

Nevada District partners with NWQL to help investigate Fallon cancer cluster

Terry Rees, Nevada District Chief, visited the NWQL June 4 to brief the management team and analysts on the Fallon, Nevada, sampling and analysis project. Nevada health officials have confirmed 14 cases of childhood leukemia in less than 2 years in the Fallon area. The U.S. Geological Survey's Nevada District Office is collecting water samples for analysis by the NWQL, which is helping to design the project.

Greg Mohrman, NWQL Chief, said "the critical role played by the NWQL in this project sets it apart from other labs because of our ability to help design the sampling protocols and carry out diverse analytical needs." He pledged the NWQL's full support and mobilized the analytical staff to carry out the work with dispatch.

Fallon is a farming and military town of 8,200 residents that borders Fallon Naval Air Station about 60 miles east of Reno. The State epidemiologist with the Nevada Division of Health said it is looking into jet fuel (JP-8) and other possible contaminants in the Fallon area. Dr. Randy Todd said the Fallon leukemia cluster is the State's first health priority, and it has tapped the Nation's top experts for help.

Involved with the probe along with the USGS are the Centers for Disease Control and Prevention and the Agency for Toxic Substances and Disease Registry. In addition, Nevada Senator Harry Reid is seeking Federal funds to reduce environmental risks in the Fallon community and to create a national data base for tracking and responding to chronic disease.

The appropriations would also include money for water filtration in Fallon schools and up to \$18 million for improved water systems for the town's tap water. Arsenic has been measured at 100 parts per billion (micrograms per liter) in the town's ground water, one of the highest concentrations in any U.S. municipal water supply.



PARTNERING WITH NEVADA—Terry Rees (left), Nevada District Chief, met with NWQL Chief Greg Mohrman and his management team June 4 to provide background information on the water-sampling project in Fallon, Nev., and the search for clues to an outbreak of leukemia in the small farming and Navy town.

NWQL implements new laboratory information management system

The NWQL implemented a new laboratory information management system (LIMS) May 20 to improve data handling and access. The new system is called “StarLIMS.” It automates many manual NWQL functions while helping to ensure the accuracy of water data.

NWQL Chief Greg Mohrman said that “StarLIMS holds an important technological key to the future of the Laboratory.” He added that launching StarLIMS was a “pivotal milestone” in the life of the NWQL, and he complimented the Information Technology Team for its hard work and dedication.

The StarLIMS combines the previous SPiN (schedules, parameters, and network program) and Catalog into a single format. (The old SPiN will remain available at least until the end of the water year, or as long as it takes to complete the analysis of samples that were received and logged in using the old system.)

Data release from the old and new systems should appear to be the same to NWQL customers, with results loading into the National Water Information System (NWIS). Interaction with NWIS has been tested to ensure the proper transfer of results.

StarLIMS was purchased in 1999 from LIMS USA. The NWQL worked with the commercial vendor to customize the product to meet the Laboratory’s diverse needs. The three-tiered design includes the data base, business rules, and StarLIMS.

The data-base tier uses the Relational Data-Base Management System (RDBMS) Oracle.

The business rules tier allows for NWQL to customize information and analytical processes. The Laboratory can add, change, or modify any of the business rules without impacting the other two tiers. The last tier is what makes it all work—the StarLIMS software.



THE KEY FOR SUCCESS—Penni Walker logs in the first water sample May 21 to launch StarLIMS, the NWQL’s new laboratory information management system. Said Greg Mohrman, Lab Chief, “The key lay in the spirit of the people throughout the Laboratory who saw the future and were not willing to let hurdles deter them from the objective.”



CHILDREN AT WORK—Kids had a chance to find out where their parents work and to explore careers in the “real world” during Bring Your Child To Work Day, April 26, at the NWQL. Virendra Jha (center, arms folded) and Kathy Bryant (behind Jha) helped to escort the children.

Publications in the news
(NWQL authors in boldface)

Battaglin, W.A., **Furlong, E.T.**, and **Burkhardt, M.R.**, 2001, Concentration of selected sulfonylurea, sulfonamide, and imidazolinone herbicides, other pesticides, and nutrients in 71 streams, 5 reservoir outflows, and 25 wells in the Midwestern United States, 1998: U.S. Geological Survey Water-Resources Investigations Report 00-4225.

Christen, Kris, 2001, Chickens, manure, and arsenic: Environmental Science & Technology, Environmental news, v. 35, no. 9, May 1, 2001, p. 184A and 185A. Article based on the research of Tracy Connell Hancock, USGS hydrologist, and **John Garbarino**, USGS research chemist.

Leenheer, J.A., Rostad, C.E., **Gates, P.M.**, **Furlong, E.T.**, and **Ferrer, Imma**, 2001, Molecular resolution and fragmentation of fulvic acid by electrospray ionization/multistage tandem mass spectrometry: Analytical Chemistry, v. 73, no. 7, p. 1461–1471.

Lopes, T.J., and **Furlong, E.T.**, 2001, Occurrence and potential adverse effects of semivolatile organic compounds in streambed sediment, United States, 1992–1995: Environmental Toxicology and Chemistry, v. 20, no. 4, p. 727-737

Wong, C.S., Garrison, A.W., Smith, P.D., and **Foreman, W.T.**, 2001, Enantiomeric composition of chiral polychlorinated biphenyl atropisomers in aquatic and riparian biota: Environmental Science & Technology, v. 35, no. 12, June 15, 2001, p. 2448–2454.



CAREFUL FOOTWORK—One young man was careful to hitch up his oversized lab coat as he negotiated the stairs at NWQL during Take Your Child To Work Day. Tripping the light fantastic is not as easy as it looks in a billowing, oversized gown.

RAPT ATTENTION—Peggy Omara-Lopez, physical science technician, escorted her daughter Mysti, 7, throughout the Laboratory during Take Your Child To Work Day, April 26.



Rapi-Notes cover fast-breaking issues

The NWQL Business Development Team is trying to improve communications between the Laboratory and its customers. One new tool in its arsenal is the **Rapi-Note**, a quick and informal method for getting the word out when new processes and procedures change or problems are being resolved. For example:

- A new web-based income/workload estimate system has been launched at NWQL to provide an easier means for estimating costs and projecting sample workload. District Offices will have the benefits of simple data entry and retrieval, whereas the NWQL benefits from having sample workload projections by quarter. (See [Rapi-Note 01-003](#) for details.)
- The NWQL automatically transfers sample data to the District National Water Information System (NWIS) data bases. Recently, however, several District Offices have requested reloads because of missing results. These "lost results" have been traced to the installation of security-based firewalls, by Districts, without providing the NWQL with sufficient rights to transfer data. Some problems have also been traced to "wu-ftp" installations. (See [Rapi-Note 01-012](#).)
- The method for determining turbidity changed effective June 1. The correct lab code for the determination of turbidity is 2187. (Lab code 50 has been discontinued.) The correct bottle type is TBY, and we need 500 mL of chilled, unfiltered sample. (See [Rapi-Note 01-016](#).)

For more details on these and other *Rapi-Notes*, check out the new web site at <http://wwwnwql.cr.usgs.gov/USGS/rapi-note.html>.

Status of selected NWQL reports

Furlong, E.T., Anderson, B.D., Werner, S.L., Soliven, P.P., Coffey, L.J., and Burkhardt, M.R., Methods of analysis by the U.S. Geological Survey National Water Quality Laboratory-Determination of pesticides in water by graphitized carbon-based solid-phase extraction and high-performance liquid chromatography/mass spectrometry: U.S. Geological Survey Water-Resources Investigations Report 01-4134. **Report approved by Director 6/18/01.**

Garbarino, J.R., and Damrau, D.L., Methods of analysis by the U.S. Geological Survey National Water Quality Laboratory-Determination of organic and inorganic mercury in filtered and unfiltered natural water with cold vapor-atomic fluorescence spectrometry: U.S. Geological Survey Water-Resources Investigations Report 01-4132. **Report approved by Director 6/15/01.**

Raese, J.W., in press, National Water Quality Laboratory-A profile: U.S. Geological Survey Fact Sheet FS-053-01, 6 p. **Publication date scheduled July 12, 2001.**

Sandstrom, M.W., Stroppe, M.E., Foreman, W.T., and Schroeder, M.P., in press, Methods of analysis by the U.S. Geological Survey National Water Quality Laboratory-Determination of moderate-use pesticides and selected degradates in water by C-18 solid-phase extraction and gas chromatography/mass spectrometry: U.S. Geological Survey Water-Resources Investigations Report 01-4098. **Publication date scheduled July 31, 2001.**

Zaug, S.D., Smith, S.G., Schroeder, M.P., Barber, L.B., and Burkhardt, M.R., Methods of analysis by the U.S. Geological Survey National Water Quality Laboratory-Determination of wastewater compounds by polystyrene divinylbenzene solid-phase extraction and capillary-column gas chromatography/mass spectrometry: U.S. Geological Survey Water-Resources Investigations Report 01-XXXX. **Method approved by Office of Water Quality 6/27/01.**

Colorado certifies Lab

The NWQL was accredited by the State of Colorado on June 1, 2001, for the analyses of drinking-water samples for Colorado-regulated trace metals, nitrate, nitrite, insecticides, herbicides, polyaromatic hydrocarbons, adipates/phthalates, volatile organic chemicals, and gross alpha/beta radionuclides.

The NWQL has also been accredited by the State of New York for the analyses of water samples for triazines, radionuclides (gross alpha and gross beta), polyaromatic hydrocarbons, volatile organic chemicals, organophosphate pesticides, organochlorine pesticides, chlorophenoxy herbicides, trace metals, and nutrients. The New York accreditation includes both NY and the National Environmental Laboratory Accreditation Program (NELAP). NELAP certification provides reciprocal accreditation among all NELAP participating states (about 20).

For further information, contact Al Driscoll at 303-236-3470 or e-mail driscoll@usgs.gov.



HEALTH FOOD-Mars Harper, physical science technician, gets the thumbs-up sign from Troy Engstrom, chemist, during a break in the action recently after learning that he is cancer free and able to return to work. *(Those high-fiber bagels reputedly are good for the colon.)*

Administrative Services launches web-based program

The NWQL launched its new web-based Online Income and Workload Estimate program April 25 to replace the AIS Detail Budget Laboratory. Advantages of the new program include reducing data-entry requirements, accessing real-time analytical costs, and providing NWQL with the ability to develop income and workload estimates for planning analytical requirements.

Districts that are using the new program have responded positively and offered suggestions for improving it. The NWQL thanks those Districts that participated in the testing phase or entered their fiscal year 2001 estimates. Reference NWQL [Rapi-Note 01-003](#), "Imminent Launch of NWQL Income/Workload Estimate System."



Merilee Bennett

Custom VOC work: Fuel characterization

The volatile organic compounds (VOC) section of the NWQL has a custom proposal to characterize fuel in groundwater samples, in cooperation with the National Research Program (NRP).

Characterization of fuels involves several different analytical techniques. The VOC section analyzes samples by using purge and trap gas chromatography/mass spectrometry (lab schedule 4054). Eighty-five selected VOCs were analyzed for, as well as nonselected VOCs. This lab schedule enables differentiation of a variety of sources because it includes other possible contributors to groundwater contamination, such as automobile parts degreasers, dry-cleaning solvents, and fuel oxygenates. NRP, on the other hand, is analyzing the samples for semivolatiles and for dye additives.

Ideally, a sample of the suspected fuel causing the groundwater contamination is obtained. The reference fuel is analyzed under the same conditions as the groundwater samples. Total ion chromatograms for gasoline, diesel fuel, JP4, and JP8 military jet fuels have characteristic patterns. Refined fuels also have characteristic patterns for homologous alkanes (which are easily degraded) at m/z (mass-to-charge ratio) 57 and for alkyl cyclohexanes (less easily degraded) at m/z 83. Sample chromatograms¹ are superimposed on reference fuel chromatograms to determine which fuel pattern matches and if weathering has occurred.

Ratios of benzene, ethylbenzene, toluene, and xylenes (BETX), the dominant aromatic constituents in gasoline, can also be used to determine the type of fuel present and how much weathering has taken place. The presence of methyl tert-butyl ether and other fuel oxygenates would indicate the presence of gasoline. The presence of 1,2-dibromoethane (EDB) also indicates possible gasoline contamination. EDB was added to leaded gasoline to improve fuel efficiency. The absence of BETX compounds might indicate a heavier fuel than gasoline is present (diesel, for example), or the fuel might be heavily weathered. Weathering might change the original distribution of many compounds, so ratios of the least-easily degraded compounds, such as iso-octane (2,2,4-trimethyl pentane) and methylcyclohexane, are used to further identify a fuel.

Any Districts interested in characterizing fuels for VOC analysis in water samples should contact Customer Service at LabHelp@usgs.gov or call our toll-free number 1-866-ASK-NWQL (1-866-275-6975). A custom proposal is required for this work. Further details are available in Hostettler and others (2001)².

 Donna Rose

¹ Examples of mass chromatograms for various refined fuels are available in Kaplan, I.R., 1997, Forensic environmental geochemistry: Differentiation of fuel-types, their sources and release time: Organic Geochem., v. 27, no. 5/6, p. 289-317.

² Hostettler, F.D., Rostad, C.E., Kvenvolden, K.A., Delin, G.N., Putnam, L.D., Kolak, J.J., Chaplin, B.P., and Schaap, B.D., 2001, Hydrologic setting and geochemical characterization of free-phase hydrocarbons in the alluvial aquifer at Mandan, North Dakota, November 2000: U.S. Geological Survey Water-Resources Investigations Report 01-4108, 117 p

Frequently asked questions

Notification of availability of new water-quality analytical method for the determination of moderate-use pesticides and degradates.

What is the new method number? The USGS method number is O-2002-01 and may be requested through the NWQL as Schedule 2002 (laboratory extraction) or Schedule 2011 (field extraction).

What are the features of the new method? The method is designed to determine a broad range of pesticide chemical classes and pesticide degradates in filtered environmental water samples. The method uses C-18 solid-phase extraction (SPE) with gas chromatography/mass spectrometry (GC/MS) operated in the selected-ion mode. The method complements methods 2001/2010, using the same sample preparation and analytical steps but including new compounds. Two-thirds of the compounds are degradates from Methods 2001 and 2050; the rest are new parent pesticides.

The new method determines 21 parent pesticides and 20 pesticide degradates in filtered water plus 14 additional parent pesticides and 21 degradates that have greater bias and variability, or shorter holding times, than the other compounds. The additional compounds will be reported with the 'E' data qualifier signaling their greater quantitative uncertainty.

Does the new method replace Schedule 2001? The new method complements Methods 2001/2010. It uses the same sample-preparation and analytical steps but includes new compounds.

What parent pesticides and degradates are determined in Schedule 2002? A list of parent pesticides and degradates is available on the NWQL USGS-Visible web site at <http://www.nwql.cr.usgs.gov/USGS>. Click on catalog and request Schedule 2002.

Are field matrix spike mixtures available for the new method? Not yet. Contact Mike Schroeder, Supervisor, Analytical Services, NWQL (schroede@usgs.gov; voice: 303-236-3270) or Mark Sandstrom, Research Chemist, Methods Research & Development, NWQL (sandstro@usgs.gov; voice: 303-236-3943) for information about quality-control samples.

May any District use the new schedules? Yes. The Office of Water Quality approved Schedules 2002 and 2011 in March 2001.

Why would I choose this method? This method and its complement, Schedule 2001, are suitable to determine low-level concentrations of pesticides and pesticide degradates in filtered natural-water samples. It is applicable to dissolved-phase compounds that are (1) efficiently partitioned from the water phase into a C-18 organic phase that is chemically bonded to a solid porous silica matrix, and (2) sufficiently volatile and thermally stable for gas chromatography (these compounds are reported with an estimated remark).

How sensitive is the new method? This method is suitable for low-level concentrations of pesticides and pesticide degradates (1 to 2,000 ng/L). Of the 110 compounds tested, 41 compounds (21 parent pesticides and 20 degradates) exhibited acceptable overall performance on the basis of reagent, surface-, and ground-water spike recovery tests. Most of these 41 compounds gave recoveries >65%. Validation data were also determined for 14 parent pesticides and 20 degradates that were found to have greater bias or variability or shorter holding times than the other compounds.

Can I send in one bottle of water (or one SPE column) for Schedules 2001 and 2010 (or 2002 and 2011)? We have designed the method to make that an option. However, we still have not modified the billing, login, and laboratory QC sample-set procedures to enable that option to be used. We hope to offer that option later this year.

How do I obtain a copy of the new method? A copy of the methods report may be downloaded from the NWQL USGS-Visible web site (<http://www.nwql.cr.usgs.gov/USGS/pubs.html>), requested by e-mail to the NWQL Technical Editor (jwraese@usgs.gov) or LabHelp@usgs.gov, or calling 1-866-ASK-NWQL. Tentative publication date is 31 July 2001. The citation follows:

Sandstrom, M.W., Stroppel, M.E., Foreman, W.T., and Schroeder, M.P., in press, Methods of analysis by the U.S. Geological Survey National Water Quality Laboratory-Determination of moderate-use pesticides and selected degradates in water by C-18 solid-phase extraction and gas chromatography/ mass spectrometry: U.S. Geological Survey Water-Resources Investigations Report 01-4098.

 Mark Sandstrom
Allison Brigham



SEMINAR PRESENTATION-Gary Cottrell, NWQL Business Development Team Chief, exchanged notes with hydrologic technicians June 13 at the Senior Technician Seminar, USGS National Training Center, in Denver. Current operations were discussed, including access to the Laboratory, Services Catalog, customer service, safety, quality issues, and new initiatives. The question and answer session was followed by a tour of the NWQL.



ROLLING STOCK-The USGS Bike Team celebrates its successful conclusion of the 2001 edition of Ride the Rockies on June 22 in Boulder, Colorado. The 6-day 432-mile bike tour started in Crested Butte. About 2,000 cyclists in the 16th annual ride had to negotiate 27,600 feet elevation gain before reaching the finish line. Riders logged 56 to 80 miles a day. Survey employees, from left, USGS Central Region Director Tom Casadevall, Susan Rhea, Janet Slate, and Jon Raese. Team members were especially thrilled by the ride on Trail Ridge Road in Rocky Mountain National Park, the highest continuous paved highway in North America at 12,183 feet above sea level. At the end of each day, Tom Casadevall spoke at a seminar about geologic features to look for on the following day's ride.

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