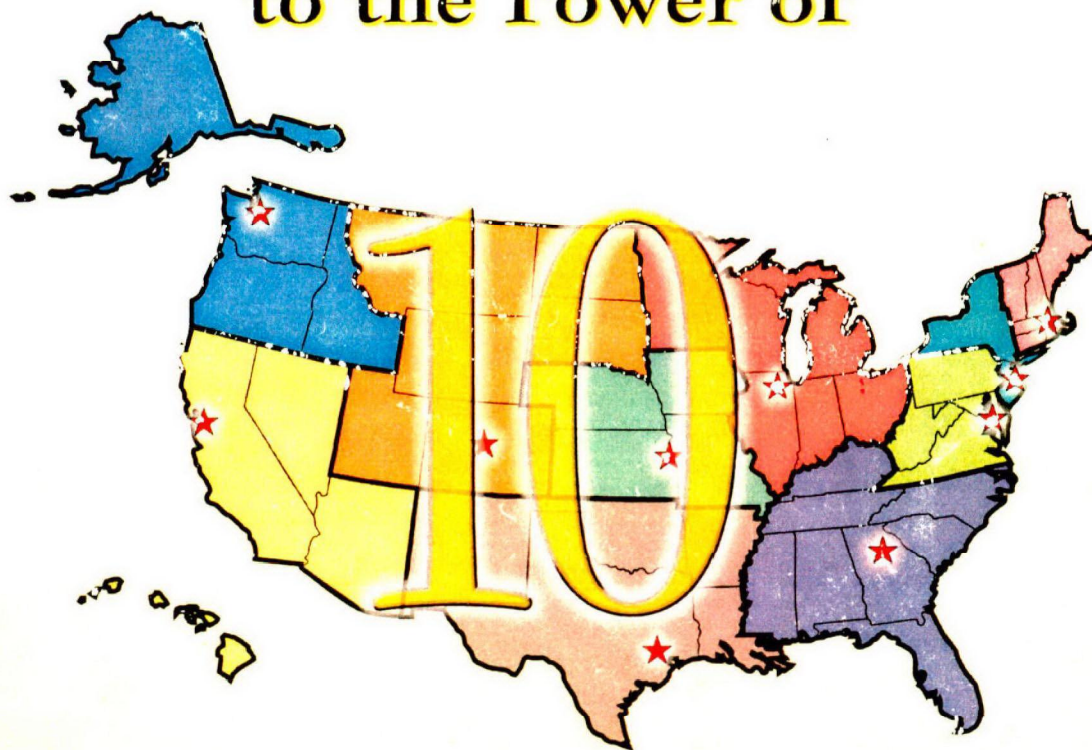


SCIENCE

to the Power of



Regional Laboratory System

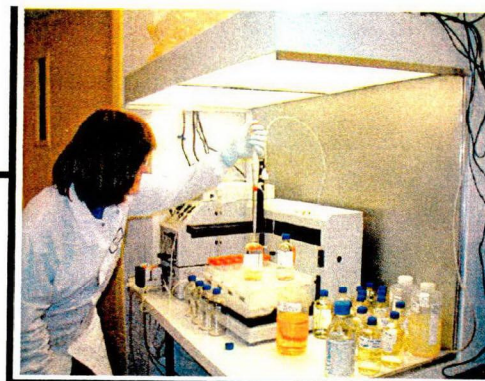


Annual Report

Fiscal Year 2002

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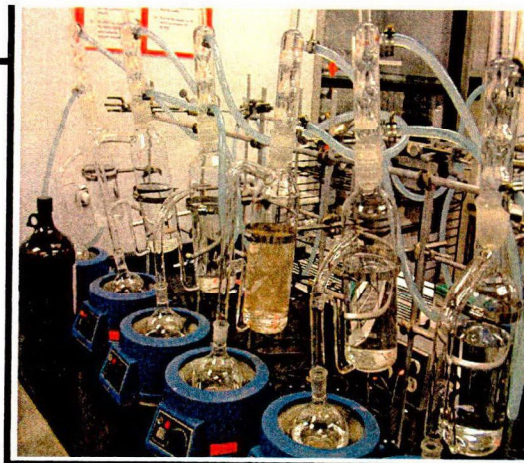


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EXECUTIVE SUMMARY

Regional Laboratory System Annual Report - FY2002

Good science is imperative for effective decision-making and fundamental to the protection and preservation of the environment. The Regional Laboratory System is an interdependent network of the ten regional laboratories of the United States Environmental Protection Agency. These regional laboratories are charged with producing environmental data and information that are technically sound and of requisite quality for use in achieving the Agency's goals.



The regional laboratories provide a full range of routine and specialized chemical and biological testing of air, water, soil, sediment, tissue, and hazardous waste for ambient and compliance monitoring as well as criminal and civil enforcement activities. In FY2002, the regional laboratories performed almost 80,000 analyses. The analytical capacity of the laboratories is enhanced by the presence of the Environmental Services Assistance Team, a dedicated Superfund contractor. Accordingly, the Superfund program was the largest client, accounting for 57% of the total analytical throughput of the Regional Laboratory System.

Analytical support is not limited to the traditional fixed laboratory. The regional laboratories also provide field analytical support, from analyses performed in mobile laboratories on-site to screening techniques performed directly in the field. This enables better, cheaper, and faster decision-making to help achieve the Agency's goals. Over seven thousand field analyses in support of Superfund, Brownfields, FEMA and RCRA were performed in FY2002.

Modern facilities, expert staff, and effective quality systems also make the regional laboratories an invaluable resource for international, national and local organizations. Technical support, training and outreach are routinely provided to partners in other countries; other federal agencies; state, local, and tribal governments; academia; and the private sector.

In FY2002, activities related to Homeland Security and Crisis Response were a major priority. Of particular importance were the assessment and enhancement of federal and state laboratory capabilities for chemical, biological and radiological warfare agents and the development of networks and agreements for providing mutual support in the event of an incident.

Each section of this Annual Report contains a bulleted list of selected accomplishments for FY2002, preceded by an introductory paragraph. Reading the introductory paragraphs will provide an overview of key areas supported by the Regional Laboratory System.

MISSION STATEMENT

Regional Laboratory System Annual Report - FY2002

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.

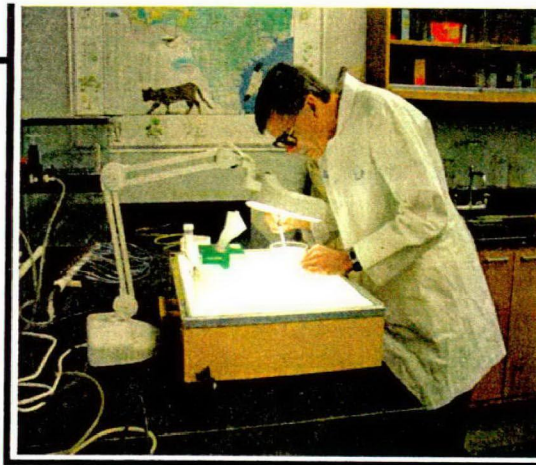
To maintain and enhance a technically and scientifically skilled, dedicated and diverse staff through the excellence of our recruitment, career development, training, management and leadership.

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

INTRODUCTION

Regional Laboratory System Annual Report - FY2002

The EPA regional laboratories were created at the inception of the Environmental Protection Agency in 1970. Originally 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 the early 1980s and again in the 1990s the agency restructured to meet changing demands and performance requirements. The effects of reorganizations on regional laboratories have varied. In some regions new Science or Ecosystem Protection Divisions were created that perform many of the core functions of the traditional S&A Divisions: field sampling and investigations, analytical support, and quality assurance of data - as well as other functions. In other regions these functions were placed under their Management Divisions or Enforcement Divisions. Regardless of organizational structure, and through several reorganizations, all ten regions continued to endorse the need for a strong regional science and laboratory capability.

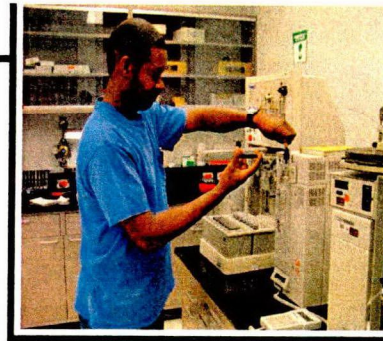
The regional laboratories continue to offer a full range of routine and special chemical and biological testing in support of regional and national programs including air, water, pesticides, toxics, hazardous waste, ambient monitoring, compliance monitoring, criminal and civil enforcement and special projects. Other core functions include expert witness testimony; training of regional 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

Regional Laboratory System Annual Report - FY2002

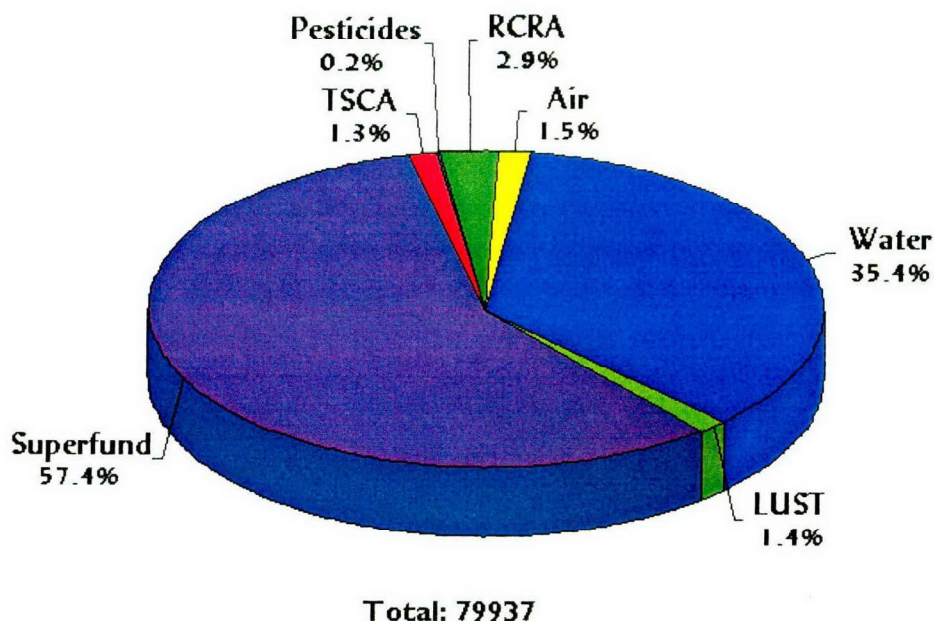
The regional laboratories exist primarily to supply quality analytical data to regional programs in support of a broad range of regional initiatives from routine monitoring to criminal enforcement.

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.

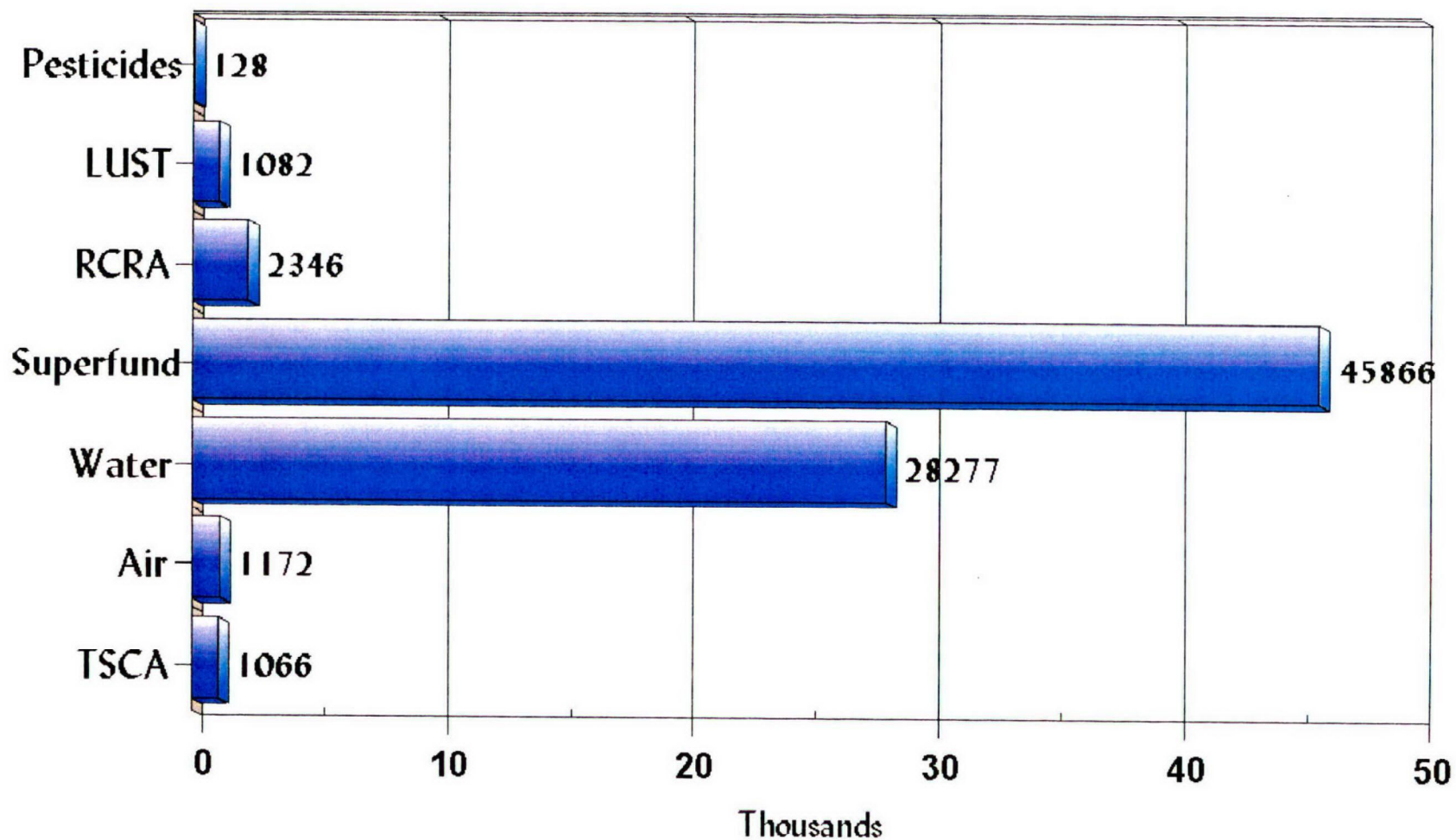
The chart below shows the percentage of analyses by media program. The chart on the following page shows the number of analyses performed by regional laboratories by program. Neither chart includes analyses performed for quality assurance purposes, generally about 30% of the analytical effort.



An analysis is one analytical test through one instrument. The sample is run through the entire process and results are reported to the customer. Examples: An ICP run of 24 elements or a GC/MS run of 65 compounds each count as one analysis. An ICP test which averages 2 or 3 "burns" for one result counts as one analysis. Analyses include field samples (e.g. field blanks, duplicates, spikes, controls) and external performance evaluation samples. They do not include laboratory calibrations, dilutions, reruns or QC (e.g. laboratory blanks, duplicates, spikes or controls).

ANALYSES BY PROGRAM - FISCAL YEAR 2002

Regional Laboratories



FIELD ANALYTICAL SUPPORT

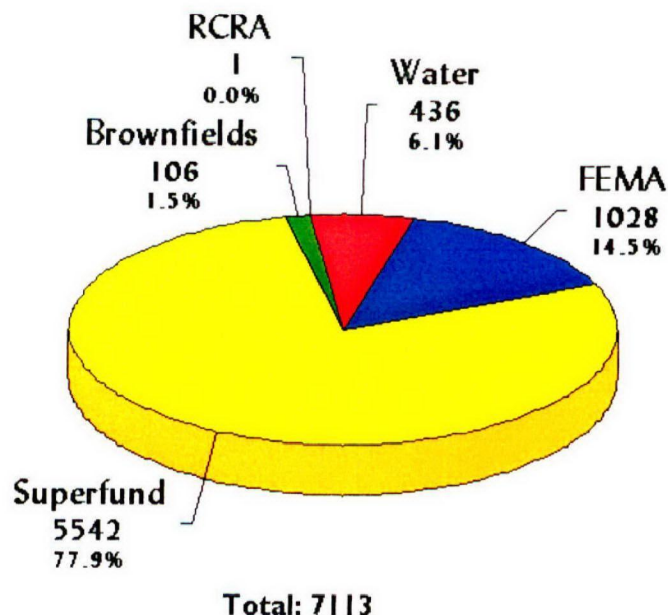
Regional Laboratory System Annual Report - FY2002



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. Field analytical capability has particular relevance to Superfund cleanups and Brownfields where rapid assessment can offer distinct advantages to an investigator. 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 (DPT). DPT refers to a group of tools used for performing subsurface investigations by driving, pushing and/or vibrating small diameter hollow steel rods into the ground with sampling tools used for the collection of soil, ground water, and soil gas samples attached to the rods. Field analyses are also performed on air samples such as soil gas, indoor air and passive vapor monitors.

Most regional laboratories also provide sample containers, preservatives, labels, coolers, ice packs and paperwork to document and track the samples. While this service is not specifically field analysis it does support the overall field effort and is part of the service offered by the regional laboratories in support of the overall assessment effort.

Field analyses performed by regional laboratories in FY 2002 are captured in the chart below:



FIELD ANALYTICAL SUPPORT

Regional Laboratory System Annual Report - FY2002

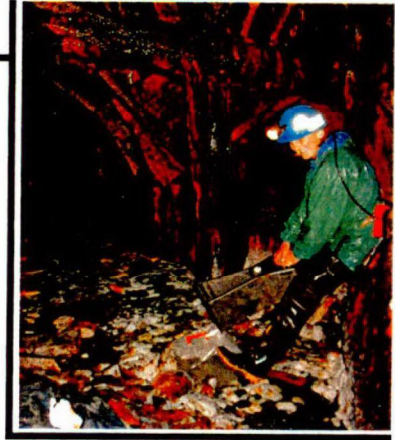


- ★ One regional laboratory supported two field projects for total mercury analyses for the Superfund program. Both projects were conducted to support investigations by a state Department of Health and Environmental Control. Performing over seventy samples per day allowed the state personnel to focus sampling efforts on real time results. One site was a battery manufacturing facility where mercury contamination was suspected. The second site was in an urban area where spoils from a dredged creek channel were discovered to be spread over an area of several hundred feet from the channel. Without information in “real time” the health department may have spent several days and an enormous amount of laboratory time trying to characterize the problems.
- ★ One region purchased a new DPT truck mounted Geoprobe 6600 system in 2002. Besides subsurface sample collection, the system has the additional capability to install 2" monitoring wells at a fraction of the cost and time when compared to using standard drill rigs. The Geoprobe with DPT may be used to support the Hazardous Waste, Superfund, and RCRA programs. This unit was successfully used to install monitoring wells and to collect samples at the Frontier Hard Chrome and Advance Electroplating Superfund sites during FY 2002. Another regional laboratory used a light weight DPT rig to sample soil and ground water in residential yards. The light weight man transportable system offers the advantage of easier access and less impact to yards when an assessment must be conducted in close proximity to houses.
- ★ One region's mobile laboratory was retrofitted to perform volatile organic analyses in air associated with rescue and debris removal operations for the World Trade Center (WTC) Disaster Response. Laboratory personnel provided real time GC/MS air analyses results for volatile organics on-site on a continuous basis from October of 2001 through May of 2002. This information, collected as a result of a request by the New York City Fire Department, was used to assign appropriate levels of personal protection for workers at the WTC site on a continuous basis during rescue and cleanup operations.
- ★ One regional laboratory performed extensive field sampling for the Office of Water National Study of Chemical Residues in Lake Fish Tissue. This four year study will provide information to meet several objectives of the Clean Water Action Plan and provide an accurate assessment of the extent and the severity of contamination of our fisheries by persistent, bio-accumulative and toxic chemicals for the Agency's PBT Initiative.
- ★ One regional laboratory began use of a field gamma radiation detector to perform radiation screening and radionuclide identification. This capability is currently undergoing refinement and will support the Regional Superfund Site Assessment Office allowing radiation screening at former mine sites.

FIELD ANALYTICAL SUPPORT

Regional Laboratory System Annual Report - FY2002

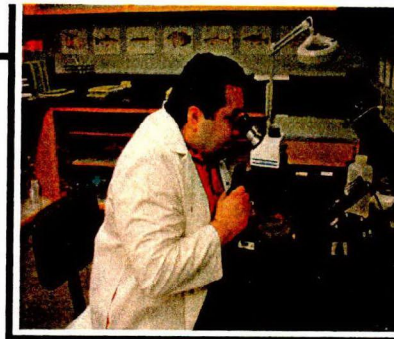
- ★ The ecosystem assessment unit in one region uses a mobile laboratory to perform Sediment Oxygen Demand (SOD) studies to support Total Maximum Daily Load (TMDL) modeling. SOD studies investigate the rate that dissolved oxygen (DO) is removed from the water column due to the decomposition of organic material in the sediments. SOD may be a major cause of low DO in water bodies and is critical in understanding the overall oxygen demand when assessing the maximum waste load that a river can sustain. The mobile laboratory allows analysis to be performed on undisturbed cores with the overlying water within 30 minutes of collection. This approach approximates insitu conditions much more accurately than would be possible with a fixed laboratory. In 2002, 4 SOD studies were performed in support of TMDL development by this region.
- ★ In support of the CAFO enforcement program and the BEACHes program, a new microbiology field laboratory in one region performed 194 analyses at 20 different sites in Washington and Idaho.



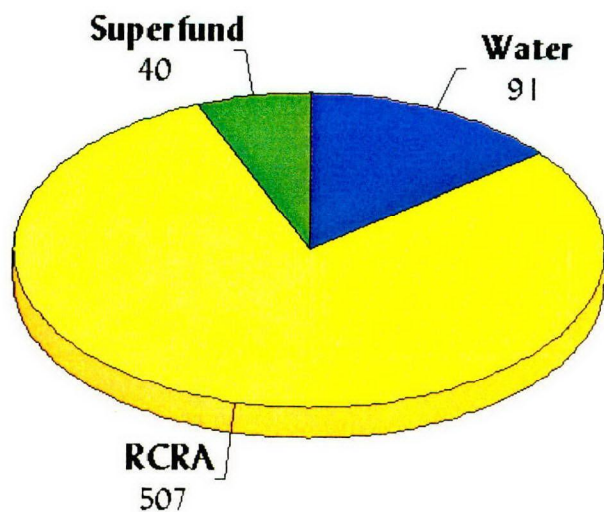
CRIMINAL PROGRAM SUPPORT

Regional Laboratory System Annual Report - FY2002

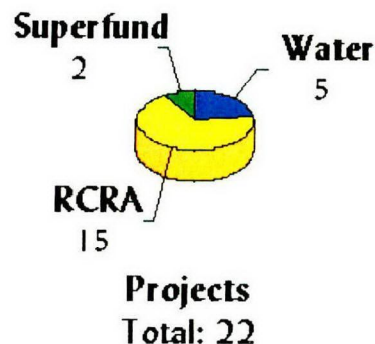
The mission of the EPA Criminal Investigation Division (CID) is to investigate the most significant and egregious violations of environmental laws under the purview of EPA. Each region supports the Criminal Enforcement Program by providing, among other things, analytical support to program activities. The laboratories analyze samples from sources such as un-permitted discharges, illegally stored hazardous wastes, and illegal dumping activities. These data are then used by the Criminal Investigation Division and Assistant U.S. Attorneys (AUSAs) 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.



The chart below identifies analytical support to the criminal enforcement program in FY2002:



**Analyses
Total: 638**



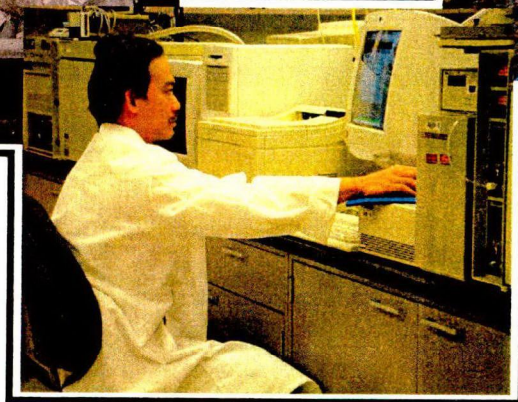
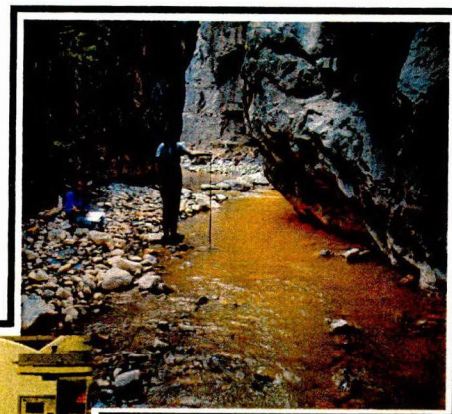
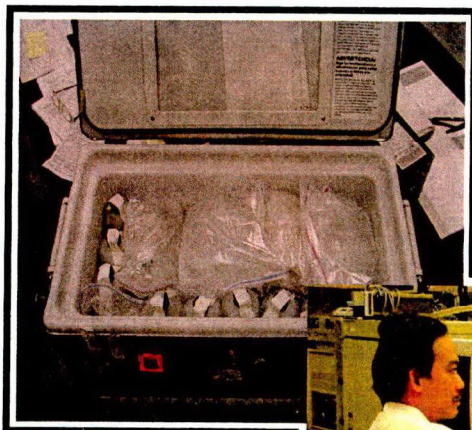
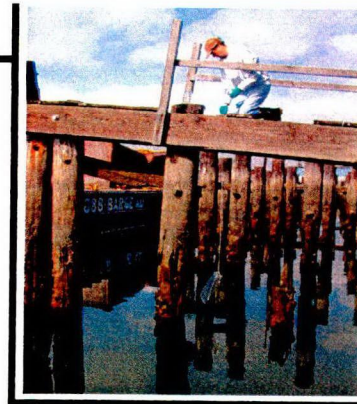
**Projects
Total: 22**

- ★ A human health risk analysis for pathogens potentially present in fecal material in horses was performed for the Office of General Counsel. The request stems from a current criminal enforcement case in discovery involving the risk to human health and the environment from the contamination of surface waters by horse manure. The report confirms that direct/indirect contact with water contaminated by fecal material from horses can pose a public health risk.

CRIMINAL PROGRAM SUPPORT

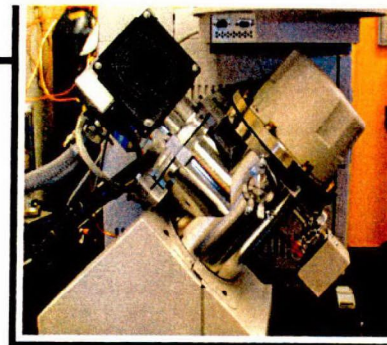
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- ★ Six laboratory personnel traveled from New Jersey to Detroit, Michigan twice in FY2002 to serve as government witnesses in the criminal trial against Johan March Heward, owner of the Industrial Court Company, located in Detroit, Michigan. The defendant was charged with illegal disposal practices at a New York State site and was convicted on all counts.
- ★ One regional laboratory provided support in the investigation of a drinking water supply which had been compromised as a result of a break-in. The incident illustrated the need for field screening and laboratory pre-screening, and raised the question of the appropriate role of regional laboratories in providing analytical support for samples which may contain contamination related to weapons of mass destruction.



CENTERS OF APPLIED SCIENCE

Regional Laboratory System Annual Report - FY2002



In addition to common core functions, regional laboratories have developed specific expertise in response to program needs unique to the particular region. In many cases, this represents the best knowledge of the discipline in the Agency, and perhaps the country. These unique regional laboratory capabilities reside in five Centers of Applied Science (CAS): Environmental Chemistry, Environmental Microbiology, Analytical Pollution Prevention, Ambient Air Monitoring and Environmental Biology. Complementing established capabilities in each Center are CAS projects being undertaken by the various regions intended to advance the state-of-the-art in environmental analysis, monitoring and pollution prevention. To maintain Center status for an established capability, a laboratory must have performed significant work in that area or conducted training within the previous year. To be considered a CAS project, the participating regional laboratory is committed to the preparation of a work plan describing the work of their discipline and an annual report describing the work's progress. Established Centers and CAS projects are listed below. A more detailed description of the Regional Laboratory System Center of Applied Science activities is contained in Appendix I.

★ Established Center Capabilities

- | | |
|---|--|
| ☆ Dioxin/Furan Analysis | ☆ PCB Congeners |
| ☆ Fish Tissue Extraction and Cleanup | ☆ Trace Metals Analysis |
| ☆ X-ray Diffractometry | ☆ Polybrominated Diphenyl Ethers |
| ☆ Toxaphene Congeners | ☆ Parasites in Drinking Water |
| ☆ Abbreviated Microwave Extraction | ☆ Microextractions with Large Volume Injection |
| ☆ Polar Hydrocarbon Compounds | ☆ Passive Vapor Diffusion Monitoring |
| ☆ Groundwaters Under Direct Influence of Surface Waters | |
| ☆ Marine/Estuarine Benthic Invertebrate Taxonomy | |

★ CAS Projects Currently Underway:

- | | |
|--|--|
| ☆ Explosives Analysis by HPLC and LC/MS | ☆ Endocrine Disrupting Compound Analysis |
| ☆ Arsenic by Hydride Generation | ☆ Passive Vapor Diffusion Monitoring |
| ☆ Polybrominated Diphenyl Ethers | ☆ Abbreviated Microwave Extraction |
| ☆ Polar Hydrocarbon Compounds (2) | ☆ X-ray Diffractometry |
| ☆ Arsenic Speciation | ☆ Solventless Extraction |
| ☆ PCB Congeners | ☆ Polymerase Chain Reaction for Protozoans |
| ☆ Coplanar PCB Congener Separation and Analysis | |
| ☆ Primary Lead Intervention Research and Support | |
| ☆ Fine Particulate Speciation by Scanning Electron Microscopy | |
| ☆ Determination of Contaminants Resulting from Modern Bleaching Sequences of Wood Pulp | |
| ☆ Microextractions with Large Volume Injection | |
| ☆ Marine and Estuarine Benthic Invertebrate Taxonomy | |

SPECIAL STUDIES

Regional Laboratory System Annual Report - FY2002

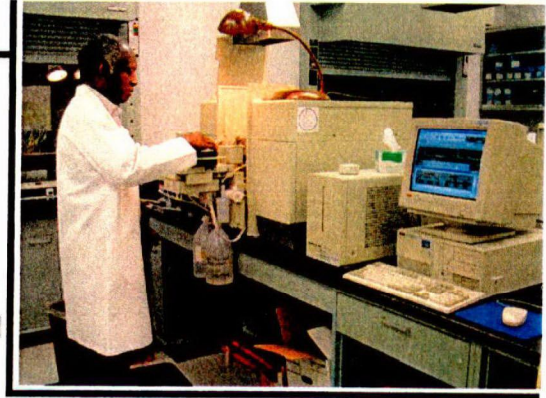
In order to meet regional as well as, in some instances, Agency-wide needs, the regional laboratories have responded by developing specialized expertise to enhance certain laboratory or scientific capabilities. Since laboratory personnel possess unique skills and experiences in a variety of scientific and environmental areas, they are frequently requested to become involved in special projects or studies to perform such tasks as developing new analytical methods; adapting existing analytical methods to specific situations; participating in method validation activities; performing analytical support for special studies; and other similar activities. The following are some examples of special studies conducted during FY 2002:



- ★ One regional laboratory worked with a consortium of state, federal and educational partners to investigate the occurrences and distribution of naturally occurring arsenic in private wells. While the occurrence of arsenic in public water supplies is well characterized, little data is available for the large number of private well owners not required to perform monitoring. Data derived from this work will be used to generate a fact sheet for private well owners and will also be extremely valuable in supporting the Private Well Public Education Campaign being developed by the region.
- ★ One regional laboratory processed over one-thousand samples collected for lead analysis from drinking water sources in thirty-nine New York City Public Schools over a four-week period. This effort was to ensure compliance with the Lead Contamination Control Act, designed to identify and reduce lead in drinking water sources in schools.
- ★ One regional laboratory provided analytical support for monitoring pesticide spraying intended to combat the transmission of West Nile Virus in New York City and New Jersey. Three pesticide compounds, Piperonyl Butoxide, Sumithrin and Resmethrin, were analyzed in the ambient water to verify that water bodies were not contaminated by the pesticide spraying.
- ★ Because of their environmental toxicity, butyltin compounds, especially tributyltin, are of major concern in coastal areas due to their significant use in the boating industry. One regional laboratory developed an analytical method for the determination of butyltins in sediment samples using a GC/MS to provide analytical support for ambient monitoring programs under the Regional Environmental Monitoring and Assessment Program initiative.
- ★ The Virgin Island Rum International Limited (VIRIL) rum distillery discharges untreated waste via a two-mile conduit to the Caribbean Sea. Regional laboratory biologists determined the biomass of sea grasses in areas in and around the VIRIL discharge to evaluate the effects of the discharge on sea grass productivity. Sea grasses are an important primary producer offering subsistence for fish and invertebrates, and breeding areas for fish.

SPECIAL STUDIES

Regional Laboratory System Annual Report - FY2002



- ★ Seven laboratories, including regional, ORD and commercial facilities, participated in a round robin evaluation of a reduced-volume sediment method for *Ampelisca abdita*, widely used in dredging and estuarine ecological assessments. The intra-laboratory study showed significant time savings for sampling and sieving, reduced laboratory storage space needs, and improved amphipod counts over traditional techniques.
- ★ Bivalve populations, an important ecological resource in estuaries, have significantly declined over the past few decades. Bivalve shell and hinge development tests conducted using the surf clam, *Spisula* sp showed a trend of increased survival and shell development when ammonia was purged from the sediments prior to testing. A study was designed and conducted to characterize sediment toxicity of estuarine sites surveyed in previous years, and confirm the role of un-ionized ammonia (UIA) as a causative agent of impaired shell and hinge development.
- ★ Employees at the Commerce Building in Washington D.C. were becoming sick from fumes released when opening mail that had been irradiated as a precaution against exposure to biological agents. One regional laboratory provided semi-volatile organic analyses in support of an investigation that eventually concluded the heat involved in the irradiation process caused the plastic wrappers and address windows to decompose and release irritating fumes. As a result of this study, it was recommended that people who receive irradiated mail be instructed to air it out so fumes can dissipate.
- ★ One regional laboratory performed analyses of air samples for metals and particulates supporting the region's air enforcement program at the American Electrical Power Plant in Cheshire, Ohio. As a result of the investigation, the plant agreed to buy the homes and property of the small village so the residents could relocate out of the immediate area of the plant.
- ★ In response to a request from a region's water program, the regional laboratory developed a quantitative analytical method utilizing a new Ion Trap GC/MS/MS for use in detecting atrazine in farm ponds and streams in the Midwest. Further utilization of this instrumentation is anticipated in such projects as achieving lower detection limits for atrazine in the waters of the Great Lakes, for determining other triazines and their metabolites, and for qualitatively confirming the presence of pesticides and PCBs in extracts from difficult matrices.
- ★ One regional laboratory is working in collaboration with the University of Texas School of Public Health on a study entitled "Chemical and Biological Interactions in the Etiology of Neural Tube Defects Along The Texas - Mexico Border" sponsored by the Agency for Toxic Substances and Disease Registry. In FY2002, 266 hair samples were analyzed for mercury. This represents one of the largest environmental quality and health databases ever collected in the United States-Mexico border region.

SPECIAL STUDIES

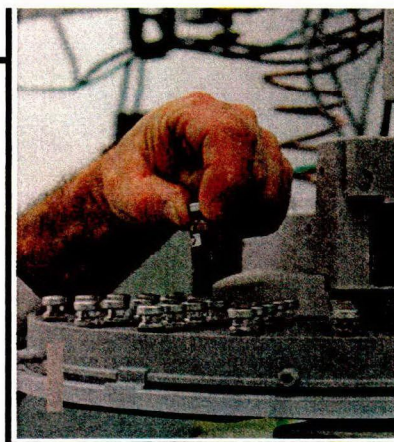
Regional Laboratory System Annual Report - FY2002



- ★ A regional laboratory developed an analytical methodology to facilitate identification of pesticides and PCBs at levels of detection comparable to GC/ECD method. This new method consists of large volume injection into a GC/MS with negative chemical ionization technique.
- ★ Prompted by a lack of agreement between the results of acute toxicity studies performed by the Metropolitan Sanitary District of Chicago and those conducted by the state agency and a regional laboratory. The regional biology laboratory initiated a two-year study of chronic toxicity of the effluents at three municipal wastewater treatment plants in the City of Chicago.
- ★ At the request of the regional water program, a cooperative study was initiated between the Metropolitan Sanitary Sewer District and the regional laboratory to determine the quality of reported concentrations of metals to better understand the amount of metals being applied to land from wastewater treatment facility biosolids. The concentrations of selected metals in biosolids material were jointly developed and characterized. About 30 wastewater treatment facilities from the region volunteered to accept samples of the material for analysis.
- ★ One regional laboratory is aggressively involved in method development on the Horizon Solid Phase Extraction (SPE) system for drinking water methods and SW-846 Method 8270 compounds. A seminar on Solid Phase Extraction and Large Volume Injection for Method 8270 was given at the 18th Annual Waste Testing and Quality Assurance Symposium.
- ★ One regional laboratory assisted the Texas Commission of Environmental Quality and Harris County Pollution Control in the development of a citizen based air quality monitoring study. During FY2002, 130 analyses were conducted on grab samples collected by citizens who had been trained in sample collection.
- ★ After making improvements to the collector urchin fertilization toxicity test and training Hawaiian laboratories, one regional laboratory initiated an inter-laboratory toxicity test study using *Tripteneustes gratilla*. The study, designed to quantify laboratory variability, is the final step in standardizing the new method, which may provide a procedure for routine testing of industrial and municipal wastewater in tropical areas.
- ★ One regional laboratory provided technical and analytical support to the Children's' Pollutant Exposure Study conducted by the UCLA School of Public Health to obtain measurements of pollutant concentrations in classrooms during normal classroom activities, outside on school grounds where students spend time, and in children's homes. The study was initiated as a result of State legislation requiring characterization of air pollution exposure associated with schoolchildren's micro environments.

SPECIAL STUDIES

Regional Laboratory System Annual Report - FY2002

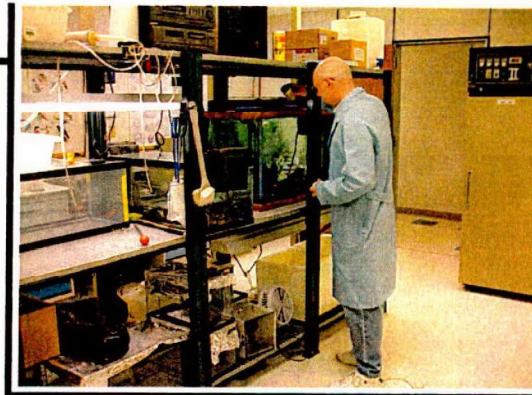


- ★ A new, faster semi-volatile extraction procedure that uses 75% less methylene chloride was developed by one of the regional laboratories. Results of a study evaluating the procedure will be presented at a national meeting in the near future.
- ★ In response to lower health advisory levels and requests from Superfund clients, one regional laboratory modified its procedures to better detect 1,4-dioxane and perchlorate in water at lower levels. By switching to a solvent extraction technique, the laboratory is now able to report down to 1 ug/L of 1,4-dioxane, well below the current drinking water health advisory limit of 3 ug/L. In addition, the laboratory was able to lower the reporting limits for perchlorate from 5 ug/L to 2 ug/L, below the 4ug/L advisory limit.
- ★ One regional laboratory co-authored a publication with Agilent Technologies called "Practical Fast GC for CLP Pesticide Analyses." This was published in *The Journal of Chromatographic Science*, September 2002.
- ★ Because of concerns about acidic degradation of MTBE over time, a study was performed demonstrating that MTBE is stable in an acidic matrix throughout its holding time (14 days) if kept at the recommended storage temperature.
- ★ One regional laboratory began atmospheric mercury monitoring to measure potential mercury emissions from the remediation of a former mercury fulminate production facility located near the laboratory. Mercury is a toxic, persistent, and bioaccumulative pollutant that affects the nervous system and has long been known to have toxic effects on humans and wildlife.
- ★ One regional laboratory participated in a study with the University of Nevada at Las Vegas to evaluate water quality impacts of dust suppressants. The laboratory conducted freshwater chronic toxicity tests using 3 species on runoff samples from test plots treated with candidate dust suppressants. The laboratory's effort enhanced the study's ability to assess potential water quality impacts of the candidate suppressants by providing aquatic toxicological screening data.
- ★ One regional laboratory initiated and conducted a study on recreational waters in Idaho which was designed to establish levels of *E. coli*, enterococci, *S. aureus* and fecal coliform bacteria in such waters, evaluate and compare various methodologies available for detection of these bacteria, and determine the feasibility of using the mobile microbiology laboratory in this kind of study. Another focus of the study was evaluating enterococci strains for the presence of antibiotic resistance.

SPECIAL STUDIES

Regional Laboratory System Annual Report - FY2002

- ★ A stability study of a prototype detector proposed for the Perkin Elmer Elan 6100- ICP/MS/DRC was performed in support of Perkin Elmer's efforts to improve the stability of dual detector calibration for Dynamic Reaction Cell (DRC) instruments. The results of this study will provide useful information to other EPA laboratories interested in purchasing ICP/MS instruments equipped with DRC.

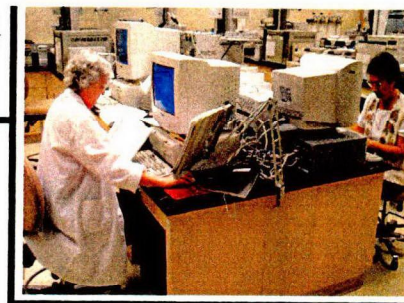


- ★ Bench studies were performed to determine the appropriate type and amount of reductant to be used at the Frontier Hard Chrome Superfund site for the treatment of soils contaminated with Cr^{+6} .
- ★ Agilent Technology's GC/ICP/MS was evaluated for the analysis of organic compounds containing phosphorus, sulfur, chlorine, bromine, and iodine. Element specific information provides valuable tools to assist in detecting and quantifying complex pesticides and herbicides. Recent GC/ICP/MS data demonstrate increased sensitivity and better chromatography compared to that obtained using GC/AED, while still displaying some degree of compound independent calibration capability. Agilent Corporation's goal is to determine the feasibility of manufacturing an ICP-MS specifically for the GC. Manchester's interest is to determine if this instrument is a viable replacement for the AED.



TECHNICAL SUPPORT, TRAINING AND OUTREACH

Regional Laboratory System Annual Report - FY2002



Modern facilities, along with well trained and experienced staff who are experts in current environmental analysis technologies, make the regional laboratories invaluable resources of knowledge. Regional laboratory staff are frequently called upon to provide training and consultation to colleagues within EPA, other federal organizations, state and local governments, academia and the private sector. Additionally, training and consultations are often requested from members of the international scientific community. These efforts help provide information about the basic mission of the regional laboratory, the role of good science within the Agency and its value in decision-making, and the fundamental importance of protecting and preserving the environment. The information provided may include simple briefings and poster presentations, lectures in a variety of workshops and symposia, hands-on training at the regional laboratory, and serving as adjunct faculty at local area universities and colleges. This year, activities of technical support for training and outreach centered around three broad categories, 1) Support to Academia; 2) Support to the International Scientific Community; and 3) Support to Local and National Organizations. Some examples of these activities performed in FY 2002:

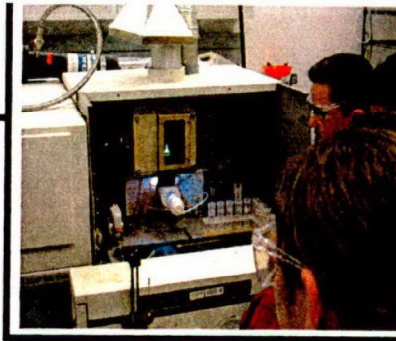
Support to Academia:

Regional technical staff served this year in a variety of settings providing support, training and outreach to academic institutions:

- ★ Teaching a complete course as an adjunct instructor at a major university entitled "Solid and Hazardous Waste Management". Additionally, specific lectures were provided at other universities for the following areas: "Introduction to Environmental Statues," "Hazardous Waste Management," and "Field Analysis of Volatile Organic Compounds."
- ★ One region developed a formal education program for local school children concerning the importance of science at EPA. This program was implemented and numerous school groups were provided this information over this past year.
- ★ One region worked with a university on a research project titled "Measurement and Monitoring Technology for the 21st Century" by providing monitoring support, access to local sites, and confirmatory testing.
- ★ Several regional laboratories provided tours to a variety of students at the middle school, high school and college levels. In each of these tours information is presented concerning the need for quality science at the point of decision making and hopefully provides a forum of encouragement and outreach for new generations of environmental scientists.
- ★ Several regional laboratory staff served as judges at local school science fairs, worked with local middle and high schools in education partnerships and served as "pen pals" and tutors.

TECHNICAL SUPPORT, TRAINING AND OUTREACH

Regional Laboratory System Annual Report - FY2002



Support to the International Community:

Regional technical staff were called upon to provide support in various ways to the international scientific community. In essentially all cases the interaction included dissemination of information concerning the production of data of known and documented quality, explanations of EPA methods and discussions of state-of-the-art techniques and instrumentation for measuring and monitoring. Some specific examples for 2002 include:

- ★ Hands on training in a regional laboratory for a scientific delegation from India to help facilitate the adoption and improvement of quality systems procedures in government laboratories in India.
- ★ Hands on training was provided to representatives of the Virgin Islands Department of Planning and Natural Resources in the use of instrumentation for the analysis of Total Kjeldahl Nitrogen and Total Phosphorus.
- ★ Consultations and technical assistance in application of environmental analytical methods were provided to the University of San Carlos, Guatemala.
- ★ Tours and technical information on operations of an environmental laboratory were provided for visiting scientists from Armenia.
- ★ A month long hands on training experience was provided to a visiting scientist from Azerbaijan concerning the operation of an environmental laboratory and the application of EPA environmental methods.

Support to Local and National Organizations

A natural consequence of being placed throughout the United States in strategic geographic regions is the cultivation of a significant interaction with the local environmental science community. Having this focus locally promotes an understanding of real world issues that is a significant benefit when the regional scientists are called upon to work on national issues on task forces, workgroups and other venues both within the Agency as well as through other professional organizations. Regional scientists are called upon to provide a variety of types of technical support, training, consultation, and other outreach activities as a natural result of their experiences and knowledge. Below are some examples of these efforts for this past year:

- ★ One laboratory provided a presentation at a Pollution Prevention/Green Chemistry seminar concerning the management of chemicals within an environmental laboratory using a chemical inventory database to help minimize waste and to promote the efficient use of stock chemicals.

TECHNICAL SUPPORT, TRAINING AND OUTREACH

Regional Laboratory System Annual Report - FY2002



- ★ Several laboratories hosted meetings and provided training to their colleagues in state laboratories. These activities included the laboratory directors, their technical staffs and the state laboratory certification officers for drinking water certification.
- ★ Some organizations hosted EPA interns explaining the operations and mission of the regional laboratory.
- ★ Some regional laboratory staffs participated in the "Analysis of Pollutants in the Environment" conference sponsored by the EPA Office of Water and made presentations during the conference.
- ★ One laboratory participated in a state sponsored conference for Water Pollution Control Operators and presented a paper entitled "Pretreatment Analytical Challenges: Interferences."
- ★ One laboratory provided support to EPA program staff evaluating a specific method being used by a principle responsible party (PRP) in gathering analytical data for a risk assessment. The evaluation resulted in not using the data, thereby preventing the use of unsubstantiated results.
- ★ One laboratory provided a tour and information to representatives of the US Army Center for Health Promotion and Preventive Medicine concerning the mission of the EPA laboratory and for assistance in the design of modern laboratory facilities.
- ★ One laboratory provided information to an author writing a children's book about EPA science.
- ★ One laboratory provided more than 80 documented individual technical consultations to a variety of organizations and individuals, both local and national in scope.
- ★ The regional laboratories are heavily involved in workgroups and other professional organizations such as:
 - ☆ Office of Solid Waste Methods Workgroups,
 - ☆ National Environmental Laboratory Accreditation Conference (NELAC), serving on boards and committees,
 - ☆ Board of Directors of the Society of Environmental Toxicology and Chemistry, a 5000 member forum for individuals and institutions engaged in the study of environmental issues; management and conservation of natural resources; and environmental education and research,
 - ☆ Various workgroups for homeland security both within the Agency and in partnerships with other organizations such as state environmental programs; the Centers for Disease Control; and the Federal Bureau of Investigation,
 - ☆ AOAC International.

TECHNICAL SUPPORT, TRAINING AND OUTREACH

Regional Laboratory System Annual Report - FY2002

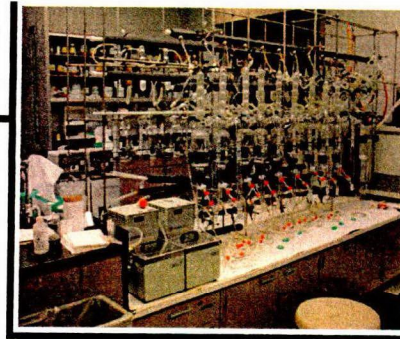


- ★ Regional laboratory staffs provided a significant number of training/seminars on a variety of technical subjects, such as:
 - ☆ "Field Analytical Capabilities,"
 - ☆ "RCRA Land Ban Regulations and Their Effect on Sampling Methods, Analytes, and Reporting Limits,"
 - ☆ "Detection Limits in ICP-MS Analysis,"
 - ☆ "Environmental Data Generation and Evaluation,"
 - ☆ "Recognizing the Potential for False Positives and False Negatives in ICP Analysis,"
 - ☆ "Considerations for Lowering Detection Levels,"
 - ☆ "Methods Development and Their Use in Regional Studies,"
 - ☆ "Methods Development and Laboratory Fraud Detection,"
 - ☆ "Quality and Integrity of Environmental Lab Data,"
 - ☆ "Proper Use of Manual Integrations and Laboratory Practices,"
 - ☆ "Application of XRD and Analytical SEM in Environmental Assessment,"
 - ☆ "Use of XRD as a Complement to Metals Analysis for Environmental Assessments,"
 - ☆ "Separation of PCB Congeners,"
 - ☆ "Microscopic Particulate Analysis and Method 1623."
- ★ Regional laboratories provided support to several Native American tribal organizations. Some examples are:
 - ☆ After the elimination of the National EPA Performance Testing(PT) sampling program one region instituted a limited PT program to assist 11 Tribal and Pacific Island microbiology laboratories with a quality assurance program to help insure sound public health data.
 - ☆ One region provided analysis assistance and technical consultations for several tribal organizations for such items as the PM 2.5 air monitoring program and the establishment of good analytical techniques for classical chemistry tests (such as nitrate; TKN; BOD; etc).
 - ☆ One region had a staff chemist participate in an interview as part of a documentary produced by Green Works Television covering projects funded by the Environmental Monitoring for Public Access and Community Tracking (EMPACT) Program.
- ★ Technical assistance in the form of sample analyses and general technical consultations (including reviews of policies, procedures and methodologies) were provided to many other governmental agencies as well as EPA national program offices. Some of these include the Federal Bureau of Investigation; the US Army Corps of Engineers; the US Geological Survey; Inspector General of EPA; EPA's Criminal Investigation Division; state environmental programs; EPA Office of Water; EPA Office of Solid Waste; state investigation divisions; state environmental laboratories; state public health laboratories.
- ★ Demonstrations were provided at Children's Groundwater Festivals held in 3 different states.

TECHNICAL SUPPORT, TRAINING AND OUTREACH

Regional Laboratory System Annual Report - FY2002

- ★ The staff of several regional laboratories participated in the Agency's Earth Day programs providing presentations and posters to help carry the message of the importance of protecting our valuable environmental resources.

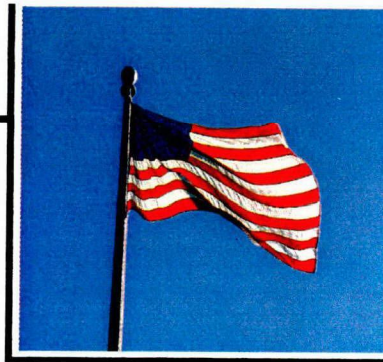


- ★ Several regions provided programmatic support by conducting Performance Audit Inspections (PAIs) for the National Pollutant Discharge Elimination System (NPDES) program and by performing audits of state laboratories required by the Clean Water Act.



HOMELAND SECURITY/CRISIS RESPONSE

Regional Laboratory System Annual Report - FY 2002



Regional laboratories played key roles in responding to the tragic events of September 11, 2001, and the Capitol Hill anthrax incidents. Regional laboratories were at the forefront of monitoring and assessing environmental impacts at the World Trade Center, the Pentagon and on Capitol Hill, providing extensive analytical support to the clean up efforts. This support included analysis of soil, sediment, air and water samples for conventional pollutants like asbestos, metals, volatile organics, and inorganic parameters, as well as some unusual compounds. The regional laboratories proved integral to the success of the Agency's response.

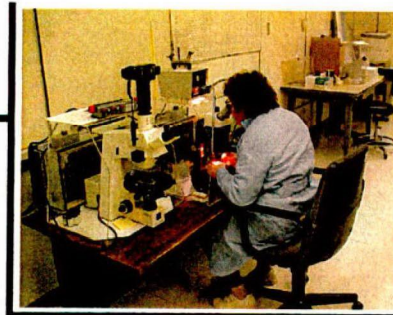
The regional laboratories also responded by assessing their capabilities and capacities and made plans to improve and/or enhance them in order to be prepared to assist the country in the event of another incident. Following are examples of some of the many activities undertaken by the regional laboratories:

- ★ COOPs - All regional laboratories reviewed and revised their Continuity of Operations Plan (COOP), a contingency plan to recover operations if their facilities had to be closed in an emergency. As some of the regional laboratories will be used for continuation of operations in the event of redeployment of essential personnel from the regional offices, many regional laboratories were involved in upgrades of LAN servers and communication systems.
- ★ Security Audits - All regional laboratories have undergone an onsite physical security audit by a national contractor. Although formal reports have not been received some information was made available at the time of the audits and several regions have begun to act on findings with regional resources.
- ★ Assessment of Regional Laboratory Capability for Chemical/Biological Warfare Agents (CBW) - Last fall the regional laboratories evaluated internal capability to analyze for CBW agents. The laboratory directors reviewed existing capability against a comprehensive list of chemical and biological agents and assessed capability as either "currently available," "could be developed within the existing facility" or "would require facility modification."
- ★ Assessment of State Laboratory Capability for Chemical/Biological CBW - Most regions have begun a dialogue with state laboratory directors to improve mutual support and communication in the event of emergencies. Some regions have circulated a request for a CBW agent capability assessment similar to the one performed by the regional laboratories.
- ★ Mutual Support Agreements with State Laboratories - Some regions have completed informal memoranda of understanding with state laboratories for mutual assistance in the event of an emergency. All regions have begun discussions with states on this subject. One regional laboratory organized a State Mutual Aid Laboratory Network. This organization is made up of

HOMELAND SECURITY/CRISIS RESPONSE

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representatives from major water system laboratories and is designed to coordinate mutual support in the event of a terrorist incident in the water supply.



- ★ National CBW Laboratory Resource Catalogue - A laboratory resource catalogue of national CBW laboratory assets has been developed and shared between the regional laboratory chiefs. The catalogue provides information on laboratory capability and points of contact in the event of an emergency.
- ★ Contact with Local National Guard Civil Support Teams - All regional laboratories have or will begin a dialogue with National Guard Civil Support Team (CST) units within their respective regions. These units are capable of providing investigation and detection of suspected nuclear, chemical and biological agent releases. Approximately 13 complete units are currently deployed nationwide and others will be deployed as resources become available. Each unit consists of approximately 22 members divided into four sections: command, survey, medical and operations. Fully deployed units have a decontamination line, field monitoring equipment, a mobile laboratory with C/B/N screening and satellite communications capability.
- ★ Proposals for Upgrading Regional Analytical Capability - Several regions have initiated internal proposals to upgrade capability for CBW agents. Staff from two regional laboratories visited several biological and chemical warfare agent analytical facilities as part of their investigation into expanding laboratory and/or field capability to include these types of analyses.
- ★ Participation in Interagency Coordination Activities - Some regional laboratories are represented on homeland security committees: 1) Chemical Laboratory Interagency Group (CLIAG) (CDC initiated interagency workgroup to establish contacts and capability knowledge base); 2) Subcommittee of the EPA Headquarters Homeland Security Task Force on EPA Laboratory Capabilities and Capacities; 3) Scientific Work Group for the Forensic Analysis of Chemical Terrorism (SWGFACT) in support of the Federal Bureau of Investigation.
- ★ Enhancements to Current Capabilities - Several regional laboratories began purchasing equipment and facilities to increase their response abilities. One region purchased an INFICON portable GC/MS for Homeland Security support. The instrument was recently loaned to their Federal Facilities Unit for on-site monitoring of remediation work involving excavation of volatile hazardous materials. Other regions increased their mobile lab capability by purchasing new mobile field laboratories or enhancing existing mobile facilities for homeland security response.

QUALITY SYSTEMS

Regional Laboratory System Annual Report - FY2002

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 is devoted to insuring the quality of the remaining 70% of the data that support Agency decisions. 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 assurance highlights include:

- ★ All regional laboratories will eventually become accredited under the National Environmental Laboratory Accreditation Conference (NELAC) standards. NELAC, an association of state and federal laboratories with private laboratory participation, establishes and promotes consensus quality standards for environmental laboratories. The Region 7 laboratory has received accreditation under NELAC. The remaining laboratories will be evaluated by a private contractor in FY 2003 defining gaps in each laboratory's quality program relative to NELAC standards.
- ★ Regional Laboratory Directors and Laboratory Quality Assurance Officers/Coordinators have developed recommendations based on common findings in the Technical Systems Audits conducted at all laboratories in CY2000. Striving for more uniformity between laboratories, each common finding was assigned a desired level of consistency by the laboratory directors. Each laboratory then evaluated its program against the designated consistency. In FY 2002 the Regional Laboratory Directors and the Regional Laboratory Quality Assurance Coordinators/Officers:
 - ☆ finalized a core set of data qualifiers to be used by all regional laboratories,
 - ☆ approached agreement on the use of significant figures,
 - ☆ approached agreement on data review procedures, and
 - ☆ approached agreement on addressing outliers.A final implementation date of 3/31/03 for most of the items has been established.
- ★ A uniform ethics policy and ethics training requirements have been established. All laboratories will conduct QA/QC training specific to the needs of the particular laboratory.
- ★ In FY2002, four regional laboratories (R1, R2, R3, and R9) completed a Drinking Water Certification audit performed by EPA Cincinnati with no significant findings.
- ★ To maintain and improve their quality systems, all regional laboratories conducted internal audits, participated in performance evaluation studies, and reviewed and revised quality assurance plans and standard operating procedures.

FACILITY INFRASTRUCTURE

Regional Laboratory System Annual Report - FY2002

Facility Infrastructure includes three elements essential to effective laboratory operation; environmental management, health and safety, and facilities management. Although the work of EPA is important, especially in the long term, it is in the operation of the very complex and potentially hazardous laboratories that Agency and personal liability are the most immediate. The reputation of the regional laboratory is judged by the quality of science it offers to regional and national programs. Far less visible but no less important is the diligence and commitment of laboratory management and staff to supporting the infrastructure required to deliver the science.



ENVIRONMENTAL MANAGEMENT

Each regional laboratory must comply with the same environmental laws that EPA is charged with enforcing. Environmental management of the laboratory includes not only hazardous waste storage and disposal, but emergency response plans, energy usage and savings, materials handling, recycling efforts and other areas not even considered a few years ago. Highlights from the past year related to environmental management and pollution prevention include:

- ★ One regional laboratory received certification of conformance to ISO 14001 for its Environmental Management System (EMS).
- ★ Several regional laboratories are working on or have submitted EMS Policy Statements. EPA's Environmental Management System Executive Order 13148 requires each federal agency to have a fully functioning EMS in place by December 2005.
- ★ One regional laboratory is pursuing the purchase of alternate sources of renewable energy, a change that will reduce the facility energy costs. Four regional laboratories are currently purchasing "green" power.
- ★ One regional laboratory recycled 20 cases of methylene chloride resulting in avoided purchase costs of \$2500 and avoided disposal costs of \$650. The use of mercury for pesticide sample cleanup (removal of sulfur) was eliminated. The laboratory also initiated an aggressive recycling program for glass, HDPE plastic, paper, aluminum, steel and cardboard products.

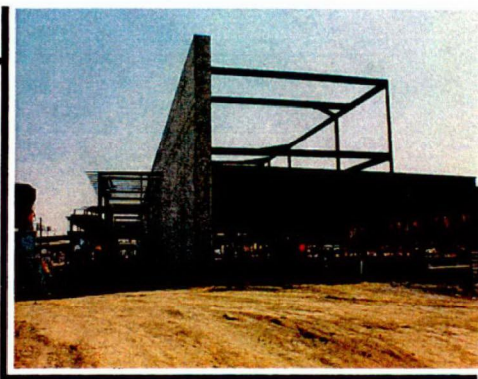
HEALTH AND SAFETY

The health and safety of laboratory personnel is the most important laboratory management imperative. The potential for accidents, usage of glassware, fires, and other safety concerns such as high-pressure compressed gases or liquified gases, solvents exposure and possible contaminated samples (some of which may be health hazards or carcinogenic), conspire to make laboratories inherently more

FACILITY INFRASTRUCTURE

Regional Laboratory System Annual Report - FY2002

risky than office environments. All of the EPA's laboratories have invested heavily in their health and safety programs and have an excellent safety record as proof of their efforts. Highlights from health and safety activities for the past year include:



- ★ All regional laboratories undergo a periodic, comprehensive audit of safety, health, environmental compliance and internal controls by the Headquarters Office of Safety, Health and Environmental Management Programs. Several laboratories completed such audits in FY 2002.
- ★ All laboratories have medical monitoring programs to evaluate and track the health of those employees with a significant possibility of workplace exposure to hazardous compounds.
- ★ Regional laboratories have active Safety and Health Committees, well represented by laboratory employees, that provide a forum for discussing safety and health issues, assisting the Laboratory Safety Officer in planning training activities, and organizing safety inspections.
- ★ The radiation dosimetry program was upgraded at one regional laboratory to include new dosimeters provided by the US Air Force Radiation Dosimetry Group. The new system will provide more reliable dosimetry measurements through better management of exposure badges.
- ★ Several laboratories provided staff to serve on the Safety, Health and Environmental Managers Pharmacy Workgroup to evaluate centralized chemical management systems. The report, "Feasibility of Developing Centralized Chemical Management Systems for EPA Facilities", satisfies the requirements of Executive Order 13148, Part 7 and describes best management practices for laboratories seeking to implement centralized chemical management systems.

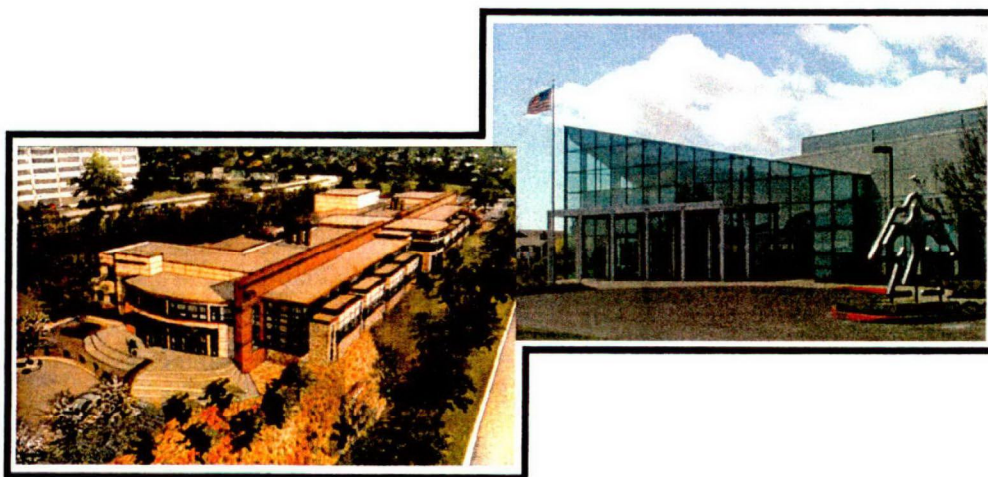
FACILITIES MANAGEMENT

EPA regional laboratories are housed in a varied array of facility types – from converted World War I buildings to recent architectural designs engaging energy efficiencies and alternative fuel sources. While some facilities are U.S. Government owned, most are operated under lease agreements through the General Services Administration. The regional laboratories are home to the core laboratory functions and related activities, special projects, field activity and mobile laboratory staging areas, and often other program activities of the region. Facilities management involves not only day-to-day oversight activities for proper maintenance but the planning, budgeting, and construction of needed modifications such as building expansions and upgrades of servicing equipment, and at times, the planning and construction of new laboratories. Because of constant attention to the supporting infrastructure, regional laboratories are able to provide outstanding scientific support to regional and national programs.

FACILITY INFRASTRUCTURE

Regional Laboratory System Annual Report - FY2002

- ★ The Region 1 Laboratory at Chelmsford, MA was occupied in September, 2001. During the period of the move, the laboratory maintained operational capability for all critical analytical methods (VOAs, BNAs, PEST/PCBs, Metals, and Field Chemistry). Where duplicate equipment was available, the laboratory insured that systems were up and operational at the new facility before shutting down equipment at the old laboratory. Within 2 months of the move, all systems were up and operational at the new laboratory.
- ★ The Region 5 Laboratory in Chicago, IL continued renovation with the completion of two more phases of the planned five phase upgrade; the administrative phase with new offices and the new wet chemistry laboratory. The organic laboratory renovation will begin in July 2003. About 60% of the renovation work planned for the regional facility has been completed.
- ★ A renovation of part of the Region 6 laboratory in Houston was completed allowing relocation of the off-site ESAT contract team to on-site space.
- ★ Progress of the new Regional Science and Technology Center in Kansas City, KS continued with completion expected in February 2003.
- ★ Construction continued on a new metal/microbiology wing and mechanical room expansion at Manchester, WA. At the end of FY2002, most of the structure was completed, piping installed and laboratory casework and fume hoods in place. The new wing will provide improved facilities for metals analysis and a new microbiology clean room suitable for DNA work. The space vacated by metals will be modified to relieve an overcrowded organics work area.



FUTURE CHALLENGES

Regional Laboratory System Annual Report - FY2002

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 represents a summary of those needs and challenges identified by the regional laboratories.



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, communications between clients, field staff and the laboratory, and minimize costs through full utilization of new technologies such as Laboratory Information Management Systems (LIMS) and the cross training of staff;
- ★ Address resource issues, future direction, and EPA involvement in the National Environmental Laboratory Accreditation Program (NELAP);
- ★ Expand participation in the environmental laboratory community through scientific papers and workgroups;
- ★ Assist ORD in field testing recently developed methods;
- ★ Develop a consistent long term laboratory resources support process for stability of core resources;
- ★ Assist in determining the role of regional laboratories in Homeland Security, participate in establishing an intergovernmental response network of environmental and health laboratories such as the Environmental Laboratory Response Network for Counter Terrorism (ELRN), and help develop analytical capabilities to meet mission needs and give appropriate analytical support;
- ★ Enhance the stature of the regional laboratory system as a valuable Agency asset by informing upper level management of the valuable work accomplished that is essential in meeting program goals;

FUTURE CHALLENGES

Regional Laboratory System Annual Report - FY2002



UNIQUE CHALLENGES

- ★ Develop analytical capabilities in diverse and specialized areas such as fish and plant tissue, PCB congeners in various matrices, polybrominated diphenyl ethers, 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 diffraction 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 new DNA-based techniques such as polymerase chain reaction to significantly improve our ability to detect and quantify parasites, bacteria and viruses in drinking water;
- ★ Develop a method for determining Aeromonas in drinking water by Membrane Filtration;
- ★ Develop the capability to speciate metals in waters and soils 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;
- ★ Analyze PCB congeners as well as low level PAHs and pharmaceuticals via high resolution GC/MS for ambient water and sediment quality determinations;
- ★ Develop GC/MS technology to routinely determine pesticides and PCBs instead of using it to just confirm GC/ECD results;
- ★ Develop low detection limits for selected analytical methods to meet program needs such as pesticides for TMDL efforts;
- ★ Develop capability for low level perchlorate analysis in drinking water to support Superfund investigations.



PROFILE OF EPA'S LABORATORIES NATIONWIDE

INTRODUCTION

The United States Environmental Protection Agency operates 27 laboratories in 10 regions and 22 states. EPA's Office of Administration and Resources Management (OARM) is chartered with managing these facilities on behalf of the Administrator and American taxpayers. The focus of this fact sheet is to highlight the locations, missions, and functions of EPA's Regional, and Program and Research Laboratories nationwide.

EPA has 10 regional laboratories located in Chelmsford, Massachusetts, Edison, New Jersey, Fort Meade, Maryland, Athens, Georgia, Chicago, Illinois, Houston, Texas, Kansas City, Kansas, Golden, Colorado, Richmond, California, and Manchester, Washington. EPA also has 9 Laboratories operated by the Office of Research and Development located in Narragansett, Rhode Island, Research Triangle Park, North Carolina, Chapel Hill, North Carolina, Athens, Georgia, Gulf Breeze, Florida, Duluth, Minnesota, Ada, Oklahoma, Las Vegas, Nevada, and Corvallis, Oregon. An additional 8 laboratories are operated by several EPA program offices, including the Office of Air and Radiation (Ann Arbor, Michigan, Montgomery, Alabama, and Las Vegas, Nevada), the Office of Prevention, Pesticides and Toxic Substances (Bay St. Louis, Mississippi, and Fort Meade, Maryland), the Office of Solid Waste and Emergency Response (Edison, New Jersey and Cincinnati, Ohio), and the Office of Enforcement and Compliance Assurance (Denver/Lakewood, Colorado).

Two major research centers in Research Triangle Park, North Carolina, and Cincinnati, Ohio, are operated by OARM and house elements from several program offices.

EPA REGIONAL LABORATORIES

Manchester, Washington Region 10 Laboratory

Specific areas of expertise include:

- ★ Arsenic Speciation
- ★ Fish Tissue Extraction and Cleanup
- ★ Polymerase Chain Reaction
- ★ X-Ray Diffractometry

Richmond, California Region 9 Laboratory

Specific areas of expertise include:

- ★ Scanning Electron Microscopy
- ★ Toxicity Testing Using West Coast Species
- ★ Pesticide Analysis by ELISA
- ★ Benthic Marine Taxonomic Identification

Golden, Colorado Region 8 Laboratory

Specific areas of expertise include:

- ★ Toxicity Testing
- ★ Total Metals by XRF
- ★ Field Sampling and Environmental Assessments
- ★ Macroinvertebrate Collection and Identification

Kansas City, Kansas Region 7 Laboratory

Specific areas of expertise include:

- ★ Low Level Dioxins and Furans
- ★ Ozone Precursors
- ★ Fish Tissue Analyses (Pesticides and Metals)
- ★ Whole Effluent Toxicity Testing

Chicago, Illinois Region 5 Laboratory

Specific areas of expertise include:

- ★ Endocrine Disruptors
- ★ Stream Habitat Bio-assessment
- ★ Hexavalent Chromium in Soil
- ★ Selenium Speciation in Water

Chelmsford, Massachusetts Region 1 Laboratory

Specific areas of expertise include:

- ★ Oil and Chemical Spill Response
- ★ Primary Lead Intervention and Research
- ★ Air Toxics-Polar Hydrocarbons
- ★ Passive Vapor Diffusion Monitoring

Edison, New Jersey Region 2 Laboratory

Specific areas of expertise include:

- ★ Air Toxics Analysis
- ★ PCB Congener-specific Analysis
- ★ Giardia and Cryptosporidium Analysis
- ★ Polyaromatic Hydrocarbon Analysis

Fort Meade, Maryland, Region 3 Laboratory

Specific areas of expertise include:

- ★ Marine and Benthic Invertebrate Taxonomy
- ★ Explosives Analysis
- ★ Nitroaromatics and Nitroamines
- ★ Diesel Range Organics

Houston, Texas Region 6 Laboratory

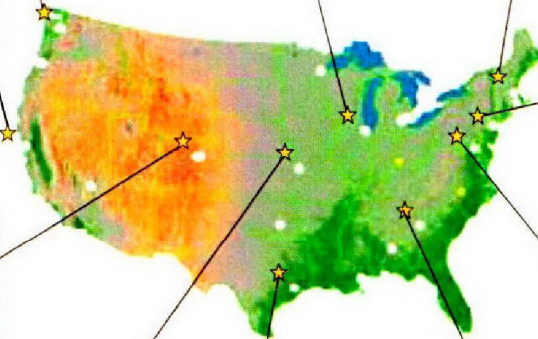
Specific areas of expertise include:

- ★ Abbreviated Microwave Extraction
- ★ Microextraction with Large Volume Injection
- ★ Solventless Extraction Techniques
- ★ Triazine Herbicides

Athens, Georgia, Region 4 Laboratory

Specific areas of expertise include:

- ★ Toxaphene Congeners
- ★ PCB Congeners
- ★ Natural Attenuation Analytes
- ★ Ultra-low Mercury Analysis



REGIONAL LABORATORIES

- ★ Conduct physical, biological, microbiological, and chemical (organic, inorganic) testing of environmental samples
- ★ Inspect State, local and commercial laboratories for compliance to Federal requirements
- ★ Provide analytical support, consultation and technical assistance to EPA Regional Programs, civil investigations, criminal investigations, sensitive enforcement activities, and emergency response actions
- ★ Provide consultation and technical assistance to other Federal, State, Tribal and local governmental and private laboratories

EPA ORD LABORATORIES

Duluth, Minnesota/Grosse Ile, Michigan

ORD Laboratory

- ▲ Emphasis on research in ecotoxicology and freshwater ecology to meet the information needs of EPA Programs and Regions
- ▲ Research on identifying impaired freshwater ecosystems and diagnosing the causes of degradation
- ▲ Freshwater ecology research has a focus on Great Lakes and Great Rivers
- ▲ Research to improve the basis for predicting toxicological responses across species and exposures to polluting chemicals
- ▲ Research contributes to improving predictions of chemical effects on population dynamics
- ▲ Research advances techniques for assessing relative risk and the interactions of chemical and non-chemical stressors on wildlife and aquatic life populations

Ada, Oklahoma

ORD Laboratory

- ▲ Develop and evaluate innovative methods to protect and restore the nation's groundwater supplies
- ▲ Conduct laboratory and field research to manage and restore aquatic ecosystems
- ▲ Conduct technical assistance and technology transfer activities to ensure that the most current knowledge is reflected in Agency actions to remediate the subsurface and restore ecosystems

Corvallis/Newport, Oregon

ORD Laboratory

- ▲ Develop monitoring tools for assessing the status and trends in condition of freshwater ecosystems (including streams, rivers, lakes, wetlands, and riparian areas)
- ▲ Determine effects of anthropogenic stressors on terrestrial plants and plant communities and on the structure and function of terrestrial habitats and habitat quality that support wildlife
- ▲ Study effects for anthropogenic stressors, especially habitat alteration, on the interaction between terrestrial systems and aquatic ecosystems
- ▲ Determine effects of natural and anthropogenic stressors on ecological resources of Pacific Coast Estuaries at multiple and temporal scales

Las Vegas, Nevada

ORD Laboratory

- ▲ Provide technical support for development and implementation of policy, guidance, programs, and regulations regarding radiation, indoor air quality, and emergency response

Gulf Breeze, Florida

ORD Laboratory

- ▲ One of four EPA laboratories devoted to marine, coastal, and estuarine water quality research, and ecological research
- ▲ This lab focuses on the Gulf of Mexico seaboard, coastal waters, and watersheds
- ▲ Conducts research on chemical, biological and physical dynamics of coastal systems, including wetlands, estuaries, and shore marine environments, to assess the ecological condition of the Gulf of Mexico

Narragansett, Rhode Island

ORD Laboratory

- ▲ Marine and estuarine ecology with focus on Atlantic Coast
- ▲ Ecological effects of nutrient loading and habitat alteration in estuarine systems
- ▲ Techniques for assessing relative risk and interaction of chemical and non-chemical stressors on wildlife and aquatic populations

Chapel Hill, North Carolina

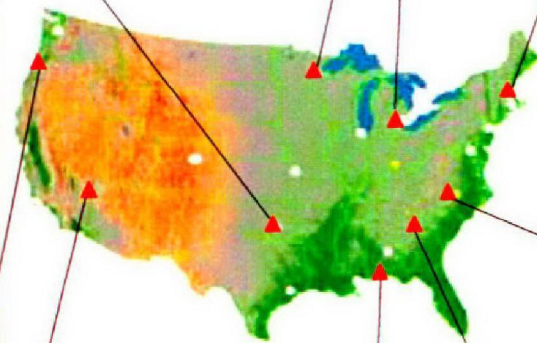
ORD Laboratory

- ▲ Study mechanism of particulate matter-induced alterations in cardiac physiology, cell and molecular biology
- ▲ Evaluate role of the environment in the transmission of infectious diseases
- ▲ Pollutant epidemiology
- ▲ Human clinical studies to assess the affects of air pollution on human health

Athens, Georgia

ORD Laboratory

- ▲ Conducts field and laboratory studies on environmental stressors such as organic and inorganic chemicals, greenhouse gases and land use perturbations
- ▲ Develops comprehensive models based on fundamental studies of stressor behavior to predict exposures in multimedia environments
- ▲ Tests, applies, and provides technical support for exposure and ecosystem response models
- ▲ Houses EPA's Center for Exposure Assessment Modeling (CEAM), a distribution center for exposure models and databases



ORD LABORATORIES

- ▲ Perform research and development to identify, understand, and solve current and future environmental problems
- ▲ Provide responsive technical support to EPA's mission
- ▲ Integrate the work of ORD's scientific partners (other agencies, nations, private sector, organizations, and academia)
- ▲ Provide leadership in addressing emerging environmental issues and in advancing the science and technology of risk assessment and risk management

PROGRAM LABORATORIES & RESEARCH CENTERS

Cincinnati, Ohio

ORD, OSWER, OW Laboratory

- Develops primary and secondary drinking water standards
- Develops suites of biological indicators to describe the conditions of watershed ecosystems
- Advances the scientific understanding of environmental problems that threaten human health and the environment
- Conducts research to measure, characterize, and predict the exposure of humans to chemical and microbial hazards
- Performs research on environmental contaminants that are transported in various pathways, including air, food, soil, and water
- Conducts bioremediation and pollution prevention studies
- Facilitates emergency response training
- National resource center for the overall process of human health and ecological risk assessments

Denver/Lakewood, Colorado

OECA, NEIC Laboratory

- Provide facilities, equipment, personnel, and expertise needed for measurement activities, data evaluation, and investigations conducted to support civil and criminal environmental enforcement efforts
- Conduct specialized analytical techniques for evidentiary samples related to forensics

Las Vegas, Nevada

OAR, ORD Laboratory

- Provide technical support for development and implementation of policy, guidance, programs, and regulations regarding radiation, indoor air quality, and emergency response
- Conduct research, development, and transfer programs on environmental exposures to ecological and human receptors

Montgomery, Alabama

OAR Laboratory

- Monitor radiation in the nation's environment by operating a nationwide network of sampling stations
- Perform radiochemical and mixed waste analyses to support EPA policy, guidance, programs, and regulations regarding radiation
- Maintain readiness to respond to national radiological emergencies—including national monitoring support to emergencies
- Non-radiological quality assurance support to national monitoring of fine particles in ambient air

Bay St. Louis, Mississippi

OPPTS Laboratory

- Evaluates pesticide environmental chemistry methods for registration and re-registration
- Develops new multi-analyte methods
- Evaluates new emerging technologies
- Provides dioxin analysis to the Agency
- Provides training and quality assurance support to State FIFRA laboratories

Research Triangle Park, NC

ORD/OAR Laboratory

- Perform pharmacokinetics research
- Examine pulmonary, immunological, cardiovascular, and toxicity resulting from contaminants
- Evaluate the effects of physical and chemical agents on the nervous system
- Conduct clinical epidemiological investigations to better understand human response to pollution
- Perform air pollution meteorological research
- Conduct research and development, and evaluation of air pollution control technologies
- Study the effects of environmental contamination on reproduction
- Evaluate the relations between environmental pollution and cancer

Ann Arbor, Michigan

OAR Laboratory

- National Resource for vehicle, fuels and emissions testing
- Advances and promotes clean fuels and automotive technologies
- Develops regulatory standards for motor vehicles, engines and fuels
- Develops voluntary programs that reduce the amount of pollutants emitted, and vehicle miles traveled

Edison, New Jersey

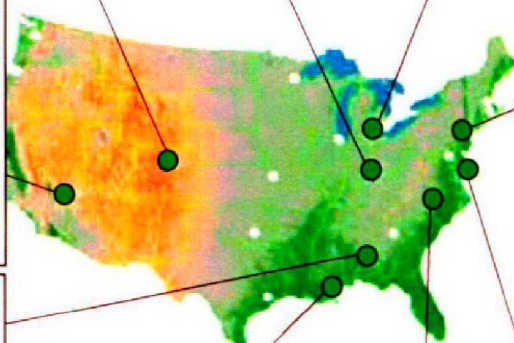
OSWER, ORD Laboratory

- Identifies and assesses immediate environmental problems, including fires, chemical spills and illegal uses of pesticides, for all EPA regions
- Provides training on oil and hazardous materials releases and response
- Conducts research on urban wet weather flows from storm, sanitary, and combined sewer systems, including volume, nutrients, pathogens, toxins, and sediments
- Examines the risks posed by the nation's deteriorating drinking water and wastewater infrastructure

Fort Meade, Maryland

OPPTS Laboratory

- Evaluates/validates analytical methods for testing pesticide products and monitoring pesticide residues in feeds/foods
- Develops new multi-residue chemistry methods
- Maintains National Pesticide Standards Repository
- Conducts product performance testing of EPA registered hospital disinfectants and tuberculocides
- Determines efficacy of sporicidal products for building remediation
- Validates DNA and protein detection methods for plant incorporated protectants (PIP)



OTHER EPA PROGRAM LABORATORIES & RESEARCH CENTERS

- Ensure compliance with the nation's environmental laws using an integrated approach of compliance assistance, compliance incentives, and innovative civil and criminal enforcement
- Develop national programs, technical policies, and regulations for controlling air pollution and radiation exposure
- Promote pollution prevention and the public's right-to-know about chemical risks

For more information on EPA's Regional or Program and Research Laboratories, please feel free to access our web address at <http://epa.gov/> and conduct a search under specific regional or program and research offices.

CENTERS OF APPLIED SCIENCE

**Annual Report
Fiscal Year 2002**

**Regional Laboratory System Annual Report
Appendix I**

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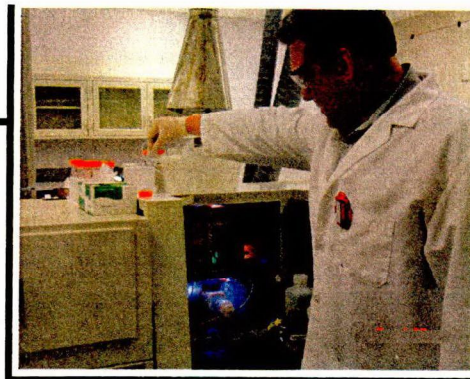
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ENVIRONMENTAL CHEMISTRY

★ Speciation of Fine Particulate Matter in Air by SEM/EDX

(Region 9) - Laboratory staff attended an intensive one week training at Lehigh University's annual Microscopy School. In addition, the laboratory began development of calibration protocols for the Scanning Electron Microscope and the Energy Dispersive X-ray Detector and collected PM_{2.5} samples on alternate filter media to determine the best collection mechanism for this analysis.

Contact: Barbara Bates - (510) 412-2325

★ Arsenic by Hydride Generation (Region 10): Methodology developed by a Region 10 chemist in Cincinnati was adapted to regional instrumentation. Required equipment modifications have been made and the membrane has been acquired from NERL, Cincinnati. All components of the system have been assembled and made ready for chemical system optimization. Initially, the intention was to use the method with high dissolved solids matrices such as sewerage. However, because of the difficulty of having to manufacture the membrane on site, and the promise of DRC-ICP/MS technology, it is unlikely that the hydride method will be offered as a routine analysis.

Contacts: Isa Chamberlain - (360) 871-8706

Katie Adams - (360) 871-8748

★ PCB Congeners (Region 2) - An instrument method based in part on EPA Method 1668A for the High Resolution GC/MS was completed. In spite of numerous hardware and software problems with the instrument, the method will detect nearly 100 PCB Congeners, including the thirteen toxic PCB congeners as defined by the World Health Organization, in water, sediment and tissue samples. An Initial Demonstration of Capability (IDC) for water samples using the baseline instrument method is scheduled for FY 2003.

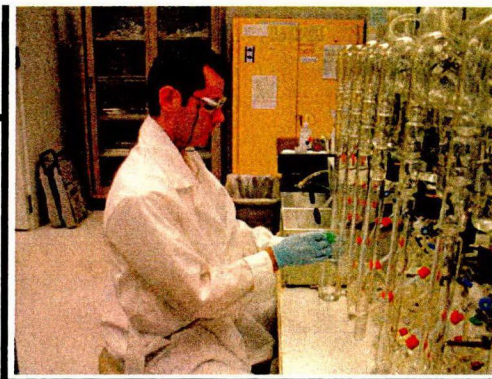
Contact: Phil Cocuzza - (732) 321-6659

★ PCB Congeners (Region 10) - Protocol for analysis of PCB congeners in various matrices using GC/ECD was completed and tested. Twenty-one contaminated marine sediment samples were analyzed for 45 PCB congeners including the toxic coplanars #77, #81, #126 and #169 incorporating Florosil, mercury and sulfuric acid cleanup procedures. The method produced acceptable precision with method detection limits between 3.5 and 6 parts per trillion for the coplanar congeners.

PROGRESS REPORTS ON ONGOING CAS PROJECTS

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Technology Transfer: A presentation was made at the LTIG Conference in Athens, GA. The technique has been peer reviewed and accepted for publication in a professional journal. The protocol has been submitted to the SW-846 organics work group for incorporation into existing methods.



Contact: Steve Reimer - (360) 871-8718

- ★ **Explosives (Region 3):** To expand the role of HPLC, work has begun to establish capability for analysis of TCLP herbicides. Both HPLC and HPLC/MS have been used to assist EPA's Criminal Investigation Division and other EPA Branches with special analytical requests. Funding was recently obtained through ORD's Regional Methods Initiative to develop HPLC methods to separate and fractionate nonylphenol isomers.

Contact: Jennifer Gundersen - (410) 305-2835

- ★ **Arsenic Speciation (Region 10):** Visits from the ORD scientist working on the project and a software expert for TotalChrom® from Perkin Elmer assisted in completing the transfer of the chromatography steps to regional instrumentation and staff. Region 10 scientists then experimented with kumamoto oysters, manila clams and ribbon kelp. ORD later found that extraction efficiencies for the various arsenic species were sub-optimal across the target range of seafood sample types (fin fish, shellfish and seaweed). ORD has since determined that a manual extraction with tetramethyl ammonium hydroxide generates the best results across all seafood types. Validation of the method using butter clams is underway. Once validated, the method will be published.

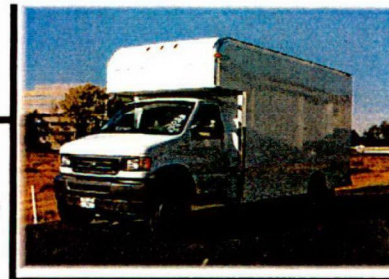
Contacts: Stephanie Le - (360) 871-8715

- ★ **Endocrine Disruptors (Region 5):** Methods for the analysis of alkylphenols in water and sediment developed in Region 5 were used to determine their presence and fate in sediment and water throughout the Chicago Area. Nonylphenol, Nonylphenol monoethoxylate, Nonylphenol diethoxylate, bisphenol A and Octylphenol were detected in sediment samples by GC/MS, full scan, and in water samples by GC/MS, Selected Ion Monitoring technique using high volume injection. Analyses were also performed in support of USDA concerns about frog populations in North Dakota and agricultural runoff in Southern California. The methods were shared with the Metropolitan Water Reclamation District of Greater Chicago, Environmental Labs and ORD. A collaboration with ASTM has been established to agree on an acceptable ASTM validated method for the analysis of these compounds. Further method development is underway.

Contacts: Babu Paruchuri - (312) 353-3646
Larry Zintek - (312) 886-3894

PROGRESS REPORTS ON ONGOING CAS PROJECTS

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- ★ X-ray Diffractometry (Region IO): Evaluation of portable X-ray fluorescence (XRF) sensitivity for metals in X-ray diffraction (XRD) specimens was continued as part of an effort to incorporate XRF analysis into the Region IO XRD method. Complementary XRF analysis allows timely screening of samples for those with the most relevant contaminant concentrations, provides an aid in phase identification, and gives an indication of element substitution in non-ideal minerals. As another complementary tool for mineralogical analysis, analytical scanning electron microscopy by means of remote operation of an SEM via the internet was demonstrated using Region IO air-particulate and mine-waste samples and is being evaluated for an operational connection between Manchester and an SEM laboratory at ORD-NERL.

Technology Transfer: Presentations were made to the Northwest Chapter of AOAC International and the 2002 LTIG Conference in Athens, GA.

Contact: David Frank - (360) 871-8708

- ★ Primary Lead Intervention Research and Support (Region I): 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 I 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 lead 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.

Technology Transfer: Presentations entitled Evaluating the Effectiveness of Low Cost Landscaping to Reduce Residential Soil Lead Hazards, and Low Level Soil Lead Intervention were delivered at the American Industrial Hygiene Conference and Exposition in June 2002. Lead Safe Yards: A Program for Improving Health in Urban Neighborhoods was published in the Journal of Urban Technology, Volume 9, Number 2, pages 71-91, August 2002.

Contact: Paul Carroll - (781) 860-4631

- ★ Polybrominated Diphenyl Ethers (Region IO): Additional PBDE congeners were added to the method.

Technology Transfer: The technique has been submitted to the SW-846 organics work group for incorporation into existing methods. A technical paper is being prepared for publication in a professional journal.

Contact: Steve Reimer - (360) 871-8718

PROGRESS REPORTS ON ONGOING CAS PROJECTS

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- ★ **Passive Vapor Diffusion Monitoring (Region I):** The guidance document describing passive vapor diffusion monitoring was completed. With the publication of the guidance document, cited below, this CAS has become a routine capability within EPA New England.

Technology Transfer: Guidance on the Use of Passive-Vapor-Diffusion Samplers to Detect Volatile Organic Compounds in Ground-Water-Discharge Areas, and Example Applications in New England was published as Water-Resources Investigations Report 02-4186, USGS/EPA, 2002.

Contacts: Scott Clifford (testing) - (781) 860-4631
Jerry Keefe (sampling) - (781) 860-4376

- ★ **Pulp Mill Effluents (Region IO):** Changes in pulp mill bleaching processes resulting from regulatory restrictions leave pulp mill effluents largely uncharacterized. This project is designed to identify environmental contaminants from modern pulp mill effluent. A review of the literature has been conducted. A Time-of-Flight GC/MS instrument expected to be more capable of resolving the highly complex mixtures of organic compounds expected from the mill effluent has been brought on-line. Samples for a preliminary scan of organic components from a pulp mill using a chlorine dioxide bleaching sequence are planned for the second quarter of FY2003.

Contact: Peggy Knight - (360) 871-8713

ENVIRONMENTAL MICROBIOLOGY

- ★ **Polymerase Chain Reaction Capability for Protozoans (Region IO) -** *Cyclospora cayantensis* oocysts have been acquired for use in development of this technological capability in the regional laboratory. Work has moved away from the use of a surrogate organism; instead *Cyclospora cayantensis* is being used, as its availability for research is currently better. New equipment has been obtained for use in PCR and will now provide the analysts with "real time" results. Work is underway using a technology which combines filtration with DNA purification and isolation which will dramatically increase the speed and efficiency of the method. The PCR facility in the new wing at the Manchester Laboratory will improve our ability to ensure the purity and accuracy of the results.

Contact: Stephanie Harris, D.V.M. - (360) 871-8710

PROGRESS REPORTS ON ONGOING CAS PROJECTS

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ANALYTICAL POLLUTION PREVENTION

- ★ Abbreviated Microwave Extraction (Region 6) - Initial Demonstration of Capability and Method Detection Limit studies were completed for semi-volatile extractions using the Mars X microwave system from CEM. Parallel testing of this technique on pesticide and semi-volatile extraction of solid samples with more traditional methods is being performed. This procedure uses only 1/5 to 1/3 the amount of extraction solvent when compared to the automated soxhlet extraction process.

Contacts: Meredith Clarage - (281) 983-2129
David Spencer - (281) 983-2125
Diane Gregg - (281) 983-2120
Rick McMillin - (281) 983-2107

- ★ Microextractions with Large Volume Injection (Region 6): The laboratory has developed methods for the analysis of semi-volatiles by LVI using inlets from several manufacturers. Working with Horizon Technology, the laboratory has developed a micro-extraction procedure for semivolatiles using a 40 ml sample size. Two other Regional Laboratories have volunteered to test the SPE procedure for extracting Semi-volatiles.

Technology Transfer: A seminar was given at the 18th Annual WTQA Symposium in 2002 on combining SPE and LVI. Also, data for this project were presented at the 18th Annual WTQA symposium and the 12th Annual Region 6 QA Conference.

Contacts: Diane Gregg - (281) 983-2120
Rick McMillin - (281) 983-2107

- ★ Solventless Extraction (Region 6): There has been little progress on this procedure due to sample load. Testing to date has been limited to semi-volatile analytes from DI water. The laboratory has purchased a second thermal desorber unit to be installed in the mobile laboratory. This unit will be used to screen for VOCs and SVOCs in a single analysis.

Contacts: Barbara Schuppener - (281) 983-2117
Nghia (Neal) Nguyen - (281) 983-2175
Diane Gregg - (281) 983-2120
Rick McMillin - (281) 983-2107

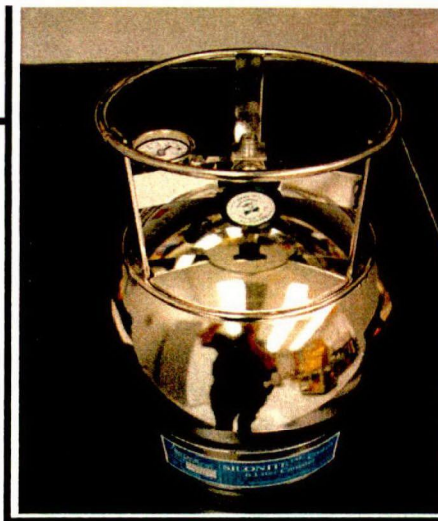
PROGRESS REPORTS ON ONGOING CAS PROJECTS

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AMBIENT AIR MONITORING

- ★ Polar Hydrocarbon Compounds (Region 1) - Work has been completed to optimize the method. Detection limits have been lowered to 50 ppt for all TO-15 compounds. The SOP has been modified to include polar compounds of interest (MIBK, MEK, MTBE).

Contacts: Dan Boudreau (testing) - (780) 860-4340
Pete Kahn (sampling) - (780) 860-4392



- ★ Polar Hydrocarbon Compounds (Region 2) - During FY2002, all appropriate analytical standards were procured. Further development work was delayed due to the World Trade Center attack of 2001, and the subsequent reassignment of duties. Method development will commence in FY2003 and is expected to be completed in FY2004.

Contact: Avi Teitz - (732) 906-6160

ENVIRONMENTAL BIOLOGY

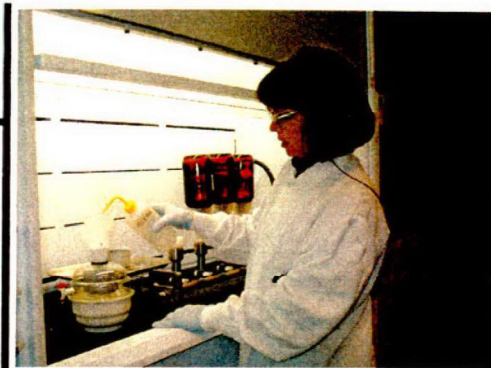
- ★ Marine and Estuarine Benthic Invertebrate Taxonomy (Region 3) - The capability has been applied to several projects with further improvements to QC procedures. Bethany Beach and Ocean City samples have been completed, except for the work of external collaborators. A technical paper is planned for this effort. Work on NASA's Andros Island project continues. Annual QC review of Maryland Dept. of the Environment (MDE) estuarine taxonomy planned for spring with additional training of MDE taxonomists to follow. Internal QC developments include new form to document justifications of reference specimen identifications, and first external review of a reference specimen collection.

Contact: David Russell - (410) 305-2656

ESTABLISHED CENTER CAPABILITIES

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ENVIRONMENTAL CHEMISTRY



- ★ **Dioxin/Furan Analysis** - EPA has classified 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) as a potent animal carcinogen and a possible human carcinogen. TCDD has been found in numerous sites across the country and is one of the most dangerous environmental contaminants that EPA is addressing. Detecting dioxins and furans requires a high resolution mass spectrometer and the requisite training. Methods have been developed to analyze for dioxin/furan in various types of environmental samples including water, soil, sediment, air PUF, fish tissue, and hazardous waste. Samples are prepared in a partial containment laboratory designed to handle hazardous samples in order to protect laboratory personnel from exposure.

Contact:

❖ Laura Webb (R7) - (913) 551-5120

- ★ **PCB Congeners** - PCB analysis has traditionally been performed by Arochlor, the grouping of PCB congeners by PCB product description. As our understanding of PCB configuration and 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, demonstrating toxicities as great or greater than dioxin. Several regional laboratories are capable of detecting PCB congeners.

Contacts:

❖ Lavon Revells (R4) - (706) 355-8840 (GC)①②; ❖ Bob Rieck (R10) - (360) 871-8719 (GC/ECD)⑤

① Water

② Soil/sediment

③ Tissue

④ Drum

⑤ All

- ★ **Fish Tissue Extraction and Cleanup** - Fish and shellfish are widely consumed in the Pacific Northwest. Many indigenous and immigrant cultures consume far more of these foods than the balance of the population and far more than what human risk models suggest. As a consequence, these populations may be receiving excessive exposures to organic and metals contaminants. Regional scientists have developed unified digestion, extraction and analytical techniques for fish tissue that permit substantially improved detection limits for a much broader array of analytes than previous techniques provided, allowing more accurate determination of population risk and environmental contamination.

Contact:

❖ Joe Blazeovich (R10) - (360) 871-8705

- ★ **Trace Metals Analysis** - Adverse impacts of human and environmental exposures to trace metals are driving the need to detect these contaminants at ever lower levels. The regional laboratory is participating in several efforts to better detect and quantify trace metals contamination: speciating between different forms of arsenic to determine the hazard of the exposure and the best mitigation techniques, assisting the Office of Science and Technology to determine better procedures for determining Method Detection Limits to better characterize environmental data, and exploring

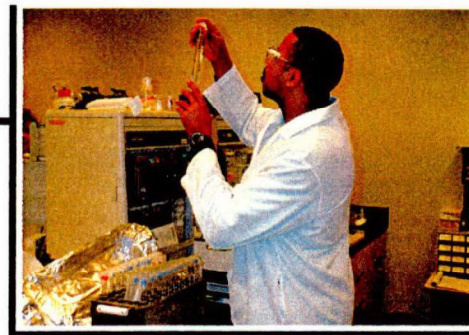
ESTABLISHED CENTER CAPABILITIES

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new detection systems, like ICP/MS/DRC, capable of achieving the lower detection limits required.

Contact:

❖ Isa Chamberlain (R10) - (360) 871-8706



- ★ **X-ray Diffractometry** - 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, conventional methods are not good at evaluating the interaction of the compound 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. X-ray diffractometry enables compound identification and provides an added mineralogical tool for characterizing pollutants and assessing their fate and transport.

Contact:

❖ David Frank (R10) - (360) 871-8708

- ★ **Polybrominated Diphenyl Ethers (PBDEs)** - PBDE contamination is an emerging concern in the United States. PBDEs found in Bromkal 70-5DE, a common fire retardant in foam pads and children's clothing, are finding their way into the environment including fish species taken from the Columbia River basin. Structurally similar to PCBs, their health effects may also be similar. The Regional laboratory used eleven congeners found both in Columbia River basin fish and Bromkal 70-5DE to determine Florisil elution patterns, GC retention times, and MDLs. Armed with this information the Regional Laboratory developed a method to separate, isolate, concentrate, detect, and quantify PBDE congeners using state-of-the-art instrumentation.

Contact:

❖ Steve Reimer (R10) - (360) 871-8718

- ★ **Toxaphene Congeners** - Weathering of toxaphene in the environment complicates the detection of the compound for site cleanup purposes. Further, congeners of toxaphene likely have different toxicities, which may be significant when determining exposure risk and cleanup strategies. Although current risk assessment and toxicological data are defined using the entire toxaphene mixture, like PCBs, toxaphene congeners may become required elements in analyzing site impacts. Methods have been developed that can determine 18 of 22 toxaphene congeners in environmental samples.

Contact:

❖ Lavon Revells (R4) - (706) 355-8840

- ★ **Passive Vapor Diffusion Monitoring**: 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

ESTABLISHED CENTER CAPABILITIES

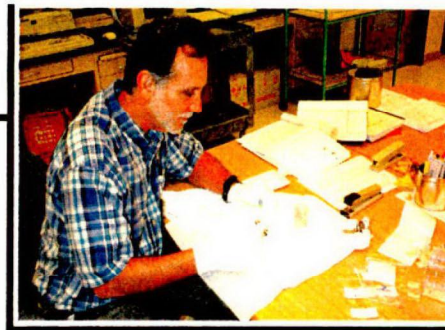
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contaminated with volatile organic compounds into surface water, delineate the extent of contamination, and define concentration gradients within the contamination plume. Passive vapor diffusion monitors provide a low cost simple technique to locate volatile organic plume discharges into rivers, lakes, water supplies, and tidal areas. 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.

Contact:

❖ Scott Clifford (testing) (R1) - (781) 860-4631

❖ Jerry Keefe (sampling) (R1) - (781) 860-4376



ENVIRONMENTAL MICROBIOLOGY

- ★ **Parasites in Drinking Water** - Untreated or under-treated drinking water systems can expose the population served to two particularly onerous intestinal parasites, *Giardia* and *Cryptosporidium*. Almost eight years ago, the city of Milwaukee, WI suffered through an outbreak of *Cryptosporidium* that sickened several hundred thousand people, killing over 50 immuno-compromised individuals. The ability to detect these parasites in source water and determine the effectiveness of drinking water filtration systems is critical to EPA's responsibility to insure the quality of the public's drinking water supply. Two regional laboratories are proficient at *Giardia* and *Cryptosporidium* analysis and one CAS project is devoted to finding a more efficient methodology than that currently available.

Contacts:

❖ Stephanie Harris (R10) - (360)871-8710

❖ Irwin Katz (R2) - (732)321-6725

- ★ **Groundwaters Under Direct Influence of Surface Waters: Microscopic Particulate Analysis (MPA)**, developed at the Region 10 laboratory, is used nationally to assist water utilities and primacy agencies in determination of ground waters under direct influence of surface water microorganism contaminants. Water sources that are designated as being "Under Direct Surface Influence" must either meet stringent requirements to remain unfiltered or install a treatment system to improve the water quality. Assistance has provided to states, utilities, tribal governments and military installations in the form of training, inspections, analytical and technical assistance to help with this determination.

Contact:

❖ Stephanie Harris (R10) - (360)871-8710

ANALYTICAL POLLUTION PREVENTION

- ★ **Abbreviated Microwave Extraction**: Microwave extraction of non-volatile analytes from solid samples has been in use for many years. The abbreviated technique developed in the Region 6 laboratory is a slight modification of current microwave methodology where the concentration

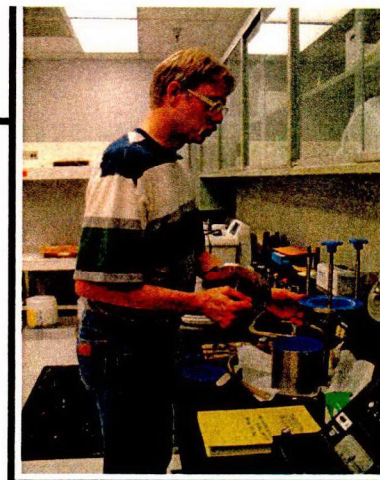
ESTABLISHED CENTER CAPABILITIES

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step is removed or reduced. A 10 g solid sample is extracted with 10-15 ml of solvent and dried. The extract can be analyzed without further concentration by GC-ECD or by GC/MS with LVI to achieve adequate sensitivity. If lower detection limits are required, the extract can be concentrated down to 0.5 ml. This procedure is quick and significantly reduces the amount of solvent required to extract solid samples.

Contact:

❖David Spencer (R6) - (281) 983-2125



- ★ Microextractions with Large Volume Injection (ME-LVI): Coupling microextractions with LVI has far ranging pollution prevention possibilities that affect many areas, including sample collection, sample preparation and waste disposal. LVI technology allows for the reduction in the amount of sample prepared because more of the extract is injected into the analytical system. This reduces the amount of sample that needs to be collected and shipped to laboratories. For example, semi-volatile samples could be collected in 40 ml VOA vials instead of 1 liter jars. Less solvent is also used to extract samples. Using ME-LVI can significantly reduce the cost for disposing of used sample jars, hazardous samples and spent solvents. Several methods of extraction are being investigated to couple with LVI, including SPE. If sample representativeness is an issue for solid samples, a routine sample size may be extracted with a low solvent usage method and coupled with LVI to achieve needed sensitivity (see Abbreviated Microwave Extraction).

Contact:

❖Diane Gregg (R6) - (281) 983-2120

AMBIENT AIR MONITORING

- ★ Polar Hydrocarbon Compounds: Methodologies for ambient air analysis have been limited by both the range of compounds they address as well as the detection limits that the methods can achieve. Optimize 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, quadrupole 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 have not included polar compounds seen in ambient samples. TO-15 methodology for ion trap MS has been optimized enabling quantitation into the part per trillion range and expanding the target list to include polar compounds. Optimizing ambient air methodologies will result in more effective air toxics monitoring networks.

Contact:

❖Dan Boudreau (testing) (R1) - (780) 860-4340

❖Pete Kahn (sampling)(R1) - (780) 860-4392

ESTABLISHED CENTER CAPABILITIES

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ENVIRONMENTAL BIOLOGY

★ Marine/Estuarine Benthic Invertebrate Taxonomy:

The processing of benthic samples and identification of benthic invertebrates is an essential part of monitoring the health of estuaries and coastal waters. Invertebrates in marine and estuarine samples are removed, sorted, and identified. Identifications are made to the lowest possible taxon using stereomicroscopes, fiber optic illuminators, and a compound microscope with phase contrast optics. An extensive collection of taxonomic literature is searched by computer for author, title, keyword, or taxon, including the species specific binomen. In addition, the laboratory contains the electronic version of Zoological Record, a bibliography of zoological literature updated annual. Voucher or reference collections are established for each project and reviewed by outside consultants. A training center with additional stereomicroscopes, additional fiber optic illuminators, and a stereomicroscope mounted with a video camera/monitor system is used to train state biologists. State programs are supported by performing quality control identification checks and counts on a randomly selected subset of samples.

Contact:

❖David Russell (R3) - (410) 305-2656



REGIONAL LABORATORIES CORE CAPABILITIES

**Annual Report
Fiscal Year 2002**

**Regional Laboratory System Annual Report
Appendix 2**

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EPA REGIONAL LABORATORIES CORE CAPABILITIES SUMMARY

ANALYTE/GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	REGIONAL CAPABILITY									
INORGANIC CHEMISTRY:			1	2	3	4	5	6	7	8	9	10
Acidity	Water	Titrimetric	X	X	X	X	X		X	X		X
Alkalinity	Water	Titrimetric	X	X	X	X	X	X	X	X	X	X
Asbestos	Solids/Bulk Material	PLM		X			X		X		X	
	Soil/Sediment	PLM	X									X
Chloride	Water	Colorimetric										
	Water	IC	X	X	X	X	X	X		X	X	X
	Water	Titrimetric		X		X			X			
Chromium, Hexavalent (+6)	Water	Colorimetric	X	X	X	X		X	X		X	X
	Soil/Sediment	"			X	X			X			X
	Water	IC			X		X					
	Soil/Sediment	IC			X		X					
Cyanide, Amenable	Water	Colorimetric	X	X		X	X	X	X	X	X	X
	Soil/Sediment	"	X	X		X		X	X	X		X
Cyanide, Total	Water	Colorimetric	X	X	X	X	X	X	X	X	X	X
	Soil/Sediment	"	X	X	X	X	X	X	X	X	X	X
	Waste	"	X	X	X	X	X	X		X		X

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EPA REGIONAL LABORATORIES CORE CAPABILITIES SUMMARY

ANALYTE/GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	REGIONAL CAPABILITY									
INORGANIC CHEMISTRY:			1	2	3	4	5	6	7	8	9	10
Fluoride	Water	ISE	X	X		X	X		X	X	X	
	Water	IC	X	X	X	X	X	X		X	X	X
Hardness	Water	Colorimetric										X
	Water	Titrimetric				X		X			X	X
	Water	ICP/Calculation	X	X	X	X	X	X	X	X	X	X
Mercury, Total	Water	CVAA	X	X	X	X	X	X	X	X	X	X
	Soil/Sediment	CVAA	X	X	X	X	X	X	X	X	X	X
	Tissue (fish and/or plant)	CVAA	X	X	X	X		X	X	X	X	X
	Waste (oil, drum, etc.)	CVAA	X	X	X	X	X	X	X		X	X
Mercury (TCLP)	Soil/Waste (oil, drum, etc.)	CVAA	X	X	X	X	X	X	X	X	X	X
Metals, Total	Water	ICP/AES	X	X	X	X	X	X	X	X	X	X
	Soil/Sediment	ICP/AES	X	X	X	X	X	X	X	X	X	X
	Tissue (fish and/or plant)	ICP/AES	X	X	X	X		X	X		X	X
	Waste (oil, drum, etc.)	ICP/AES	X	X	X	X	X	X	X		X	X
Metals (TCLP)	Soil/Waste (oil, drum, etc.)	ICP/AES	X	X	X	X	X	X	X	X	X	X
Metals, Total	Water	GFAA		X	X	X	X	X	X	X	X	X
	Soil/Sediment	GFAA		X	X	X	X	X	X	X	X	X

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EPA REGIONAL LABORATORIES CORE CAPABILITIES SUMMARY

ANALYTE/GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	REGIONAL CAPABILITY									
INORGANIC CHEMISTRY:			1	2	3	4	5	6	7	8	9	10
Metals, Total	Tissue (fish and/or plant)	GFAA		X	X	X		X	X	X	X	X
	Waste (oil, drum, etc.)	GFAA		X	X	X	X	X	X	X	X	X
Metals (TCLP)	Soil/Waste (oil, drum, etc.)	GFAA		X	X	X	X	X	X	X	X	X
Metals, Total	Water	ICP/MS	X	X	X	X		X		X	X	X
	Soil Sediment	ICP/MS	X	X	X	X				X		
	Tissue (fish and/or plant)	ICP/MS			X	X		X		X		X
	Waste (oil, drum, etc.)	ICP/MS			X	X				X		
Metals (TCLP)	Soil/Waste (oil, drum, etc.)	ICP/MS		X		X				X		
Nitrogen (Ammonia)	Water	Colorimetric		X	X	X	X	X	X	X	X	X
	Soil/Sediment	"		X	X	X	X		X	X		X
	Water	Electrode	X							X		
	Soil/Sediment	"								X		
Nitrogen (NO ₃ &/or NO ₂)	Ambient Air	Colorimetric				X			X			
	Water	"		X		X	X		X	X		X
	Soil	"				X	X			X		X
	Soil	IC			X		X			X	X	
	Water	IC					X	X				

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EPA REGIONAL LABORATORIES CORE CAPABILITIES SUMMARY

ANALYTE/GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	REGIONAL CAPABILITY									
Nitrogen, Total Kjeldahl	Water	Colorimetric		X	X	X	X	X	X	X	X	X
INORGANIC CHEMISTRY:												
	Soil	"		X	X	X	X	X	X	X		X
Phosphorous, Ortho	Water	Colorimetric		X		X			X	X		X
	Water	IC	X	X	X	X	X	X		X	X	X
Phosphorous, Total	Water	Colorimetric	X	X	X	X	X	X	X	X	X	X
	Soil	"			X	X	X			X		X
Sulfate	Water	Colorimetric							X	X		
	Soil	"							X	X		
	Water	IC, Turbidimetric	X	X	X (IC)	X	X	X		X (IC)	X	X
	Soil	"			X (IC)	X	X			X	X	
Sulfide	Water	Colorimetric		X	X	X	X		X			X
	Soil	"				X	X		X			
	Water	IC, Turbidimetric			X			X				
	Water	Titrimetric		X			X			X	X	X
	Soil	"								X		

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EPA REGIONAL LABORATORIES CORE CAPABILITIES SUMMARY

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

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EPA REGIONAL LABORATORIES CORE CAPABILITIES SUMMARY

ANALYTE/GROUP NAME	SAMPLE MEDIA	ANALYTICAL TECHNIQUE	REGIONAL CAPABILITY									
BIOLOGY/MICROBIOLOGY:			1	2	3	4	5	6	7	8	9	10
Chlorophyll	Water	Various	X	X		X			X	X	X	
Coliform, Total	Water, Soil &/or Sludge	“	X	X	X		X	X		X	X	X
Coliform, Fecal	Water, Soil &/or Sludge	“	X	X	X		X	X		X	X	X
E.coli	Water, Soil &/or Sludge	“	X	X	X			X		X	X	X
Toxicity (Acute & Chronic)	Water	Fathead, Ceriodaphnia	X	X	X	X	X	X	X	X	X	

ORGANIC CHEMISTRY:			1	2	3	4	5	6	7	8	9	10
BNA	Water	GC/MS	X	X	X	X	X	X	X	X	X	X
	Soil/Sediment	“	X	X	X	X	X	X	X	X	X	X
	Waste (oil, drum, etc.)	“	X	X	X	X		X	X	X	X	X
	Tissue (fish and/or plant)	“			X	X			X	X		X
BNA (TCLP)	Solid/Waste	GC/MS	X	X	X	X	X	X	X	X	X	X
BNA (TPH)	Water	GC/MS or GC			X	X			X	X	X	X
	Soil/Sediment	“			X	X			X	X	X	X
BOD	Water	Membrane Electrode	X	X	X	X	X	X	X	X	X	X
COD	Water	Photometric						X	X			
	Water	Colorimetric		X	X	X	X			X		

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ORGANIC CHEMISTRY:			1	2	3	4	5	6	7	8	9	10
	Air	"	X		X	X			X			X
	Tissue (fish and/or plant)	"	X			X			X			X
	Waste (oil, drum, etc.)	"	X	X	X	X		X	X	X		X
TOC	Water	Combustion/IR	X	X	X		X		X	X	X	
	Soil	"	X	X	X		X		X	X	X	
TOC	Water	Combustion/ Oxidation			X	X						X
	Water	UV/Persulfate						X		X		
VOA	Water	GC/MS	X	X	X	X	X	X	X	X	X	X
	Soil/Sediment	"	X	X	X	X	X	X	X	X	X	X
	Air	"	X	X	X	X		X	X		X	X
	Waste (oil, drum, etc.)	"	X	X	X	X		X	X	X	X	X
	Water	GC				X				X		X
	Soil/Sediment	"				X				X		X
	Waste(oil, drum, etc.)	"	X			X				X		X
VOA (TCLP)	Solid/Waste	GC/MS	X	X	X	X	X	X	X	X		X
VOA (TPH)	Water	GC/MS or GC				X			X	X	X	X
	Soil/Sediment	"				X			X	X	X	X