NATIONAL WATER QUALITY LABORATORY
NEWSLETTER
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Quality Systems merges with Office of Water Quality

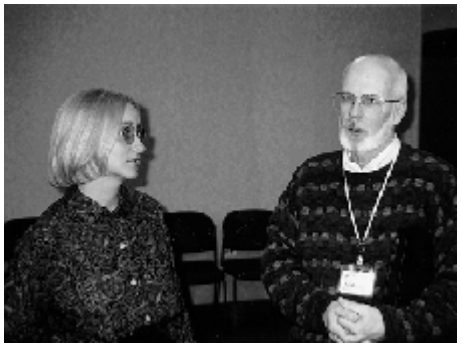
The Branch of Quality Systems is now part of the Office of Water Quality (OWQ). The branch was formerly under the auspices of the Assistant Chief Hydrologist for Technical Support of the U.S. Geological Survey (USGS).

Janice Ward, acting chief of OWQ, announced the change, and said the Branch of Quality Systems will enhance the ability of the office to provide leadership in quality assurance for the collection, handling, and analysis of water samples.

Immediate goals of the branch are

- to work with USGS programs to provide direction for the rapidly changing field of quality assurance;
- to design, document, and conduct existing and new quality-assurance projects; and
- to reestablish the review of analytical production laboratories that produce data for USGS.

LeRoy Schroder is the acting chief of the branch that will continue to focus its resources and talent on water quality.



RECENT APPOINTMENTS – Janice Ward, Acting Chief of the Office of Water Quality, becomes acquainted with Robert Green, new Supervisory Chemist heading up the NWQL Methods Research and Development Program. They took part in meetings in late February, including an all-hands greeting by Janice to the Laboratory staff.

Reanalyses tracked on Web

By Thomas J. Maloney

The NWQL has developed a Web application to process and track requests for reanalysis. The new application will replace the current process of sending email to DENQC. Testing of the Web application began in February with three District Offices and the Branch of Quality Systems. The testing has proceeded smoothly and will likely be completed by the end of April. Kathy Bryant, of the Quality Assurance Unit, is preparing a detailed announcement on the use of the new application.

Cookies on our Web

What a tangled web we weave . . .

By Sandy Turner

Last Fall, John Crisci, Computer Services Unit, found and installed a series of Perl Modules that enhance Web-development programming. These modules allow

(1) Production of dynamic Web pages
(2) Processing of fill-out forms
(3) Uploading of files from browser to server
(4) Generating and processing of cookies*
(5) Multiframe pages

(6) Clickable images that return coordinates to a Common Gateway Interface program
(7) Access to the Ingres data base

The installation of these modules coincided with the start of a Web-development project on fish data for the National Water-Quality Assessment Program (NAWQA) by Sandy Turner and Allison Brigham. Since the Perl Modules offered many new features, it was decided to test their capabilities by using them in the new system.

Originally the biological data-base system used the Worldwide Web (WWW) to create and maintain a data base for all biological Analytical Services Requests (ASRs). These data were loaded into Ingres along with all results. The system used "application helpers" to produce FrameMaker reports or download data into an Excel spreadsheet. Enhancements that had been requested included the ability to load data from a spreadsheet to the WWW data base and to customize the environment for the NAWQA study unit. These enhancements are now a reality.

All WWW pages are produced dynamically through the Perl Modules. The format for fish data can be retrieved by the browser, which automatically invokes an Excel spreadsheet. Data load automatically from the browser to the server for review. Since the page is generated dynamically, a "Save" button is produced only if the data pass the check. Once the data have been saved, they are either referred to the Biological Quality Assurance Unit to resolve any taxonomic problems or automatically loaded into the Ingres data base. Once in Ingres, the data set can be retrieved by the study units via the WWW.

The Quality Assurance Program uses the Multiple Frames capability extensively to modify the data and maintain the master taxonomic list. The clickable image interface was used to display site locations and automatically retrieve site information and samples for the site.

The final feature added is the ability to produce and save a cookie of preferences for the study unit. This "cookie" is stored on the browser and allows preferences such as study unit and desktop applications to be preselected for the user. In addition, FrameMaker reports are printed as an option only if FrameMaker has been specified as a desktop application. It is planned to produce Rich Text Format reports for those wishing to have Microsoft Word as a desktop application.

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*Cookies provide the client with the capability to maintain session information. Cookies are little bits of information that are stored on the client's local disk (Ju, Patricia, 1997, Databases on the Web--Designing and programming for network access: New York, M&T Books, p. 32).

CONSTRUCTION UPDATE

Views of the south wing of the new National Water Quality Laboratory under construction on the Denver Federal Center campus. Photo was taken in mid March just before concrete was poured on the top floor. The General Services Administration says construction will be completed early next year.

Looking westward. . .

Looking eastward . . .

View of north wing . . .

CU-Boulder, Wiggins wrap up drinking-water treatment project that denitrifies ground water

By Jim Scott
CU Office of Public Relations

[**Editor's note**: Reprinted with permission from *Carillon*, a publication of the University of Colorado at Boulder. Prof. JoAnn Silverstein discussed her biofilm process for denitrification of ground water for drinking-water treatment in rural communities during a seminar in February at NWQL.]

The University of Colorado at Boulder and the town of Wiggins, Colo., are wrapping up a pilot project which shows that a novel drinking-water treatment process that removes nitrates from ground water is both efficient and cost effective.

Directed by Professor JoAnn Silverstein of the CU-Boulder Civil, Environmental, and Architectural Engineering Department, the pilot facility is the first to use natural bacteria to remove nitrates from drinking water. Results of the effort, which are being monitored by the Colorado Department of Public Health and Environment, should pave the way for such facilities in a growing number of towns and cities faced with rising ground-water nitrate levels and limited budgets to deal with them.

"Although Wiggins' drinking water easily meets Federal and State nitrate drinking-water regulations, nitrate levels in nearby ground-water supplies have been rising in recent years," said Silverstein.

The CU demonstration project was approved in 1995 by the Wiggins Town Council, whose members recognized that a readily available denitrification process might be of use for the town in the future.

"Biological processes have been used to treat wastewater for a long time," Silverstein added. "What's new here is that we are using it to treat drinking water."

Nitrate contamination of drinking water caused by agriculture, industry, and commercial and residential development is a growing problem for many rural communities in the United States, Europe, and Asia. Although about 80 percent of rural Americans use ground water for drinking, up to 25 percent of the wells in heavily farmed areas of the Midwest and West exceed nitrate standards for drinking water, according to the U.S. Environmental Protection Agency (USEPA).

Nitrates in drinking water are known to cause infant methemoglobinemia, also known as "blue baby" disease. The USEPA estimates that 4.5 million Americans, including 66,000 infants, are at risk for drinking well water that exceeds Federal nitrate (as nitrogen) standards of 10 milligrams per liter.

"Biological processes have been used to treat wastewater for a long time. What's new here is that we are using it to treat drinking water."

-JoAnn Silverstein

The Wiggins plant includes two 10-foot-high towers containing layers of nonpathogenic microorganisms commonly found in soil and water. Ground water is pumped through the towers, where the microorganisms gobble up nitrates and expel harmless nitrogen and carbon dioxide into the air.

The few bacterial cells that enter the water are easily removed using a conventional slow sand-filter "polishing" process, and excess bacteria from the towers are periodically removed from the system by scouring the towers with air.

"This is a very simple, low-maintenance system to operate," said Gary Carlson, a CU-Boulder postdoctoral researcher working with Silverstein on the project. "This plant can treat up to 60,000 gallons of water per day, but the process could easily be scaled up to treat much larger quantities of drinking water."

Although water treated at the pilot facility is used only for irrigation and to recharge ground-water supplies, intensive water-quality measurements indicate the final product meets all Federal and State drinking-water regulations.

"We believe the data generated by this plant justifies building one anywhere in the world," Silverstein said.

Silverstein's method was patented by the University of Colorado, and the technology has been licensed to Nitrate Removal Technologies of Denver for commercialization.

The $200,000 pilot project was funded by the Electric Power Research Institute and the National Rural Electric Cooperative Association with additional assistance from Wiggins, the Morgan Country Rural Electric Corp., the TriState Generating and Transmission Association, and the Colorado Department of Local Affairs.

FISH-AND-CHIPS – Jim Dobbs (left) and Jim Trumbo (right), physical science technicians in the Organic Chemistry Program, slice up frozen carp prior to passing the tissue through a grinder. The samples will be analyzed for pesticides.

New titles in print

Connor, B.F., Rose, D.L., Noriega, M.C., Murtagh, L.K., and Abney, S.R., 1998, Methods of analysis by the U.S. Geological Survey National Water Quality Laboratory-Determination of 86 volatile organic compounds in water by gas chromatography/mass spectrometry, including detections less than reporting limits: U.S. Geological Survey Open-File Report 97-829, 78 p.

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Jon Raese, Editor

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