

## *In this issue . . .*

Safety program rated "best overall" in Region

Online survey available

Service request forms enter electronic age

Interactive web service enhanced for Sample Status application

High marks for potable water performance study

Frequently asked questions

Method developed for gasoline oxygenates and degradates in water samples

Applications developed for current and historical method-detection levels

New publications

## **Safety program rated "best overall" in Region**

Best overall local program in the Central Region" was the verdict of a safety, health, and environmental review of NWQL that was carried out the week of July 22 by Headquarters staff from the U.S. Geological Survey in Reston. Safety, health, and compliance initiatives and actions were reviewed throughout. The report identified two areas for the USGS Central Region, where the NWQL improvement: establishment of job hazard resides, analyses for lab operations and annual program planning.



The audit team toured the Laboratory and talked with managers, supervisors, and staff. Findings were reported to Tom Casadevall, Regional Director, on August 9. Specific strengths listed in the report are as follows:

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

The last item regarding industrial hygiene was given added emphasis. It was called the "most proactive overall program and best blood-borne pathogens written program within the Bureau to date."

Greg Mohrman, NWQL Chief, said the "findings belong to all of us-Federal employees and contractor staff-who work in Building 95 and support the mission of the NWQL. If we all do our part, it works to the benefit of all." He thanked the staff for the successful review and stressed the need to keep safety, health, and environmental issues in the forefront of Laboratory planning and operations.

## **Online survey available**

The NWQL has prepared an online survey to offer its customers an opportunity to evaluate the Laboratory's products and services, and to provide additional suggestions and ideas for improvement. We need your participation as we seek to provide our customers and their cooperators with quality products and services at reasonable cost.

We request that you rate us based on your experiences over the past several years. If we have not asked the right questions, use the "other" boxes (see survey access, p. 6) to let us know what is on your mind. Please tell us about products and services that you would like to see offered at the NWQL. If you use, or have knowledge of, other laboratories that provide superior services, customer support, value, and quality, tell us about them. This will help us as we search for benchmarks that can be used to plan and assess the Lab's progress.

The NWQL's commitment to you for taking the time to respond to this survey is twofold. First, survey results will be available. Second, we will use the information to make substantive changes and improvements, and continue to enhance our products and services. We want to be your analytical laboratory of choice-to serve you and your customers in the future.

♦Greg Mohrman, Chief

---

## Service request forms enter electronic age

The electronic Analytical Services Request (eASR) has been tested and is now available for use. For many years customers have been requesting a means to enter ASR information directly into the National Water Quality Laboratory (NWQL) data base and have the information available when their samples arrive. The NWQL has developed two procedures for fulfilling these requests.

The first procedure involves the production of ASRs from the NWQL's USGS Home Page before the samples are shipped. This procedure allows templates to be produced and saved under unique names. These templates then can be retrieved and modified to include various sampling situations at various sites, to make more templates, and to submit finalized ASRs. When sampling is scheduled, the template can be used to produce a final sampling ASR complete with barcode.

The web application produced a PDF (portable document format) file consisting of two pages. The first page is the ASR in the standard format with a barcode added. The second page contains labels with a barcode and any other available information, such as station, date, and time. The labels can be printed on standard waterproof stock for use with the sample bottles and for pasting into the field logbook as a cross reference. This application and instructions for using it can be found at <http://nwql.cr.usgs.gov/usgs/eASR/>.

The second procedure involves the use of customer-written field programs. The NWQL has implemented an application that can load and check a formatted electronic data stream as it is transmitted from the field. The data stream will be checked for errors and the sender will receive a list of problems if any are found. Once the data passes all of the error checks, each eASR will receive an acceptance number that can be used to identify the sample and upload the data to the NWQL data base. Anyone who has developed a field program to produce ASRs is welcome to test their program with the NWQL's application. Please contact Gary Cottrell (Cottrell@usgs.gov) (303) 236-3490 for specifications, including the file format and transmission procedures.

When samples are received at the NWQL with the paper ASR produced by either procedure above, the barcode or eASR number is scanned, and information from the stored eASR automatically populates the data fields in the Laboratory Information Management System (LIMS). Handwritten updates on the ASR must be checked; however, data entry and transcription errors are reduced. Problems with trying to interpret handwriting or decipher wet ASRs will be eliminated. The result saves time and money.

◆ Sandy Turner

---

## Interactive web service enhanced for Sample Status application

The National Water Quality Laboratory has received many requests to add and change features of the popular Sample Status application. A new version is now available. Features and changes include the following:

The password has been eliminated. Many customers thought the password was unnecessary because the application has access set to USGS-only. Those customers who would like their data password protected are asked to notify Gary Cottrell ([cottrell@usgs.gov](mailto:cottrell@usgs.gov)).

Selections may be made by User Code, Station ID, or Lab ID. The selections may be limited further by specifying an account code, start date, or end date. The report will display all samples that meet the criteria. A single date may be entered or the list of samples may be narrowed further by start and end dates. The single date allows all samples after a start date or all samples before an end date to be displayed.

A list of all samples matching the criteria then is displayed from the initial selection. This display includes a link to results for any sample. The link produces a table of general information obtained from the Analytical Services Request form and specific information on the reporting groups and status of each group, as well as comments and release date. A secondary link from the list gives more information about each reporting group. This link produces a table of parameters, results, status, and analysis date. New features of this report allow sorting by clicking on a column heading and options to select multiple conditions, including the reload, verify or reanalysis buttons.

Modifications to this application were based on comments and requests received at various meetings and by E-mail. If there are other suggestions for improvements to the Sample Status application, contact Gary Cottrell or LabHelp. This application is available at <http://nwql.cr.usgs.gov/usgs/sampstatus/index.cfm>.

◆ Sandy Turner

---

**Water Science In The Schools** - Jeffery Cahill, chemist in the Methods Research and Development Section, presented a talk to fifth-grade students September 19 at Stott Elementary School in Arvada, Colorado. Cahill's presentation included basic water properties, the water cycle, ways to use water, and how consumers affect water quality. He is shown demonstrating how chemicals can be isolated from water for measurement. Susan Sautier and Tim Rock, fifth grade teachers at Stott, arranged the program for their students.



---

## High marks for potable water performance study

The NWQL received high marks in the latest round of potable water studies administered by the New York State Department of Health (NYSDOH). The Laboratory received a "Satisfactory" rating 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 Laboratory 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.

In addition to the potable water studies, the Laboratory also took part in a limited (seven organic constituents) nonpotable water study administered by the NYSDOH. The Laboratory received a "Satisfactory" rating for all seven constituents in the most recent study. Results of the studies can be viewed at <http://nwql.usgs.gov/Public/Performance/publicnycert2002.html>.

---

## ARSENIC SPECIATION

### Frequently asked questions

*Four new field and laboratory methods to determine arsenic speciation in filtered water are now available.*

#### **What are the new method numbers and parameter codes?**

Method **I-1190-02** is used to separate two inorganic arsenic-species in the field. There are three laboratory arsenic speciation methods-**I-2191-02** (determines four arsenic species), **I-2193-02** (determines four arsenic species and other organoarsenic species on a custom basis), and **I-2192-02** (determines two inorganic arsenic species). The parameter codes range from 62452 to 62455. Information is available on the NWQL USGS-visible website at <http://wwwnwql.cr.usgs.gov/USGS>. Select LIMS Catalog (upper right corner). Select a search category, such as parameter code, and enter the number to retrieve information about the constituent.

#### **What are the features of the new methods?**

All species are measured in micrograms-arsenic per liter (ug/L). The field method uses solid-phase extraction to separate the arsenate anion ( $\text{H}_2\text{AsO}_4^-$ ) from uncharged arsenite ( $\text{H}_3\text{AsO}_3$ ) in the field. Laboratory determination is by graphite furnace-atomic absorption spectrometric detection. There are no problems associated with the stability of the species of arsenic.

The three laboratory methods for arsenic speciation rely upon high performance liquid chromatography (HPLC) to separate the species of arsenic in samples preserved with ethylenediaminetetraacetic acid (EDTA). Different HPLC conditions are used for each method. The methods vary in sensitivity and the number of species of arsenic determined.

Method **I-2191-02** uses a phosphate mobile phase to separate the four species of arsenic [arsenite; arsenate; monomethylarsonate,  $(\text{CH}_3)\text{HAsO}_3^-$ ; and dimethylarsinate,  $(\text{CH}_3)_2\text{HAsO}_2^-$ ] with determination by arsine generation and inductively coupled plasma-mass spectrometry (ICP-MS) detection. This is the most sensitive method (reporting levels 0.1 to 0.2 ug/L) and has the least analytical interference.

Method **I-2193-02** uses a nitric acid mobile phase with ICP-MS detection to separate the four species of arsenic. Reporting levels are 0.2 to 0.3 ug/L. Other organoarsenic species can be requested as custom analyses.

Method **I-2192-02** uses a malonate/acetate mobile phase with ICP-MS detection to separate arsenate from arsenite. Reporting levels are 0.6 ug/L.

### ***What preservation and bottle type are required?***

Samples collected for arsenic speciation require preservation to maintain the original distribution of species of arsenic. Natural water is filtered using either a 0.45-micrometer-membrane syringe filter or an inline filter. Minimize or eliminate exposure of the sample to air when filtering ground water to prevent oxidation; the risk is minor for aerated surface water.

EDTA is added to the filtrate to eliminate precipitation of metal oxyhydroxides, to buffer the pH of the sample, and to reduce effects of microbial action. Guidelines for determining the appropriate volume of EDTA to add are included in a companion document on the NWQL USGS-visible website at [http://www.nwql.cr.usgs.gov/USGS/USGS\\_tech.html](http://www.nwql.cr.usgs.gov/USGS/USGS_tech.html). Scroll down and select "Arsenic speciation guidance document." Recommendations for EDTA volumes are on page 2.

A preserved sample is stored in an opaque polyethylene bottle to eliminate the effects of photochemical oxidation.

### ***How do I choose which method to use?***

Method **I-1190-02** requires prior knowledge of the sample matrix because of the limited exchange capacity of the cartridge. Methods **I-1190-02** and **I-2192-02** cannot be used for samples containing methylated arsenic species. Whenever there are questions about the arsenic species present or the sample-matrix composition, choose either Method **I-2191-02** or **I-2193-02**.

### ***May any District use the new methods?***

Yes. The Office of Water Quality approved the four new waterquality analytical methods for arsenic speciation in filtered water on 3 April 2002 for all projects and programs.

### ***How do I obtain field supplies for the new methods?***

USGS personnel can order all supplies from NWQL through the Intranet at [1stop.usgs.gov](http://1stop.usgs.gov) under the Analytical Supplies (NWQL) button.

### ***How do I obtain a copy of the new methods?***

In addition to the guidance document for arsenic speciation, checklist, and reporting sheet available on the NWQL USGS-visible website, a copy of the report may be downloaded from the NWQL USGS-Visible website (<http://www.nwql.cr.usgs.gov/USGS/pubs.html>), requested by e-mail to the NWQL Technical Editor ([jwraese@usgs.gov](mailto:jwraese@usgs.gov)) or [LabHelp@usgs.gov](mailto:LabHelp@usgs.gov), or calling 1-866-ASK-NWQL. The citation follows:

Garbarino, J.R., Bednar, A.J., and Burkhardt, M.R., 2002, Methods of analysis by the U.S. Geological Survey National Water Quality Laboratory-Arsenic speciation in natural-water samples using laboratory and field methods: U.S. Geological Survey Water-Resources Investigations Report 02-4144, 40 p.

◆ John Garbarino and  
Allison Brigham



**Summer Residents** - These two mule deer were part of a small herd of bucks that visited the Laboratory this summer. Wetlands and open spaces on the campus of the Denver Federal Center encourage abundant wildlife to take up residence.

**Sample Preparation** - Tom White, physical science technician, prepares a water sample for determining silica using a colorimetric method.



## Application developed for current and historical method-detection levels

Jeremy Fee of the Information Technology Section has 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 Laboratory Information Management System (LIMS).

The resultant report displays a code specifying the result as LRL (laboratory reporting level) or MRL (minimum reporting level) and the corresponding LT-MDL and reporting level. Start and end dates for each change in the LT-MDL are provided. Current (2002) information is highlighted to facilitate the interpretation of the chart. The resultant information also is available for retrieval in a delimited format. The LIMS has information dating back to about 1992. The application can be reached at <http://nwql.cr.usgs.gov/usgs/ltmdl/ltmdl.cfm>.

◆ Sandy Turner

---

## Method developed for gasoline oxygenates and degradates in water samples

A method for determination of the alkyl ethers used as gasoline oxygenates [tert-butyl ethyl ether (ETBE), tert-butyl methyl ether (MTBE), diisopropyl ether (DIPE), and tert-pentyl methyl ether (TAME)] at low concentrations (<5 ug/L) in water samples has been developed. The new method includes some of the main degradates [acetone, methyl acetate, tert-butyl alcohol (tBA), and tert-amyl alcohol (tAA)] and BTEX (benzene, toluene, ethylbenzene, and xylenes).

The compounds are determined by using heated extraction to improve purging of polar compounds in a standard gas chromatography/mass spectrometry (GC/MS) method for volatiles. Volatile compounds are extracted (purged) from the sample by bubbling helium through a 25-mL sample heated at about 65°C. The volatile compounds are trapped on a sorbent and then thermally desorbed into a GC/MS system for identification and quantitation. The method detection limits range from 0.035 to 0.052 ug/L for the gasoline oxygenates, 0.217 to 0.625 ug/L for the oxygenate degradates, and 0.005 to 0.036 ug/L for BTEX.

Oxygenated gasoline is designed to increase combustion efficiency, thereby reducing carbon monoxide emissions from motor vehicles. The oxygen content of gasoline is increased by the addition of fuel oxygenates. The main fuel oxygenates used in the United States are MTBE and ethanol.

The widespread use of oxygenated gasoline, combined with the high water solubility of the oxygenates, has also resulted in point and nonpoint source releases of oxygenates to the environment. In the environment, these oxygenates transform to degradates, which have different fates and susceptibility to degradation. The new heated purge and trap method will be an official USGS method and become available as a routine schedule for NWQL customers early in fiscal year 2003. Contact Donna Rose or Mark Sandstrom for more information.

◆ Mark Sandstrom and  
Donna Rose

---

## New titles in print (NWQL authors in boldface)

**Garbarino, J.R.**, Snyder-Conn, Elaine, **Leiker, T.J.**, and **Hoffman, G.L.**, 2002, Contaminants in arctic snow collected over northwest Alaskan sea ice: Water, Air, and Soil Pollution, v. 139, p. 183-214.

**Garbarino, J.R.**, Bednar, A.J., and **Burkhardt, M.R.**, 2002, Methods of analysis by the U.S. Geological Survey National Water Quality Laboratory-Arsenic speciation in natural-field samples using laboratory and field methods: U.S. Geological Survey Water-Resources Investigations Report 02-4144, 40 p.

---

**Visitor from Brazil** - Gustavo Merten (left), Hydraulic Research Institute, Federal University of Rio Grande Do Sul, in San Paulo, visited the NWQL May 28-30 to get a first-hand look at a state-of-the-art laboratory. Mr. Merten is equipping a laboratory at his university that will be used to analyze sediment samples for contaminants. He is shown inspecting the microwave digestion apparatus with Anthony Bednar, student trainee in the Methods Research and Development Section. Bednar recently completed his Ph.D. in Geochemistry at Colorado School of Mines in Golden.



## Newsletter Staff

Jon Raese, Editor  
Diana Rime, Editorial Assistant

*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) 236-3502 or send e-mail request to [dcrime@usgs.gov](mailto:dcrime@usgs.gov).

The purpose of *Water Logs* is to improve communications on water-quality issues in the U.S. Geological Survey. The Newsletter is for administrative use only. It should not be quoted or cited as a publication. The use of trade, product, or firms names in this publication is for descriptive purposes only and does not imply endorsement by the U.S. Geological Survey. Visit the NWQL Home Page Web site at <http://wwwnwql.cr.usgs.gov/USGS>.

The NWQL Customer Survey may be accessed at <http://nwql/usgs/survey/login.cfm>. Use the password `nwqll.` The survey takes about 15 minutes to complete. If you have any problems completing the survey, please send an e-mail message to [LabHelp@usgs.gov](mailto:LabHelp@usgs.gov) and put "NWQL Customer Survey" on the subject line. We will be in touch.