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National Water Quality Laboratory

Annual Report

Fiscal Years 2001 and 2002

Open-File Report 03-14

WATER LOGS

National Water Quality Laboratory Newsletter

Volume 11 • Number 2 • April 2003

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SAMPLING AT THE FEDERAL CENTER—CH2M-HILL is under contract with the General Services Administration (GSA) to drill some 200 monitoring wells for water and soil samples at the Denver Federal Center (DFC). The sampling is mandated by the Colorado Department of Public Health and Environment. The GSA Region VIII signed a consent order in 1997 to investigate contaminated areas and clean up the sites. The DFC was used as an ordnance plant during World War II. The drilling rig is immediately west of the USGS National Water Quality Laboratory.

District action required for applying corrections to data base

Corrections (reloads) to previously transmitted NWQL data are not automatic with the implementation of NWIS 4_1 (National Water Information System, version 4_1). It is no longer possible for the NWQL to correct data for historic samples and automatically load the data into the District NWIS systems because codes have been added for the Data Quality Indicator. District data managers must reload all data and notify the NWQL when the reloads are completed.

the past year and found that implementation by Districts was sporadic. As a result, the NWQL will start a tracking process that displays pending reloads on the web. After the District completes a reload, it must notify the NWQL at LabHelp@usgs.gov so that we can update our tracking system. District completion status eventually will be posted on a web page and the launch date announced at URL <http://www.nwql.cr.usgs.gov/USGS/>.

■ Gary Cottrell

The NWQL tracked data reloads in four Districts in

Perfect score earned by Organic Section for performance study

The New York State Department of Health's (NYSDOH) 4th quarter performance-evaluation study awarded high marks to the NWQL. Performance is listed in the accompanying table.

These potable water studies have replaced the U.S. Environmental Protection Agency water-supply studies. The NYSDOH study is required for the NWQL to be accredited by the National Environmental Laboratory Accreditation Conference (NELAC) and for accreditation by the State of Colorado for the

majority of Colorado's primary drinking-water constituents. Results of the study are posted at <http://nwql.usgs.gov/Public/Performance/publicnyfall2002.html>.



Constituents	Number analyzed	Satisfactory	Unsatisfactory	Total satisfactory (percent)
Inorganic	13	10	3*	76.9
Organic	47	47	0	100
Total	60	57	3	95.0

*No result was submitted for nickel in this evaluation because the NWQL is seeking accreditation for nickel by U.S. Environmental Protection Agency (USEPA) method 200.9, rather than USEPA method 200.7. The NWQL received an "unsatisfactory" score for nickel because the value was not reported.

Leenheer credited with *ES&T* cover article

Jerry Leenheer, hydrologist with the Branch of Regional Research in Denver, wrote the feature article for the scientific journal *Environmental Science & Technology*, in its January 1, 2003, issue. The monthly feature article is an overview of a particular aspect of environmental science. The journal used Leenheer's photo of the Okefenokee Swamp, taken on a USGS field trip, on

the full-color front cover of the issue. The article, co-written with Jean-Philippe Croue, from Poitiers, France, was titled "Characterizing Aquatic Dissolved Organic Matter," and presented an overview of research into natural organic matter and its relevance to treatment of drinking water.

■ Colleen Rostad



TANK CHANGEOVER—A new contract was awarded for bulk gases last December. The changeover for new bulk nitrogen and argon tanks was completed in January.



UPGRADING INSTRUMENTS—Chemists in the Metals Unit are pleased to get hands-on training on two new inductively coupled plasma-optical emission spectrometers (ICP-OES). The Perkin-Elmer Optima 4300 ICPs replace four old instruments. Chase Davis (seated left) and Patricia Pavelich were among unit staffers who received training recently from Randy Hergenreder, P-E applications chemist. The total cost of the two ICPs is about \$170,000. The new instruments are expected to improve overall data quality and provide increased efficiency and sample throughput.

Reports, articles published by Laboratory authors

(NWQL authors in boldface)

REPORTS

Jha, V.K., and Wydoski, D.S., 2003, Methods of analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of organophosphate pesticides in bottom sediment by gas chromatography with flame photometric detection: U.S. Geological Survey Water-Resources Investigations Report 02-4222, 30 p.

Madsen, J.E., Sandstrom, M.W., and Zaugg, S.D., 2003, Methods of analysis by the U.S. Geological Survey National Water Quality Laboratory—A method supplement for the determination of fipronil and degradates in water by gas chromatography/mass spectrometry: U.S. Geological Survey Open-File Report 02-462, 11 p.

JOURNAL ARTICLES

Bednar, A.J., Garbarino, J.R., Ferrer, Imma, Rutherford, D.W., Wershaw, R.L., Ranville, J.F., and Wildeman, T.R., 2003, Photodegradation of roxarsone in poultry litter leachates: *The Science of the Total Environment*, Elsevier, v. 302, p. 237–245

Boyd, R.A., and **Furlong, E.T.**, 2002, Human-health pharmaceutical compounds in Lake Mead, Nevada and Arizona, and Las Vegas Wash, Nevada, October 2000–August 2001: U.S. Geological Survey Open-File Report 02-385

Thurman, E.M., **Ferrer, Imma**, and Parry, Rick, 2002, Accurate mass analysis of ethanesulfonic acid degradates of acetochlor and alachlor using high-performance liquid chromatography and time-of-flight mass spectrometry: *Journal of Chromatography A*, Elsevier, v. 957, p. 3–9

Note: Copies of these publications are available from NWQL by contacting Diana Rime by e-mail dcrime@usgs.gov or by telephone (303-236-3714).

Ethics coordinator named by QA chief

Jeanne Hatcher, physical science technician in the Quality Assurance (QA) Section, has been named NWQL ethics coordinator by Tom Maloney, QA chief. Hatcher will develop the ethics program at the Laboratory. She will develop and coordinate training for new employees, provide on-going ethics training for all employees, and develop the NWQL's ethics policy.

Hatcher also is the contact person for NWQL staff to report ethics concerns, and is the liaison with Laboratory management to ensure that ethics issues are addressed. Hatcher can be contacted by e-mail jhatcher@usgs.gov or by telephone (303-236-3481).

Maloney said that an ethics program is “necessary in our constantly changing laboratory environment.” In addition, he said the program is mandatory for the NWQL to maintain certification by the National Environmental Laboratory Accreditation Conference (NELAC). NELAC is a cooperative association of the U.S. Environmental Protection Agency, States, and other Federal agencies formed to promote mutually acceptable performance standards for the operation of environmental laboratories.



A JOB WELL DONE—Service Awards recently were presented by NWQL Chief Greg Mohrman to six hard-working chemists and physical science technicians. Angie White (front, left to right), received a 20-year pin and certificate; receiving 10-year awards in recognition of service to the Federal Government were Debbie Hobbs and Ben Rustin; (back row) Bruce Anderson, Scott Losche, and Armin Burdick.

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NWQL seminar schedule

Jeff Pritt, NWQL, January 22:
“Analytical Atomic Spectroscopy—
Techniques and Applications”

Mark Benotti, State University of New
York, January 23: “HPLC–TOF–MS
as a Useful Tool for the Analysis
of Polar Organic Contaminants in
Complex Environmental Samples”

Chad Kinney, National Research
Council Postdoc, NWQL, February
11: “Agricultural and Biogeochemical
Influences on the Fluxes and Isotopic
Composition of Trace Gases from
Colorado Grassland Soils”

Robert Eganhouse, USGS, Reston,
February 13: “Stranger in a Strange
Land--Experiences of an Expert
Witness in the Montrose Case.”

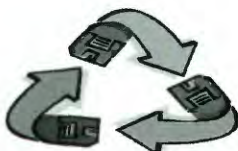
Paul Zavitsanos, Agilent
Technologies, March 6: “New
Instrumental Approaches to
Environmental Analysis”

Robert Eganhouse, USGS, Reston,
March 11: “Problems with the
Reliability of Physicochemical
Property Data for Hydrophobic
Organic Compounds”



THE EXPERT WITNESS—

Robert Eganhouse (right), research
chemist in Reston, confers with
Jerry Leenheer (left), Regional
Research, and Edward Furlong,
research chemist at NWQL, following
a seminar February 13 at the
Laboratory. Eganhouse summarized
his experiences as an expert witness in
the Montrose case, one of the largest
environmental lawsuits in U.S. history.



Printed on recycled paper

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Water Logs, the National Water
Quality Laboratory Newsletter, is
published quarterly by the National
Water Quality Laboratory, U.S.
Geological Survey, Box 25046, MS-
407, Denver Federal Center, Denver,
CO 80225-0046. For copies, call
Diana Rime (303) 236-3714 or send e-
mail request to dcrime@usgs.gov.

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USGS-visible Home Page Web site at
<http://wwwnwql.cr.usgs.gov/USGS>.
The public-visible Web site is accessed
at <http://nwql.usgs.gov/>.

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By Jon W. Raese

U.S. GEOLOGICAL SURVEY

Open-File Report 03-14



Denver, Colorado
2003

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FOREWORD

This National Water Quality Laboratory (NWQL) annual report is designed to recap the important changes, contributions, and successes of the Laboratory over the past 2 years. The intent is to provide our customers with a concise overview of what the Laboratory has accomplished, how it has performed, and how the assets entrusted to us have been used to further the mission of the U.S. Geological Survey. As with any organization or corporation, success belongs to the people who do the work. As you read through this report, take note of the faces of the people who are the NWQL. They are dedicated to the pursuit of science, quality, and customer service, and they are responsible for the success of the NWQL. Thank you for your confidence in our ability to meet your analytical needs.

GREGORY B. MOHRMAN
Chief, Branch of Analytical Services
National Water Quality Laboratory



ACKNOWLEDGMENTS

Technical Assistance

Gary L. Cottrell, U.S. Geological Survey
Gregory B. Mohrman, U.S. Geological Survey

Technical Review

Robert B. Green, U.S. Geological Survey
Keith J. Lucey, U.S. Geological Survey
Peter F. Rogerson, U.S. Geological Survey
LeRoy J. Schroder II, U.S. Geological Survey
Merle W. Shockey, U.S. Geological Survey

Production Notes

Design and Layout: Suzanne C. Roberts, U.S. Geological Survey
Photography: Jon W. Raese, U.S. Geological Survey



SUMMARY AND MISSION

Fiscal years 2001 and 2002 were marked by important events for the National Water Quality Laboratory (NWQL). New accreditation, an improved Laboratory Information Management System, creation of a Joint Project Team, a citation as the “best overall safety program” in the Central Region, and the development of new analytical methods were pivotal as the NWQL responded aggressively to customer needs in the face of declining financial resources.

The primary mission of the NWQL is to support U.S. Geological Survey (USGS) programs that require long-term, consistent, analytical chemistry and biological data of known quality for national assessment and trends analysis. Results of these studies provide natural-resource managers and policymakers with essential earth science information needed to make decisions about the use and conservation of the Nation’s resources.

This mission was strengthened in the past 2 years as the NWQL worked to transform itself to respond quickly to customer needs. For example, the USGS Ocala Water Quality and Research Laboratory in Florida and the NWQL set up a Joint Project Team in 2001 to address improvements in overall customer service. A charter was set up to focus team responsibilities on enhancing customer access to field supplies provided by both laboratories.

During 2001 and 2002, the NWQL produced about 2.6 million individual data results for its customers. Most of this information is stored in the USGS National Water Information System (NWISWeb), where scientists can access and use the water-resources data from about 1.5 million sites in all 50 States, the District of Columbia, and Puerto Rico. These water-quality results represent the single most important contribution that the NWQL makes to the science of studying the Nation’s water resources. The ability of the NWQL to provide high-quality analytical data—at exceptionally low detection levels for various chemical contaminants, including parent compounds and

degradates, in sample matrices collected throughout the United States—is unmatched in government or industry.

In addition, the NWQL developed cooperative programs with other Federal agencies, installed new safety measures, and enhanced communication with its customers. Unfortunately, given the high cost of training new staff and the uncertainty of sample submission following budget cuts in various programs throughout the USGS, the NWQL left some personnel vacancies unfilled.

Fiscal years 2001 and 2002 are reviewed, respectively, on the following pages, along with plans for the coming months in 2003.





Accreditation

The National Environmental Laboratory Accreditation Program (NELAP) accredited the NWQL in August 2001 using guidelines developed by the National Environmental Laboratory Accreditation Conference (NELAC). NELAC is a cooperative association of the U.S. Environmental Protection Agency (USEPA), participating states, and other Federal agencies formed to promote mutually acceptable performance standards for operating environmental laboratories. The on-site accreditation audit was carried out by the State of New York Department of Health Environmental Laboratory Approval Program.

Three major criteria must be met to qualify for NELAP accreditation: successful analysis of performance-testing materials, implementation of quality systems, and a satisfactory on-site laboratory audit. The NWQL successfully passed the on-site audit for drinking-water analyses as described in the Safe Drinking Water Act. NELAP accreditation is the only USEPA-sponsored national program for accrediting environmental laboratories.

The NELAP accreditation process promotes the development of mutually acceptable performance standards for the inspection and operation of environmental laboratories. It is designed to ensure acceptance and comparability of environmental data produced by NELAP-approved laboratories throughout the United States. Last year, Thomas J. Maloney, NWQL Quality Assurance Section Chief, was selected to join the NELAC Board of Directors.

The NWQL also is accredited by the State of Colorado for the analysis of drinking-water samples and is audited regularly by the USGS Branch of Quality Systems.

Laboratory Information Management System

NWQL launched a new Laboratory Information Management System (LIMS) in May 2001 to improve data handling and access. Many manual functions were automated by the new LIMS, helping to ensure the accuracy of water data. There were headaches, too, because the transition from the old LIMS to the new system was not error free. Once the startup problems were resolved, attention was turned to enhancing the system. Data from the new LIMS were loaded into NWIS after testing to ensure the proper transfer of results.

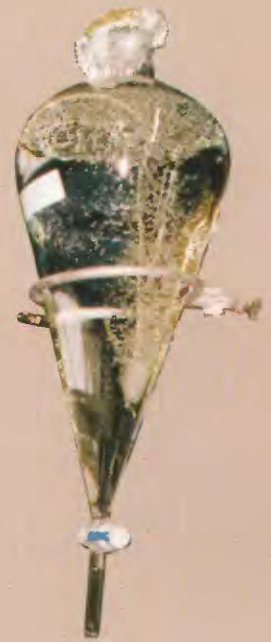
NWQL Chief Greg Mohrman hailed the new LIMS as an "important technological key to the future of the National Water Quality Laboratory." He called it a "pivotal milestone" and complimented the dedicated work of the Information Technology Team.

Methods Research and Development

Accurate, precise, and timely data are essential to assessing water quality and its effect on the Nation's environment. The NWQL continues to provide its expertise and leadership in analytical and environmental chemistry to the USGS and other local, State, and Federal agencies and the scientific community through developing and improving methods for assessing water quality, enhancing productivity, and supporting future water-quality investigations.

Five new methods were developed, approved, and published in 2001:

- Determination of ammonium plus organic nitrogen
- Processing, taxonomy, and quality control of benthic macroinvertebrate samples
- Determination of moderate-use pesticides and selected degradates in water
- Determination of organic plus inorganic mercury in filtered and unfiltered natural water
- Determination of polar and labile pesticides in water



Core Business Emphasized in Reorganization

Operating units were reorganized in mid-October 2001 to enhance the core business of providing high-quality analytical services. The most prominent changes involved the so-called “production units” and the formation of a Business Development Team.

The former Inorganic and Organic Chemistry Programs were merged under Analytical Services, and radiochemistry and biology were included. Mohrman said he expects the change to “increase efficiency by cross-training our analysts and providing them with opportunities to diversify their experience and to grow individually.” Mark Burkhardt was named as the initial chief of the section. In addition, a new Business Development Team under Gary Cottrell consolidated various business elements, such as customer services and publication programs. The purpose of the team is to improve customer satisfaction and to develop effective communications. A key goal is to reduce the response time for problem resolution.

The Business Development Team (BDT) assists customers with problems, data tracking, and coordinating responses to those who request assistance in developing project plans. Emphasis is placed on improving the NWQL web site and *Water Logs*, the NWQL Newsletter.



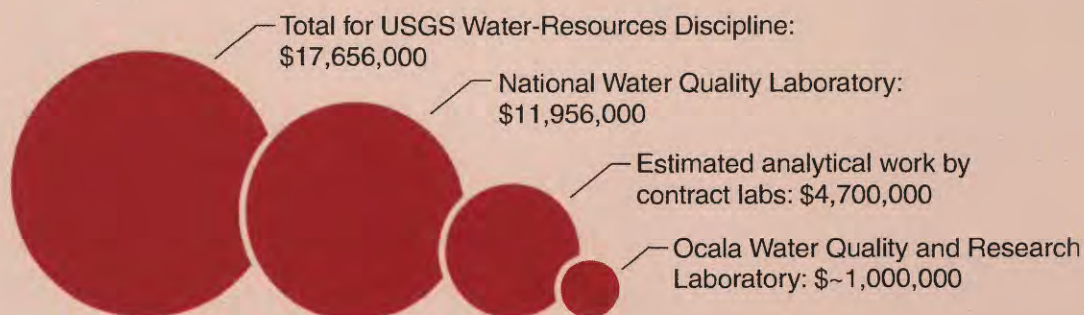
Early achievements of the Business Development Team are as follows:

- Informal notice system called “Rapi-Note” launched to provide a quick method of delivering preliminary information to customers;
- Toll-free customer-service telephone number 1-866-ASK-NWQL (1-866-275-6975) set up to speed service calls;
- New help mailbox established to send and receive inquiries regarding sample submittal, receipt, and login;
- BDT provided assistance to the Information Technology Section to redesign the reanalysis request form for easy use on the NWQL’s web site;
- Publication of the Profile Fact Sheet, which describes services, capabilities, and facilities.

Administrative Services

NWQL management implemented a pricing model to capture and recover all costs associated with analytical tests. This model is used to set analytical prices by weighting and combining all costs for each analysis, including employee hours, waste disposal, instrument depreciation, chemicals and other consumables, scheduled computer replacement, and overhead expenses.

The following illustration shows the dollar amount of analytical work performed for the USGS Water-Resources Discipline (WRD) by the NWQL in relation to all other laboratories doing work to support USGS WRD programs:



Dollar amount of analytical work performed for the U.S. Geological Survey Water-Resources Discipline in fiscal year 2001.

Joint Project Team

The NWQL and the USGS Ocala Water Quality and Research Laboratory in Florida set up a joint project team to address improvements in overall customer service. Team members promptly undertook projects to save money by purchasing Gelman filters in large numbers for users, by standardizing lot sizes on organic blank water, and by using a new common carrier to return sample coolers to the District offices. In the latter case, shipping costs for sample coolers should save District customers \$15,000 to \$20,000 annually, according to the NWQL Support Services Section. Improved discounts from the new common carrier for returning nonstandard packages to District offices not only result in reduced shipping costs, but also cut shipping time by 1 to 2 days and expand the service area to include Alaska, Hawaii, Puerto Rico, and Canada. The joint team also helped to develop strong ties between the two laboratories that will ultimately benefit all customers.

Analytical Services—Selected Special Projects and Custom Methods

- Analytical results by the NWQL supported the first nationwide reconnaissance of the presence of pharmaceuticals, hormones, and other organic wastewater contaminants in water resources. USGS scientists used newly developed methods by the NWQL to measure concentrations of 95 organic wastewater contaminants in water samples from streams throughout the United States. The compounds detected represented a wide range of origins and uses. Concentrations generally were low and rarely exceeded drinking-water standards. However, many of the compounds do not have such standards established, and the detection of multiple wastewater contaminants in a given sample was common for the study.



- The NWQL achieved the first environmental confirmation of benzalkonium chlorides (BACs) in sediment samples using a new methodology based on accelerated solvent extraction followed by an on-line cleanup step. The BACs were detected by liquid chromatography/ion trap mass spectrometry (MS) or by tandem mass spectrometry (MS/MS) using an electrospray interface operated in the positive ion mode. The latter method combines the high efficiency of extraction provided by a pressurized fluid with the high sensitivity offered by the ion trap MS. The method provides detection limits in the subnanogram-per-gram range. The BACs are quaternary ammonium surfactants with detergent and antimicrobial properties that are produced for industrial cleansers.

- Representatives of the USGS Nevada District Office briefed the NWQL management team and analysts on the Fallon, Nevada, sampling and analysis project. The Nevada District Office and the NWQL developed a partnership to search for clues to an outbreak of leukemia in the small farming town of Fallon. Nevada health officials confirmed 14 cases of childhood leukemia in less than 2 years in the Fallon area. The Nevada District collected water samples for analysis by the NWQL, which helped to design the analytical protocols.



- A partnership was developed with the U.S. Department of Agriculture (USDA) in a pilot program for new laboratories in New York and San Francisco to analyze drinking-water samples for pesticides. The USDA was aware of USGS methods for determining pesticides and asked the State laboratories to implement those methods. In that connection, the NWQL briefed a delegation from State laboratories, provided information on pesticide methods, and helped to train analysts and technicians to implement the USGS methods in New York and San Francisco.



- In 2001, the NWQL developed a custom method to determine fipronil and its degradates in sediment samples for the USGS District Office in Baton Rouge, Louisiana. Fipronil has been applied to rice in Louisiana to control the rice weevil. The NWQL began developing a custom method before 2001 to analyze water and suspended-sediment samples for fipronil and its degradates. The NWQL has validated the fipronil data for water samples and is preparing a method report for approval and publication.

• The USGS Texas District Office requested a custom method for biomarker compounds, specifically for use with bottom- and suspended-sediment samples. Molecular biomarkers typically are hydrocarbon-based organic compounds with their origins in biological structures and processes. They are a diverse group of compound classes that typically are preserved in fossilized organic matter, including petroleum and its products. The sediment core samples will be collected by the National Water-Quality Assessment (NAWQA) Program as part of its reservoir study.



- The USGS and the Glen Canyon National Recreation Area have identified sediment and water-quality issues for Lake Powell in Arizona and Utah. Major sediment deposits are found in inflow areas of the Colorado, San Juan, and Escalante Rivers, forming sediment deltas. These deltas are potential sites for the accumulation and storage of contaminants that can affect water quality. The NWQL analysts have been asked by the USGS Arizona District Office to look for low-level organochlorine pesticides, polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyl (PCB) congeners in sediment and water samples.

• The USGS is using paleolimnological methods in the Yukon River Basin in Alaska to determine trends in atmospheric fallout as a result of urban development. The NAWQA Reconstructed Trends Study is designed to collect core samples from five pristine lakes in the Yukon River Basin. The NWQL is modifying a method to determine low-level organochlorine pesticides, including technical chlordane and PCBs, and PAHs in lake core-sediment samples.



Safety, Health, and Environmental Compliance

Changing hazardous sample preservatives, eliminating methylene chloride from an analytical method, and reducing waste are some of the projects tackled by the NWQL Safety Office and Analytical Services Section.

The Department of Transportation (DOT) updated regulations on the permissible levels of hazardous materials that can be shipped by common carrier. As a result, the Safety Office had each sample type tested to determine if the preservatives met DOT criteria. Only one sample preservative failed the test: mercury samples preserved with concentrated nitric acid and potassium dichromate. Following preliminary tests, the NWQL modified the analytical method so that water samples for mercury analysis could be preserved with hydrochloric acid, which passed the DOT regulation for corrosives. The Safety Office, in turn, coordinated with the USGS Office of Water Quality and field offices for the proper disposal of unused potassium dichromate.

The NWQL continually seeks to improve analytical methods by reducing chemical waste and using less hazardous materials when appropriate. For example, methylene chloride was replaced as the extraction solvent from one method with a less harmful solvent (ethyl acetate). As a result, the waste stream for the method may be sufficiently clean for release to the publicly owned treatment works and will not need to be contained and disposed as hazardous waste.

A containment vault system at NWQL monitors all wastewater from laboratory sinks and drains. The system monitors and adjusts the pH of wastewater to meet discharge requirements for publicly owned treatment works. The system was modified to include the processing of aqueous waste from a large glassware washing machine. Previously, this waste was collected in drums and processed through an ion-exchange system, which involved moving heavy drums of acidic water and required many hours for processing. The neutralization of this waste now is automated because it is handled through the containment vault system.

The NWQL also started an automated external defibrillator (AED) program. Eighteen employees were trained in the use of AED and cardiopulmonary resuscitation (CPR). AEDs are specialized devices designed to recognize and treat certain lethal heart rhythms during cardiac arrest. The AEDs now are in place, and trained responders are prepared to save the lives of cardiac arrest victims.

DOMESTIC COLD WATER

DOMESTIC HOT WATER

ACID WASTE

ACID VENT

ACID WASTE



Public Outreach—Tours, Meetings

The NWQL is an active participant in field-training courses and routinely opens its laboratories to visiting classes and guests. It hosted various tours, meetings, and classes in FY2001, beginning with a tour for 10 emergency managers, who were in town to attend a class sponsored by the Bureau of Reclamation.

Other tours included a technically oriented group from three U.S. Department of Agriculture facilities in New York, California and Virginia; an Interagency Hazardous Materials group gathered to discuss hazardous material problems and solutions; Barbara Waiman, Chief, Office of Communications, accompanied by Ann Frazier, Focus Area Coordinator, Great Plains Focus Area, toured the facility to understand the role of the NWQL in the USGS.

Karen Siderelis, USGS Geographic Information Officer, visited NWQL to learn about integrating USGS information systems; Eric Evenson, New Jersey District Chief, and David Steadfast, Assistant District Chief, visited the Carbon Unit; two groups from a National Water-Quality Assessment Program (NAWQA) meeting in Denver, one from Connecticut and one from Oregon, toured the NWQL.

Colorado Department of Health audited the facility (primary interest in drinking-water methods and general protocols). High school students and senior citizens, guests from the American Water Resources Association (AWRA), and students from the USGS National Training Center (NTC) Field Water-Quality Methods class for Ground Water and Surface Water visited NWQL.

Karin Harlin, Laboratory Chief, National Atmospheric Deposition Program (NADP), met with Charles Patton to discuss nutrient methods, and with John Garbarino to discuss trace metal speciation and analytes. The NWQL was host to 23 children of NWQL employees during "Take Your Child to Work Day." Other guests included Dr. Mohammed A. Tawfig, Acting President, Saudi Geological Survey; students from the NTC Senior Technician Seminar; and 28 students from the NTC Water-Quality Field Methods Refresher training course.





Research Support

End-of-year funding from USGS helped to support three special projects in 2002:

- 1 National Environmental Methods Index (NEMI),
- 2 electronic Analytical Services Request form (eASR), and
- 3 alkaline persulfate digestion method development.

1 All USGS methods are being added to NEMI (see World Wide Web at www.nemi.gov). By early spring 2002, the NWQL had scanned, converted to portable document format (PDF), and added 142 USGS methods to the NEMI data base. These methods represent the beginning of a project to place all USGS methods in the NEMI data base for national access through the Internet.

The NEMI workgroup released the methods to the public in summer 2002; the USGS methods were a prominent part of this initial release. Periodic releases with additional methods are planned, including field and biological methods. The purpose of NEMI is to provide a mechanism to compare and contrast the performance and cost of analytical methods for environmental monitoring.

The Methods and Data Comparability Board, a partnership of water-quality experts from Federal agencies, States, tribes, municipalities, industry, and private organizations, developed NEMI. After the project is finished, the methods will also be placed on a USGS web page.

2 For many years customers requested a means to enter Analytical Services Request sample information directly into the NWQL data base so that the information is available to personnel when the samples arrive at the NWQL. The NWQL developed procedures to fulfill these requests and placed the eASR online. Information from the stored eASR automatically populates data fields in the LIMS. Handwritten updates must be checked; however, data entry and transcription errors are reduced with the improved flow of electronic

information from the field, to the LIMS at NWQL, and into NWIS. Accuracy is improved and errors are reduced, thus saving time and money.

3 Charles J. Patton developed and validated an alkaline persulfate digestion method for automated total nitrogen and total phosphorus determinations. The new method, once approved, will be an alternative to the Kjeldahl digestion method for determination of dissolved and total nitrogen and phosphorus. It will eliminate safety concerns and waste-stream disposal costs associated with Kjeldahl digestion, and lower detection limits for dissolved and total nitrogen and phosphorus determinations.

As part of the ongoing work, nitrate in the alkaline persulfate digests will be determined simultaneously by the current cadmium method and a new nitrate reductase (NaR) reduction method. An NaR-reduction method would eliminate the need for toxic cadmium in total and dissolved nitrogen determinations by the alkaline persulfate digestion method. Eliminating highly toxic mercury and cadmium from these high-demand analyses would be a major accomplishment for NWQL and environmental safety. The NaR

work is a Cooperative Technical Assistance project with the Nitrate Elimination Company. The NWQL anticipates that this collaborative effort will result in improved science using a “greener” chemistry.



Laboratory Information Management System Updated

In addition to the eASR, a number of new applications have been added to the LIMS, including interactive Sample Status and access to current and historical long-term method detection levels. A new version of Sample Status was added that eliminated the use of passwords and provided specific selections by user code, station identification, or laboratory identification. Selections may be limited further by specifying an account code, start date, or end date. All samples that meet the criteria are displayed in a report.

Modifications to this application were based on comments and requests received at meetings and by e-mail. The application is available to USGS employees at <http://nwql.cr.usgs.gov/usgs/sampstatus/index.cfm>.

The Quality Assurance and Information Technology Sections jointly developed an application to post information on the current and historical long-term method detection levels (LT-MDLs) on the web. The application can search for a schedule, lab code, or constituent for all methods available in the LIMS. The application can be reached at <http://nwql.cr.usgs.gov/usgs/ltml/ltmdl.cfm>.

Methods Research and Development

NWQL scientists were part of a research team that conducted a nationwide reconnaissance for pharmaceuticals, hormones, and other organic wastewater contaminants in streams (Kolpin and others, 2002). Pharmaceuticals and wastewater methods, developed at the NWQL, were important components of this study. The study proved that mixtures of pharmaceuticals, hormones, and other contaminants can occur at low concentrations in streams that are susceptible to wastewater sources.

The study also provided methodology and guidance for future monitoring and assessment of these types of environmental contaminants. The reconnaissance was sponsored by the USGS Toxic Substances Hydrology Program and was spearheaded by its emerging contaminants working group, which includes NWQL scientists in the Methods Research and Development Program.



Four new methods were developed and approved in fiscal year 2002:

- Determination of wastewater compounds
- Determination of organophosphate pesticides in filtered water
- Determination of organophosphate pesticides in bottom sediment
- Arsenic speciation in natural-water samples using laboratory and field methods

Other new methods under development include the following: a method supplement for determination of fipronil and degradates in water; determination of gasoline oxygenates, selected degradates, and BTEX (benzene, toluene, ethylbenzene, and xylenes) in water; determination of organochlorine pesticides and polychlorinated biphenyls in bottom sediment; determination of organophosphate pesticides in whole water; an automated alkaline persulfate digestion method for determination of dissolved and total nitrogen and phosphorus; and determination of polycyclic aromatic hydrocarbons, aliphatic hydrocarbons, and petroleum biomarker compounds in sediment.

Chemists Peter Rogerson (USGS Office of Water Quality) and Charles Patton (NWQL Methods Research and Development Program) collaborated with hydrologists in the USGS Louisiana District Office in Baton Rouge to develop methods for measuring near real-time nitrate concentrations in the Atchafalaya River. Using a new portable field analyzer to measure nutrients, they optimized reaction conditions for freshwater analysis and developed an improved and reliable cadmium reactor, which is crucial for the analyzer's long-term performance.

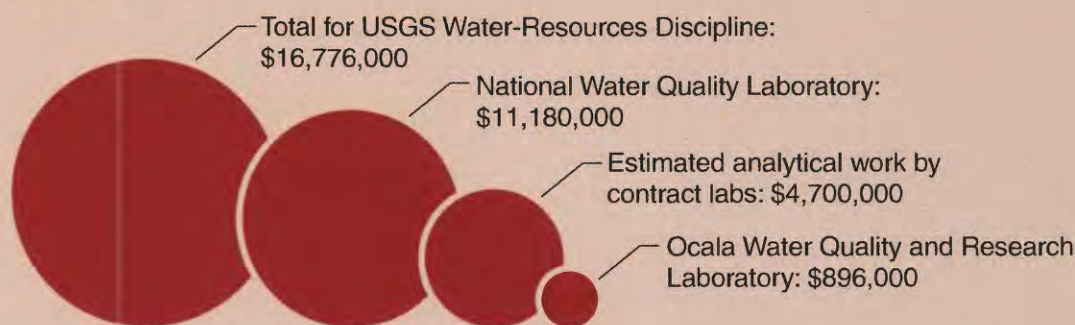
The Atchafalaya is thought to contribute substantially to seasonal episodes of hypoxia in the Gulf of Mexico. Hypoxia, a depletion of dissolved oxygen from coastal water that can lead to stress or even death of bottom-living and bottom-feeding marine organisms, increasingly threatens fisheries along the Louisiana and Texas coasts on the Gulf.

Administrative Services Improves Billing Web Site, Income/Workload Estimates

Administrative Services teamed with the Information Technology Section to add enhancements to the billing web site, including cost center and exception reports combined in a single monthly report. All weekly and monthly reports are available within 3 working days of the date in the billing report schedule. Weekly reports are convenient for tracking sample login and reviewing charges for supplies and postage. Monthly reports reflect actual charges during the monthly billing process. The Administrative Services Office and Information Technology Section also developed a new user code that will be implemented in fiscal year 2003.

In addition, Administrative Services revised its process to estimate income and workload. Sample-submission estimates are linked to the NWQL's pricelist and the cost is computed on the basis of the test requested and number of samples entered, using a program on the NWQL Home Page web site at <http://www.nwql.cr.usgs.gov/> USGS.

The income/workload estimate tool will help customers to project sample submission and cost for the fiscal year and to develop estimates for pending negotiations with their cooperators. At the same time, the NWQL can base its budget on valid estimates, and the Analytical Services Section can schedule its workload based on the estimated time for sample submission. The following illustration shows the dollar amount of analytical work performed for the USGS WRD in fiscal year 2002 by the NWQL in relation to all other laboratories doing work to support USGS WRD programs:



Dollar amount of analytical work performed for the U.S. Geological Survey Water-Resources Discipline in fiscal year 2002.

Innovation and Improvement

One of the new enhancements to the LIMS to improve customer services is the sample-receipt notification system. Electronic mail is sent automatically on the day that samples arrive at the NWQL, notifying the sender that the samples were received and their condition. Responses to any problems indicated in this electronic mail are to be addressed to the LabLogin mailbox.

The LabLogin mailbox (LabLogin@usgs.gov) was established to send and receive inquiries regarding sample submittal, receipt, and login. Customers use the mailbox for immediate contact with the Login Unit concerning time-sensitive samples, to update information on ASRs, to add or delete lab codes or schedules, and to discard samples sent in error.

In response to customer requests, the Business Development Team published a one-page summary of NWQL services, including areas of expertise, facilities, technology, accreditation and certificates, and

external validation. The page offers a quick guide of NWQL capabilities and resources for customers and their cooperators.

An online survey was prepared for customers to evaluate the NWQL's products and services, and to provide additional suggestions and ideas for improvement. Greg Mohrman, Chief, requested participation "as we seek to provide our customers and their cooperators with quality products and services at reasonable cost." He promised to make the results available and to use the suggestions "to make substantive changes and improvements in our products and services."

Training

The NWQL strives to improve processes, enhance quality assurance, and hold the line on costs. Training is one measure of fitness and excellence to achieve these goals. The American Chemical Society taught two classes on Good Laboratory Practices (GLP) for NWQL employees.

Instructors emphasized the practical aspects of selecting analytical methods to meet the needs of programs that must submit data to regulatory agencies. Among the topics covered were how to apply quality-assurance principles to improve effectiveness; measurements traceability, calibration, and record keeping; and operational requirements imposed on laboratories that must operate under GLP protocol.

In addition, the Quality Assurance Section set up a short course on scientific ethics for all laboratory staff and contract employees. Instructors used the U.S. Department of Interior Ethics Guide supplemented by USGS administrative policies. NELAC accreditation requires that all laboratory staff have periodic ethics training and an understanding of inappropriate or fraudulent laboratory practices and the consequences of such actions.

Safety Compliance Rated "Best Overall in Region"

Safety and compliance programs were reviewed throughout the USGS Central Region where the NWQL is located. USGS Headquarters staff called

the NWQL's safety practices the "best overall local program in the Central Region."

The audit team cited the following specific strengths in its report to Tom Casadevall, USGS Regional Director:

- Management support/resources
- Committee activities and support
- Emergency planning
- Accident/unsafe condition reporting
- Training
- Industrial hygiene program implementation

Industrial hygiene, in particular, was called the "most proactive overall program and best blood-borne pathogens written program within the Bureau to date." The report identified two areas for improvement: establishment of job hazard analyses for laboratory operations and annual program planning.

Moreover, the Colorado Department of Public Health and Environment, in an earlier on-site inspection, found the NWQL to be in full compliance with all Colorado Hazardous Waste Regulations. Inspectors examined the NWQL's satellite accumulation areas, 90-day storage area, emergency plans, training records, and other documents. No deficiencies were noted. The inspectors found the NWQL to be much improved since the last inspection in 1998, when the NWQL was located in the old laboratory building on Ward Road in Arvada, Colorado.

"In all my years within safety, I've never seen a report without a violation of some kind, so I consider what the NWQL did as quite an accomplishment!" said William G. Miller, Bureau Safety Manager, in a letter of congratulations.

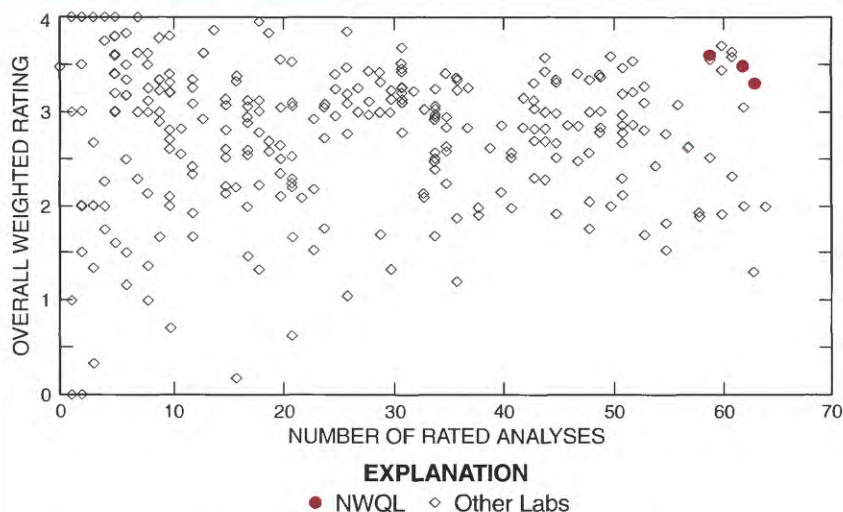
Finally, to top off the accolades, the U.S. Department of the Interior presented the NWQL with honorable recognition for the 2002 Departmental Environmental Achievement Award. Charles G. Groat, USGS Director, congratulated the staff for its initiative in strengthening the Survey's environmental program. Groat said the award exemplifies "our commitment to an effective pollution prevention, waste management, energy conservation, and environmentally friendly acquisition program."

Quality Assurance

The NWQL received a “good” rating, the highest possible, for overall performance in the Environment Canada Federal Provincial Study 80, which was conducted in late spring 2002. The NWQL has participated in the Environment Canada studies for 10 years. More than 60 laboratories take part in one or more of the sample series during a study. The NWQL participated in the following series for surface water—major ions and nutrients, trace elements, and total phosphorus—and also took part in the rain and soft-water sample series.

Each sample series consists of 10 separate water samples that use various types of natural water as the raw material. Constituents of interest include inorganic constituents, nutrients, dissolved organic carbon, and various physical properties. The studies are used to assess systematic bias and precision. Detailed results for the NWQL, along with a study-specific glossary, are available under “Lab Performance Evaluations” on the NWQL Public web site: <http://nwql.usgs.gov/>.

Results of interlaboratory performance evaluations that are administered by third-party agencies provide an independent check of capability. The NWQL analyzed a high percentage of the selected constituents in the inorganic sample-evaluation studies administered by the USGS Branch of Quality Systems (BQS) and consistently received overall weighted ratings between 3 (good) and 4 (excellent) in fiscal year 2002 (see accompanying graph).



Results of National Water Quality Laboratory performance in relation to more than 100 participating laboratories in the inorganic sample-evaluation studies administered by the U.S. Geological Survey Branch of Quality Systems for fiscal year 2002.

In addition, the NWQL received high marks in the latest round of potable water studies administered by the New York State Department of Health (NYSDOH); a “Satisfactory” rating was received for 56 of 60 constituents for an overall score of 93.6 percent. The NYSDOH studies have replaced the U.S. Environmental Protection Agency’s water-supply studies for drinking-water accreditation. The potable water studies are required for the NWQL to be accredited by the National Environmental Laboratory Accreditation Conference (NELAC) and by the State of Colorado for the majority of Colorado’s primary drinking-water constituents. The NWQL has participated in these studies for the past 2 years.

The NWQL also took part in a limited (seven organic constituents) non-potable water study administered by the NYSDOH; a “Satisfactory” rating was received for all seven constituents in the most recent study. Results of the studies can be viewed under “Lab Performance Evaluations” on the NWQL Public web site: <http://nwql.usgs.gov/>. The most recent NWQL certificates of approval for analyses of potable and nonpotable water are posted at <http://nwql.usgs.gov/> under “Lab Performance Evaluations.”

Public Outreach—Tours, Meetings

Water-quality scientists are encouraged to visit the NWQL because the visits are part of a collaborative process within USGS that includes the entire monitoring framework, from sample collection in the field to assistance with interpretation of data produced in the laboratories. At all steps in the process, NWQL managers believe that collaboration between the NWQL and its customers is important.

Visitors in fiscal year 2002 included about 30 members of the National Water Quality Monitoring Council, who toured the NWQL following a meeting in Denver. The group was guided through the entire sample-processing activity, from sample collection to data management.



Other guests visiting the NWQL included the following: attendees from the Denver Workshops for USGS District Water-Quality Specialists, who toured the facility in December and January; visitors from the USGS Upper Midwest Environmental Sciences Center; a delegation from the Yangtze Valley Water Resources Protection Bureau in the People's Republic of China; Gustavo Merten, Hydraulic Research Institute, Federal University of Rio Grande Do Sul, San Paulo, Brazil; Shi-Kwun Wang and Ms. Tzu-Yin Cheng, Water Quality Analysis, Environmental Protection Agency, Taiwan; Chung-Soo Kim, Hyoung-Seop, and Joon-Seok Lee, Water Resources and Environmental Research Division, Korea Institute of Construction Technology, Koyang, Korea.



FINANCIAL STATEMENT FOR FISCAL YEARS 2001 AND 2002

Beginning in fiscal year 1995, the NWQL has operated as a fee-for-service component under the Working Capital Fund (WCF) authority. The WCF gives the NWQL and its customers a powerful fiscal tool to provide program and project flexibility. The WCF also allows the NWQL to reinvest in the equipment it needs to apply new analytical techniques and information-handling systems.

In the past 5 years, the NWQL has improved and developed budgetary and financial tools to define estimated income in relation to actual income. It has also provided value-added information to its customers, such as the on-line Income/Workload Estimate program and the NWQL customer web page for the weekly and monthly billing reports—two important innovations that have been well received by customers in the Water-Resources Discipline.

The Income and Workload Estimate program annually asks the chiefs in the USGS District Offices, generally located in the State capitals, to provide their anticipated quarterly workload for the current fiscal year. The program then estimates cost based on the planned analyses and the established NWQL pricelist. The estimates assist NWQL management in determining anticipated workload and staff requirements for the year and provide a basis for evaluating the projected budget expenditures in relation to potential income. As the Income and Workload Estimate program matures, data also will be evaluated to determine how accurately the estimates reflected the actual workload for the year.

The NWQL's customer web page was revised in fiscal year 2002 to include report format, consolidation of sample login data, DENSUPPLY expenditures, and changes in the customer user identification (userid).

The NWQL is careful to set priorities for its equipment reinvestment to meet the most critical needs of the USGS. The NWQL established a special team of senior managers and supervisors that meets annually to take suggestions from every laboratory section regarding instrumentation, computers and support equipment needs. The team takes into account the amortization schedule established for all equipment, the current cost of maintenance contracts on aging equipment, and the capacity of the analytical equipment to meet anticipated workloads. The team is responsible for meeting the mission requirements established by USGS Headquarters and the needs of its customers. The money available from the Working Capital Fund then is used to purchase new equipment. Once the review has been completed, the recommended equipment is submitted to the NWQL Management Team for final approval.

The most important fiscal indicators for the NWQL for fiscal years 2001 and 2002 are listed in the following table.

	Fiscal Year 2001*	Fiscal Year 2002*
Workforce		
Federal	145.3	134.1
Contractor	20.0	21.8
Total:	165.3	155.9
National Water Quality Laboratory (Nonworking Capital Fund)		
Other Federal Agencies (OFA)	51,305	286,541
State-Cooperative Program	780,548	732,248
Work With Others (WWO)	0	48,405
Miscellaneous	68,000	0
Total:	\$899,853	\$1,067,194
National Water Quality Laboratory (Working Capital Fund)		
Income	10,322,986	9,273,512
Late Sample	1,633,280	1,907,873
Division Goods	2,507,965	2,252,953
Special Initiative	47,100	111,445
Total:	\$14,511,331	\$13,545,783
Expenditures		
Labor	9,132,350	9,089,420
Other Expenses	5,162,503	4,115,691
Equipment Reinvestment	267,470	392,000
Total:	\$14,294,853	\$13,205,111

*NOTE: Reimbursable income and expenditures for the USGS Department of Defense Environmental Conservation (DODEC) Program are not reflected in the table.

REFERENCE

Kolpin, D.W., Furlong, E.T., Meyer, M.T., Thurman, E.M., Zaugg, S.D., Barber, L.B., and Buxton, H.T., 2002, Pharmaceuticals, hormones, and other organic wastewater contaminants in U.S. streams, 1999–2000—A national reconnaissance: *Environmental Science & Technology*, v. 36, no. 6, p. 1202–1211.

HOW TO CONTACT US

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ASK-NWQL: toll-free number
1-866-ASK-NWQL
(1-866-275-6975)

Customer Service

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LabHelp@usgs.gov
or call toll-free number

Web Sites

Public site
<http://nwql.usgs.gov>

NWQL/USGS site
(for internal USGS use only)
<http://wwwnwql.cr.usgs.gov/USGS>



