosporidium parvum*, Microsporidia, *Toxoplasma gonii* and *Giardia lamblia*	15. Using micro or nano-filtration, evaluate the use of PCR for detecting enteroviruses and bacterial pathogens	15. Report on utility of method for detecting enteroviruses and bacterial pathogens:	.5				15. Other interested and qualified laboratories

WORK PLAN FOR MICROBIOLOGY

Giardia and Cryptosporidium

Goal 2: Clean and Safe Water

Objective 01: By 2005, protect human health so that 95% of the population served by community water systems will receive water that meets drinking water standards, consumption of contaminated fish and shellfish will be reduced, and exposure to microbial and other forms of contamination in waters used for recreation will be reduced.

Subobjective 07: By 2003 provide a stronger scientific basis for future implementation of the Safe Drinking Water Act.

Regional Objective R01: Center of Applied Science - Microbiology - Develop analytical methods that allow the accurate identification and quantification of microbial contaminants.

Description: Current methods for the detection of microbial contaminants in water and drinking water, where they exist at all, are inefficient and difficult to perform. To adequately protect public health, new methods are needed to insure that microbial contaminants can be easily identified and quantified.

Regional Subobjective R0201: During FY99, Implement EPA Method 1623: *Cryptosporidium parvum*, and *Giardia lamblia* Testing in Water by Filtration Immuno-Magnetic Staining, Fluorescent Antibody Analysis to Support EPA's Surface Water Treatment Rule.

Description: EPA Region 2 plans to conduct a surveillance monitoring program, including analysis of the pathogens *Giardia* and *Cryptosporidium*, to document New York City's continued compliance with the avoidance criteria of the EPA's Surface Water Treatment Rule (SWTR), in the source water from the Catskill/Delaware reservoir system and the New York City's distribution system.

FY 1999 PERFORMANCE PLAN

R0201 (YEAR 1)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By FY 2000, implement Method 1623 for the analysis of the pathogens Giardia and Cryptosporidium and monitor selected drinking water systems	1. Establish instrument capability for *Cryptosporidium/Giardia* detection	1. Fluorescent DIC microscope with imaging system acquired: April 1999	.1		$60,000		
	2. Training of personnel	2. Training of personnel and observation of NYCDE completed: April 1999	.1		$500		2. NYCDE
	3. Finish writing SOPs, Run through method using blanks and spiked samples and perform method on actual samples from the Kensico Reservoir	3. SOPs completed, analyze blanks and spiked samples, perform method on environmental samples: May 1999	.1				
	4. Perform routine monitoring of Kenisco Reservoir	4. Monitor the reservoir: monthly	0.25				

FY 2000 PERFORMANCE PLAN
R0201 (YEAR 2)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By FY 2000, implement Method 1623 for the analysis of the pathogens Giardia and Cryptosporidium and monitor selected drinking water systems	5. Demonstrate proficiency in Method 1623	5. Initial Demonstration of Proficiency completed: October 1999	.1				
	6. Enroll in the Method 1623 Certification Program	6. Enrolled: November 1999	<.1				
	7. Monitor Catskill/Delaware Reservoir system and the NYC Distribution System for public health	7. Monitor throughout FY2000: Monthly	.25				

WORK PLAN FOR ANALYTICAL POLLUTION PREVENTION

Abbreviated Microwave Extraction

Goal 4: Preventing Pollution and Reducing Risk in Communities, Homes, Workplaces and Ecosystems

Objective 05: By 2005, reduce by 25% (from 1992 levels) the quantity of toxic pollutants release, disposed of, treated, or combusted for energy recovery. Half of this reduction will be achieved through pollution prevention practices.

Subobjective 01: By 2005 EPA will achieve adoption of P2 principles as the basis for sustainable development by: increasing the integration of P2 into state environmental regulatory and other mainstream environmental programs; facilitation practices that advance eco-efficiency in business practices and decision making; increasing the adoption of prevention concepts to educate the public and the nation's students; expanding the use of environmentally preferable products by the federal government to stimulate demand and production capacity in the private sector for products which minimize environmental impact; integrating P2 into EPA's regulatory, enforcement and compliance programs; and providing information to states, businesses and other consumers to assist them in making prevention oriented decisions.

Description: Laboratory waste is generated as a result of chemical reagents added to the sample in the analytical process and residue from the sample itself. Of particular concern is organic waste produced in the extraction phase where the compounds of interest are removed from the initial sample. This waste is often hazardous with an attendant threat of exposure to the analyst. Exposure and disposal of this waste is of concern to the facility and the public in general as to current and future health concerns this may cause. The regional laboratory is exploring new methods and instrumentation that reduce or eliminate the quantity or toxicity of waste in the extraction phase. Other benefits of these new techniques include automation and productivity increases. With these new techniques extractions may be performed in minutes instead of days. In some cases sample volume is reduced by a factor of 100, which improves safety and ease of shipment. The cost benefits are also notable through reduction in labor costs, reagent cost, and equipment needs due to scaling of extractions.

Abbreviated microwave extraction will reduce solvent usage by reducing or eliminating the concentration step in current extraction procedures. The ultimate goal of this project is complete acceptance of the technique as equivalent to currently accepted practices.

FY 1999 PERFORMANCE PLAN
(YEAR 1)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
Have in operation in Region 6 and available for export to other interested laboratories an abbreviated microwave extraction technique.	1. Continue evaluation of AMAE vs. other soil methods. 2. Write paper outlining method used for AMAE.	1. Present comparison studies at LTIG: April 1999 2. Present new study at WTQA: July 1999	.2 .1	.2 .1	$1500	$1500	1. CEM Corporation

FY 2001 PERFORMANCE PLAN
(Year 3)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
Have in operation in Region 6 and available for export to other interested laboratories and abbreviated microwave extraction technique.	3. Purchase equipment for AMAE (newer model).	3. Equipment installed: October 2000			$25,000	$20,818	
	4. Learn and evaluate the new design microwave	4. None	.2				
	5. Finalize the method	5. Final method available for review: September 2001					

FY 2002 PERFORMANCE PLAN
(Year 4)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
Have in operation in Region 6 and available for export to other interested laboratories and abbreviated microwave extraction technique.	6. Submit method as a modification or as a new method	6. Method accepted by RCRA Workgroup for evaluation: July/August 2002 Meeting	.2				6. RCRA Workgroup
	7. Test the method	7. Round robin testing initiated: September 2002	.1				7. Other interested and qualified labs

FY 2003 PERFORMANCE PLAN
(Year 5)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
Have in operation in Region 6 and available for export to other interested laboratories and abbreviated microwave extraction technique.	8. Round robin testing completed	8. Final report prepared: During 2003	.1				8. Other interested and qualified labs
	9. Make method available to the laboratory community	9. Paper submitted for publication: During 2003	.1				

WORK PLAN FOR ANALYTICAL POLLUTION PREVENTION

Micro-Extractions with Large Volume Injection

Goal 4: Preventing Pollution and Reducing Risk in Communities, Homes, Workplaces and Ecosystems

Objective 05: By 2005, reduce by 25% (from 1992 levels) the quantity of toxic pollutants release, disposed of, treated, or combusted for energy recovery. Half of this reduction will be achieved through pollution prevention practices.

Subobjective 01: By 2005 EPA will achieve adoption of P2 principles as the basis for sustainable development by: increasing the integration of P2 into state environmental regulatory and other mainstream environmental programs; facilitation practices that advance eco-efficiency in business practices and decision making; increasing the adoption of prevention concepts to educate the public and the nation's students; expanding the use of environmentally preferable products by the federal government to stimulate demand and production capacity in the private sector for products which minimize environmental impact; integrating P2 into EPA's regulatory, enforcement and compliance programs; and providing information to states, businesses and other consumers to assist them in making prevention oriented decisions.

Description: Laboratory waste is generated as a result of chemical reagents added to the sample in the analytical process and residue from the sample itself. Of particular concern is organic waste produced in the extraction phase where the compounds of interest are removed from the initial sample. This waste is often hazardous with an attendant threat of exposure to the analyst. Exposure and disposal of this waste is of concern to the facility and the public in general as to current and future health concerns this may cause. The regional laboratory is exploring new methods and instrumentation that reduce or eliminate the quantity or toxicity of waste in the extraction phase. Other benefits of these new techniques include automation and productivity increases. With these new techniques extractions may be performed in minutes instead of days. In some cases sample volume is reduced by a factor of 100, which improves safety and ease of shipment. The cost benefits are also notable through reduction in labor costs, reagent cost, and equipment needs due to scaling of extractions.

Application of micro-extraction techniques coupled with large volume injection to GC/MS will reduce sample size requirements and trim the volume of solvent needed for analysis. Another potential application of this technique is the direct injection of water samples into an analytical instrument eliminating laboratory generated hazardous waste. The goal of this effort is complete acceptance of this technique as equivalent to current practices and a viable alternative to less environmentally-friendly environmental methods.

FY 1999 PERFORMANCE PLAN
(YEAR 3)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
Have in operation in Region 6 and available for export to other interested laboratories a technique for micro-extraction coupled with large volume injection (LVI) for GC/MS analysis	1. Continue evaluation of LVI techniques (PTV and pre-column)	1. Evaluation of HP autosampler complete: September 1999	.1				1. HP Inc; Gerstel, Inc

FY 2000 PERFORMANCE PLAN
(Year 4)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
Have in operation in Region 6 and available for export to other interested laboratories a technique for micro-extraction coupled with large volume injection (LVI) for GC/MS analysis	2. Acquire COC-SVE equipment	2. COC-SVE equipment purchased and installed: November 1999			$3000	$3000	
	3. Learn and evaluate COC-SVE techniques	3. Evaluation complete: March 2000	..05	.05			3. Agilent
	4. Evaluate and compare LVI techniques	4. Report comparing LVI techniques completed and presented at PITTCON: March 2000	.15	.15			4. Agilent, Gerstel, Apex
	5. Evaluate ATAS Optic II LVI	5. Purchase, install and evaluate ATAS LVI: August 2000	.05	.05	$15,000	$15,000	5. ATAS
	6. Evaluate JAS UNIS LVI	6. Purchase, install and evaluate JAS LVI: August 2000	.05	.05	$3,000	$3,015	6. JAS
	7. Evaluate Apex ProSep XT upgrate	7. Purchase, install and evaluate Apex XT upgrade: August 2000	.03	.03	$3,000	$3,505	7. Apex
	8. Compare LVI techniques	8. Report prepared and presented at WTQA: August 2000	.015	.015			

FY 2001 PERFORMANCE PLAN
(Year 5)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
Have in operation in Region 6 and available for export to other interested laboratories a technique for micro-extraction coupled with large volume injection (LVI)for GC/MS analysis	9. Acquire automated solid phase extraction (SPE) equipment	9. Purchase and install automated SPE equipment: November 2000			$25,000	$20,608	9. Varian
	10. Evaluate micro-extraction techniques	10. Report on comparison of micro-extraction techniques completed: September 2001	.1				
	11. Evaluation shared with laboratory community	11. Paper submitted for presentation at Pittcon: September 2001	.1				

FY 2002 PERFORMANCE PLAN
(Year 6)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
Have in operation in Region 6 and available for export to other interested laboratories a technique for micro-extraction coupled with large volume injection (LVI) for GC/MS analysis	12. Combine best micro-extraction methods and best LVI techniques into a single method (ME-LVI)	12. Draft complete: March 2002	.02				
	13. Share findings with the laboratory community	13. Present paper describing the new method at PITTCON 2002: March 2002	.05				
	14. Evaluate the new ME-LVI method by comparison to standard techniques	14. Prepare and present a report at WTQA Conference: August 2002	.15				

FY 2003 PERFORMANCE PLAN
(Year 7)

Subobjective	FY02 Goal/Action	FY02 Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
Have in operation in Region 6 and available for export to other interested laboratories a technique for micro-extraction coupled with large volume injection (LVI)for GC/MS analysis	15. Optimize the method	15. Based on method usage and feedback from conference participants, make final modifications to the method: August 2003	.05				
	16. Make the method available to the environmental testing community	16. Submit the method for inclusion in SW-846: August 2003					
	17. Test the method	17. Perform round robin testing of the method: September 2003					17. Interested and qualified laboratories

FY 2004 PERFORMANCE PLAN
(Year 8)

Subobjective	FY02 Goal/Action	FY02 Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
Have in operation in Region 6 and available for export to other interested laboratories a technique for micro-extraction coupled with large volume injection (LVI)for GC/MS analysis	18. Method accepted	18. Accepted for publication in SW-846:					

WORK PLAN FOR ANALYTICAL POLLUTION PREVENTION

Solventless Extraction Techniques

Goal 04: Preventing Pollution and Reducing Risk in Communities, Homes, Workplaces and Ecosystems

Objective 05: By 2005, reduce by 25% (from 1992 levels) the quantity of toxic pollutants release, disposed of, treated, or combusted for energy recovery. Half of this reduction will be achieved through pollution prevention practices.

Subobjective 01: By 2005 EPA will achieve adoption of P2 principles as the basis for sustainable development by: increasing the integration of P2 into state environmental regulatory and other mainstream environmental programs; facilitation practices that advance eco-efficiency in business practices and decision making; increasing the adoption of prevention concepts to educate the public and the nation's students; expanding the use of environmentally preferable products by the federal government to stimulate demand and production capacity in the private sector for products which minimize environmental impact; integrating P2 into EPA's regulatory, enforcement and compliance programs; and providing information to states, businesses and other consumers to assist them in making prevention oriented decisions.

Description: Laboratory waste is generated as a result of chemical reagents added to the sample in the analytical process and residue from the sample itself. Of particular concern is organic waste produced in the extraction phase where the compounds of interest are removed from the initial sample. This waste is often hazardous with an attendant threat of exposure to the analyst. Exposure and disposal of this waste is of concern to the facility and the public in general as to current and future health concerns this may cause. The regional laboratory is exploring new methods and instrumentation that reduce or eliminate the quantity or toxicity of waste in the extraction phase. These pollution prevention benefits are stated as agency goals under the Government Performance Results Act (GPRA). Other benefits of these new techniques include automation and productivity increases. With these new techniques extractions may be performed in minutes instead of days. In some cases sample volume is reduced by a factor of 100, which improves safety and ease of shipment. The cost benefits are also notable through reduction in labor costs, reagent cost, and equipment needs due to scaling of extractions.

This effort intends to completely eliminate the use of hazardous solvent in organic extraction. The project currently focuses on the use of phase-coated materials to extract analytes from liquid media and then transfer them into a chromatographic system via thermal desorption. Future projects may include direct thermal desorption of solids and direct injection of liquids.

FY 2000 PERFORMANCE PLAN
(YEAR 1)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
Have in operation in Region 6 and available for export to other interested laboratories extraction techniques that would eliminate the use of solvent	1. Acquire a Gerstel Desportion unit	1. Gerstel Desorportion unit purchased and installed: December 1999			$14,000	$13,669	

FY 2001 PERFORMANCE PLAN
(Year 2)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
Have in operation in Region 6 and available for export to other interested laboratories extraction techniques that would eliminate the use of solvent	2. Evaluate Hot Water Extraction technique	2. Hot Water Extraction evaluation report complete: September 2001	.05				2. Los Alamos National Laboratory
	3. Evaluate Gerstel Solventless extraction	3. Paper on results submitted to PITTCON: September 2001	.1				3. Gerstel Inc.

FY 2002 PERFORMANCE PLAN
(Year 3)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
Have in operation in Region 6 and available for export to other interested laboratories extraction techniques that would eliminate the use of solvent	4. Evaluation of water matrix complete	4. Paper presented at Pittcon: March 2002	.1				

FY 2003 PERFORMANCE PLAN

(Year 4)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
Have in operation in Region 6 and available for export to other interested laboratories extraction techniques that would eliminate the use of solvent	5. Investigate solventless extractions in other matrices	5. Investigation complete. Paper accepted at Pittcon: March 2003	.1				
	6. Initiation of formal acceptance of method	6. Method submitted to SW-846 organics workgroup for review: August 2003	.02				6. RCRA Organic methods work group

FY 2004 PERFORMANCE PLAN
(Year 5)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
Have in operation in Region 6 and available for export to other interested laboratories extraction techniques that would eliminate the use of solvent	7. Test the method 8. Method accepted for publication in SW-846	7. Round robin testing complete, report generated: June 2004 8. Method published in SW-846: September 2004					7. Other interested and qualified laboratories

WORK PLAN FOR AIR MONITORING

Polar Hydrocarbon Compounds

Goal 1: Clean Air

Objective 102: By 2010, reduce air toxic emissions by 75 percent from 1993 levels to significantly reduce the risk to Americans of cancer and other serious adverse health effects caused by airborne toxics.

Subobjective 10202: By 2010, develop improved air toxics information (i.e., monitoring networks, inventories) to support the quantitative evaluation, characterization, and tracking of risk-based indicators.

Regional Subobjective R0201: By 2001, develop an ambient air method to characterize >80% of the volatile organics typically found in ambient air samples.

ProjectDescription: Current techniques for ambient air analysis do not provide a complete characterization of the sample. This is because 1) The target list for the existing methods (PAMS and TO-14/15) share little overlap, and therefore analysis is incomplete, and 2) Polar hydrocarbons, which typically make up 30% of the volatile organics in ambient air, are not reported by either the PAMS or TO-14/15 methods. By developing a new method, >80% of the organics in ambient air can be identified and quantified, thus providing accurate and complete ambient air analyses for use in environmental compliance, trends analysis, modeling, and risk assessment.

FY 2001 PERFORMANCE PLAN

R0102(YEAR 1)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2001, develop an analytical method for characterizing polar hydrocarbon compounds in ambient air samples	1. Acquire standards	1. Purchase standards: January 2001	.05		$2000		
	2. Develop the analytical method	2. SOPs and QA plan completed: August 2001	.2		$1000		

FY 2002 PERFORMANCE PLAN
RO102 (YEAR 2)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2001, develop an analytical method for characterizing polar hydrocarbon compounds in ambient air samples	3. Test the method on real-world samples	3. Analyze samples and adjust the method as necessary: November 2001	.1		$1000		
	4. Distribute and validate the method	4. Train chemists, initiate round robin testing: January 2002	.15		$1500		4. ORD, National Center for Atmospheric Research (NCAR), interested laboratories
	5. Method validated	5. Round robin testing report completed: June 2002	.1				
	6. Method published	6. Method submitted for publication: September 2002	.1				

WORK PLAN FOR AMBIENT AIR MONITORING

Air Toxics Method for Low Level Polar Hydrocarbon Compounds

Goal 1: Clean Air: The air in every American community will be safe and healthy to breathe.

Objective 102: By 2010, reduce air toxic emissions by 75 percent from 1993 levels to significantly reduce the risk Americans face from cancer and other serious adverse health effects caused by airborne toxics.

Subobjective 10202: By 2010, develop improved air toxics information to support quantitative evaluation, characterization and tracking of risk based indicators. Develop the technical tools needed to fully implement strategies and programs to reduce toxic exposure risks.

Discussion: Current methodologies for ambient air analysis are limited by both the range of compounds they address as well as the detection limits that the methods can achieve. In order to address the developing interest in air toxics, methods need to be modified/developed to expand current analytical capability.

Regional Subobjective R0201: Reduce ambient levels of and exposure to air toxics

Project Description: During 2001, optimize an ambient air method to do low level analysis volatile organics typically found in ambient air samples. The instrumentation most commonly used for TO-15 analysis, quadrapole MS, is not capable of attaining the level of sensitivity needed for analysis of ambient samples of low level polar hydrocarbon compounds. The current target lists for TO-14/15 do not include polar compounds seen in ambient samples. By optimizing current TO-15 methodology for ion trap MS enabling quantitation into the part per trillion range and expanding the target list to include polar compounds we will be better able to supports efforts of the states in the region in establishing an effective air toxics monitoring network.

FY 2001 PERFORMANCE PLAN
(YEAR 1)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2002, optimize TO-15 for low level and polar compound analysis.	1. Acquire standards	1. Purchase standards: January 2001					
	2. Optimize TO-15	2. Prepare draft SOP: June 2001					
	3. Coordinate with R2 to evaluate method for application on a quadrupole vs an ion trap MS	3. Visit R2 for coordination meeting: By June 2001					3. R2
	4. Test the method on real-world samples by doing split sample analysis with ME and RI	4. Analyze test samples, adjust the method as necessary and finalize the SOP: Summer 2001					4. Maine DEP and Rhode Island DOH

FY 2002 PERFORMANCE PLAN
(YEAR 2)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2002, optimize TO-15 for low level and polar compound analysis.	5. Distribute and validate the method 6. Method validated	5. Train chemists, initiate round robin testing: January 2002 6. Round robin testing report completed: June 2002					5. R2, ME DEP, RI DOH

WORK PLAN FOR ENVIRONMENTAL BIOLOGY

Marine/Estuarine Benthic Invertebrate Taxonomy

Goal 2: Clean and Safe Water

Objective 02: By 2005, conserve and enhance the ecological health of the nation's (state, interstate and tribal) waters and aquatic ecosystems - rivers and streams, lakes, wetlands, estuaries, coastal areas, oceans and ground waters - so that 75% of waters will support healthy aquatic communities.

Subobjective 01: By 2005, restore and protect watersheds so that 75% of waters support healthy watersheds as shown by comprehensive assessment of the nation's watersheds

Subobjective 03: By 2003, provide means to identify, assess and manage aquatic stressors, including contaminated sediments.

Project Description: The processing of benthic samples and identification of benthic invertebrates is an essential part of monitoring the health of Mid-Atlantic estuaries and coastal waters. A need exists for standardized protocols. The Region, working with the Office of Science and Technology (OST), is developing SOPs for removing and identifying invertebrates from estuarine and marine benthic samples. Details such as mesh size and necessary level of taxonomy will be included. With standardized protocols, information from coastal waters throughout the region can be compared and trends tracked to determine if pollution control strategies are working. On going projects include: 1) Biological assessments near waste water outfalls off Bethany Beach, DE, and Ocean City, MD. 2) QC of estuarine invertebrate identifications done by the Maryland Department of the Environment, Dredging Assessment Division. 3) Inventory of coral reef biodiversity in NASA-funded project to map (with satellite remote sensing) the coral reef at Andros Island, Bahamas, identify discrete reef habitats, and biodiversity associated with those habitats.

FY 2000 PERFORMANCE PLAN

(Year 1)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2002, develop standardized taxonomic protocols for marine invertebrate organisms and make them available for national application.	1. Finalize draft protocols: a) Removal of Invertebrates from Estuarine and Benthic samples and b) Identification of Estuarine and Marine Benthic Invertebrates	1. Peer review complete: July 2000	.1	.1			
	2. Transfer and test protocols	2. Train Maryland Department of the Environment and perform periodic QC checks of their IDs: September 2000	.1	.2			2. MDE

FY 2001 PERFORMANCE PLAN
(Year 2)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
By 2002, develop standardized taxonomic protocols for marine invertebrate organisms and make them available for national application.	3. Distribution of protocols	Protocols distributed to regions, states, and other interested parties: June 2001	.1				
	4. Transfer and apply knowledge to bioassessments	4a.. Train MD Dept. of the Env. biologists and perform QC checks of their Chesapeake. Bay IDs: September 2001	.2				4a. MDE
		4b. Complete taxonomic analysis of NASA/Bahamas coral reef biodiversity assessment samples: September 2001	.3				4b. NASA, American Museum of Natural History Center for Biodiversity and Conservation

FY 2002 PERFORMANCE PLAN
(Year 3)

Subobjective	Goal/Action	Performance Measures	FTE Projected	FTE Expended	Funds Projected	Funds Expended	Collaborators
Support estuarine and coastal bioassessments	5. Continue to transfer and apply knowledge to bioassessments	5. Complete taxonomic analysis of Bethany Beach and Ocean City samples for OST project: June 2002	.3				
	6. Draft manuscript for publication of OST Bethany Beach/Ocean City data in a peer reviewed journal	6. Draft complete: September 2002	.2				