NATIONAL WATER QUALITY LABORATORY
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U.S. DEPARTMENT OF THE INTERIOR U.S. GEOLOGICAL SURVEY
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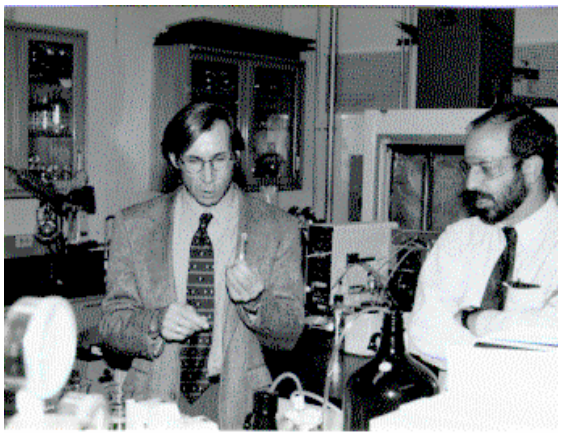
Bob Hirsch calls for strong partnerships

Chief Hydrologist Bob Hirsch emphasized the need for "stronger internal and external partnerships in all that we do" during an all-hands address October 11 at the National Water Quality Laboratory. Hirsch said partnerships are important because the use of diverse talents often leads to better products.

The new Chief Hydrologist made the comments following a tour of the Laboratory that included technical presentations by NWQL analysts and discussions with senior staff.

Hirsch also emphasized the need for improved outreach. He said the U.S. Geological Survey must reach beyond water professionals to communicate with interested citizens and public officials at all levels.

Hirsch said his main goal is "to keep our programs strong and balanced in an era of highly constrained budgets and staff size. We are in a period of rapid change," said Hirsch, "but we must not lose sight of our mission to provide earth science information in the public service."



Mark Sandstrom (left), Chief, Methods Research and Development Program (MRDP), served as tour guide of the MRDP laboratory during a recent visit by Bob Hirsch, Chief Hydrologist. Hirsch toured the NWQL, addressed the staff, and took part in round-table discussions.

Bob Hirsch (right), Chief Hydrologist of the Water Resources Division, makes a point while touring a laboratory in the Quality Management Program, October 11. Also shown (from left) are Pete Rogerson, Chief, Branch of Analytical Services; Al Driscoll, Supervisor, Quality Assurance Unit; and Merle Shockey, Chief, Inorganic Chemistry Program and Acting Chief, Organic Chemistry Program.

Workload estimates improve; process undergoing refinement

The National Water Quality Laboratory would like to thank all of its customers for providing analytical-workload estimates during fiscal year 1994. Deborah Treseder, Administrative Officer, reports that the NWQL was able to close out the fiscal year in the black, and the ability to more closely estimate income was helpful. Estimate accuracy ranged from 10 to 25 percent above or below actual funds received. Treseder will be working with the Water Resources Division to improve estimate accuracy this year.

Treseder plans to implement an automated system to capture analytical-workload estimates. She said that laboratory budgets will be built into customer cost centers using the Administrative Information System (AIS). The workload budgets, will then be transferred to the AIS data base at the NWQL. More information on this process will be reported at a later date.

Meanwhile, Treseder requests analytical-workload estimates in the same format that was used in the last fiscal year. The NWQL plans to send out a request for estimates via electronic mail early in January 1995. The response date is January 23.

New syringe-pump dispenser solves dilution problems

Approximately 15 percent of samples received at the NWQL for inorganic analyses--major cations and anions, nutrients, and trace metals--requires dilution prior to analysis. Dilution is necessary because one or more of the analytes of interest in these samples are present at concentrations that exceed the calibration range of the analytical methods by which they are determined.

Performing dilutions with conventional laboratory glassware--pipettes, volumetric flasks, graduated cylinders, and the like--is time consuming, cumbersome, and prone to contamination. Furthermore, equipment and procedures used to dilute samples by conventional methods was discretionary, and varied among the Inorganic Chemistry Program units. Consequently, precision of analytical results for samples that required dilution sometimes suffered.

Chemists in the Methods Research and Development Program suggested that recently developed, microprocessor controlled, syringe pump dispenser/diluters had the potential to solve many of the problems associated with diluting samples by conventional methods. At the core of these units are two precision-bore syringes driven by microprocessor-controlled motors. Control of the motors is sufficient to permit liquids to be aspirated and dispensed in increments of 1/1,000th of the total syringe volume with a precision of 0.05 percent and an accuracy of better than 1 percent; for example, a 1-milliliter syringe can be used to aspirate or dispense liquid volumes as small as 1.0 microliter. Instructions for each dilution are stored as programs and can be recalled as needed.

A committee arranged for loans of syringe pump dilutors from two vendors with competing products. Data from evaluations demonstrated that the performance of diluters from both vendors was comparable, and that precision (repeatability) of dilutions was significantly improved relative to that obtained by more conventional methods.

As a result, the Inorganic Chemistry Program purchased five syringe-pump diluters near the end of 1993. Since then, these units have been in routine operation where they have proved to be highly reliable, precise, and cost effective. They are compact, self cleaning, fast, and eliminate the need to stock and clean conventional glassware previously used to perform dilutions. Using these diluters has also moved the program closer to its goal of having uniform sample dilution protocols in all production units.

by Charles Patton and Chris Milne

Molybdenum moves to LIS Unit

Effective November 1, 1994, the Low Ionic Strength (LIS) Unit in the Inorganic Chemistry Program began analyzing molybdenum in water samples by graphite furnace atomic absorption spectrophotometry (GF-AAS). Previously, the Metals Unit determined molybdenum by a flame atomic absorption spectrometric chelation-extraction method. The GF-

AAS method does not require the use of hazardous reagents, and it uses less sample volume and preparation time. Although similar to the flame method, the GF-AAS method has an applicable analytical range from 1 to 50 micro-grams per liter (µg/L), with a method detection limit of 0.8 µg/L.

The major advantage in moving the molybdenum determination to the GF-AAS method was to discontinue the use of reactive and hazardous reagents associated with the chelation- extraction process. These reagents are methyl isobutyl ketone (MIBK) and 8-hydroxy- quinoline, which present health, safety, and hazardous-waste problems. On two recent occasions, the entire Laboratory had to be evacuated because of the release of small amounts of MIBK. In concern for the safety of the Laboratory staff and to protect the environment, the NWQL and LIS Unit pursued the transfer to the safer GF-AAS method. The GF-AAS method also has an additional benefit of saving time and money.

Molybdenum is a metallic element used mainly to strengthen and to harden steel. In compound form, it is used as a lubricant in grease. Molybdenum may be spread through the environment by burning fossil fuels.

by Betty McLain and Sandy Jones

Game plan set for QAU team

Jeff Pritt, Carmen Reed-Parker, Kim Pirkey, and Suranne Horodyski are members of the Quality Assurance Unit (QAU) organic team. They have devised a successful game plan to assist with on-line quality-control (QC) data, to supplement bench-level QC, and to provide QA/QC data to NWQL customers.

To assist with on-line QC data, the organic QAU team helped to log-in blanks and spikes so the data would be available electronically. Electronic access enables the analysts to use these data as part of their on-line QC and the QAU to produce summary statistics from these data. Statistical process control is being implemented as well.

The organic QAU team also has been successful in supplementing bench-level QC by submitting standard reference materials, conducting external performance evaluations, and starting a blind-sample program. Third-level data review and in-house audits also are being planned.

The team also provides QA/QC data and support to NWQL customers. These support activities include the publication of the NWQL QA/QC manual every other year, technical support for data interpretation, summary reports for QA/QC data, and special studies.

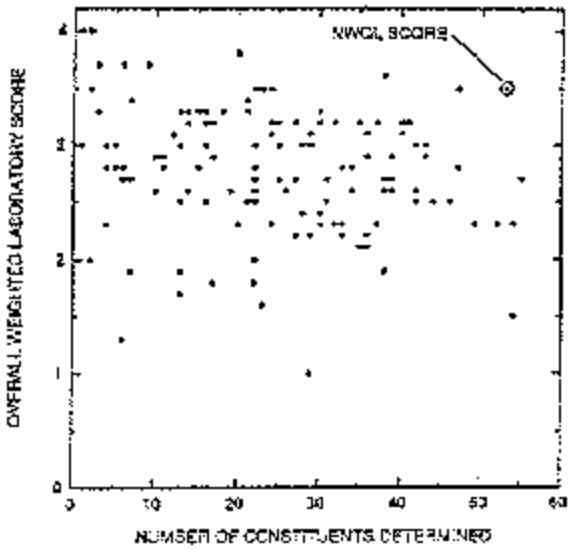
by Kailin Terry and

Kim Pirkey

Evaluation reports keep NWQL on its toes

The NWQL annually participates in USGS Branch of Quality Assurance (BQA) and U.S. Environmental Protection Agency (USEPA) quality-assurance studies. Twice a year, the NWQL determines inorganic constituents in fortified natural-water samples for BQA. The BQA publishes the results in Open-File Reports (see, for example, Long and Farrar, 1994).

A score is determined by comparing the laboratory's value to a most probable value (MPV) for each constituent measured. A score of 4 (the highest possible) indicates a laboratory value is less than 0.5 standard deviation from the MPV. Scores decrease as the laboratory result deviates further from the MPV. An overall laboratory score is the weighted average of all constituents determined by a laboratory. A participating laboratory may submit as few as 1 result to as many as 60 or 70 results. Figure 1 shows the NWQL overall score relative to 131 other participating laboratories.



Score	Number of standard deviations from most probable value
4 (excellent)	0.00 to 0.50
3 (good)	0.51 to 1.00
2 (satisfactory)	1.01 to 1.50
1 (questionable)	1.51 to 2.00
0 (poor)	greater than 2.00

Figure 1 – Laboratory performance for Branch of Quality Assurance April 1994 Standard Reference Water Sample interlaboratory study.

For USEPA studies, the NWQL determines inorganic constituents and organic compounds. The USEPA studies are used by States and USEPA regional offices to certify a laboratory to perform analyses for regulatory purposes. Figure 2 shows the NWQL successful performance percentages for more recent USEPA studies separated into organic-compound and inorganic- constituent determinations.

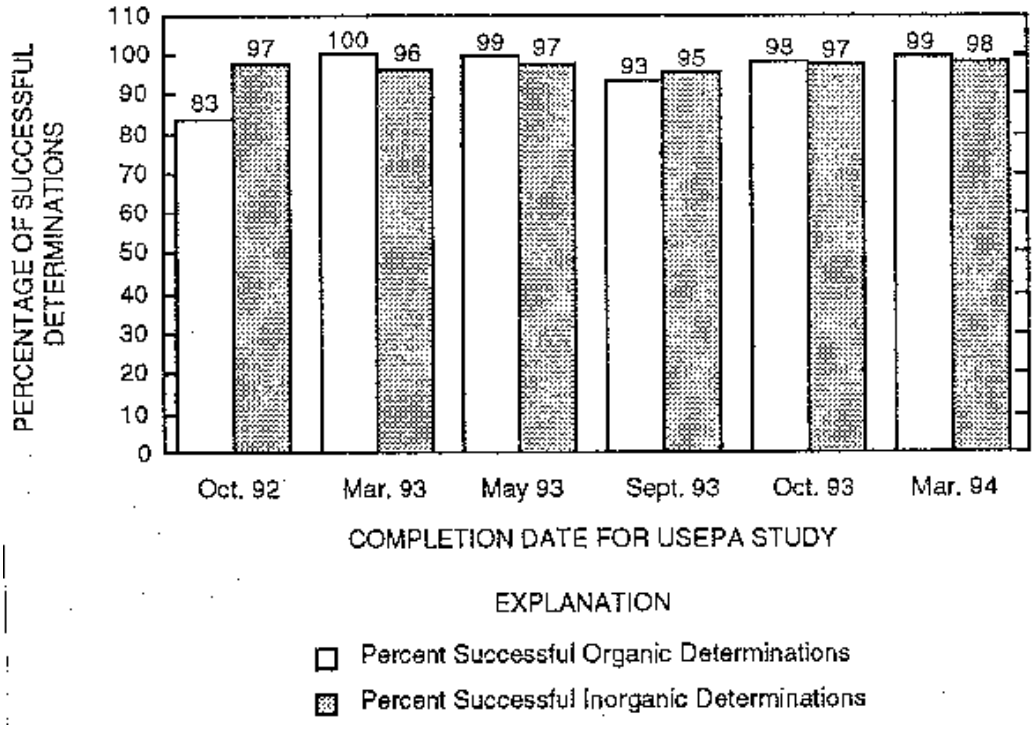


Figure 2 – National Water Quality Laboratory performance for recent U.S. Environmental Protection Agency (USEPA) laboratory evaluation studies.

The BQA and USEPA return evaluation reports to the NWQL. The NWQL corrects procedures when evaluations indicate less than satisfactory results. The Quality Management Program chief sends results of evaluation reports to all USGS district chiefs and regional water- quality specialists for their information and to keep on file for water-quality projects that use NWQL analytical services.

Reference: Long, H.K., and Farrar, J.W., 1994, Report of the U.S. Geological Survey's evaluation program for standard reference samples distributed in April 1994: U.S. Geological Survey Open-File Report 94-369, 101 p.

by Jeff Pritt

Technical writing course slated

About 20 authors from the Laboratory are registered for a training course titled "Critical Reasoning in Scientific Writing," to be taught by Dr. Robert Frodeman, January 25 and 26, 1995, at the National Water Quality Laboratory.

Frodeman will review the principles for clear technical writing, the need for logical rigor in our written work, techniques for manuscript appraisal, and how to detect faulty reasoning.

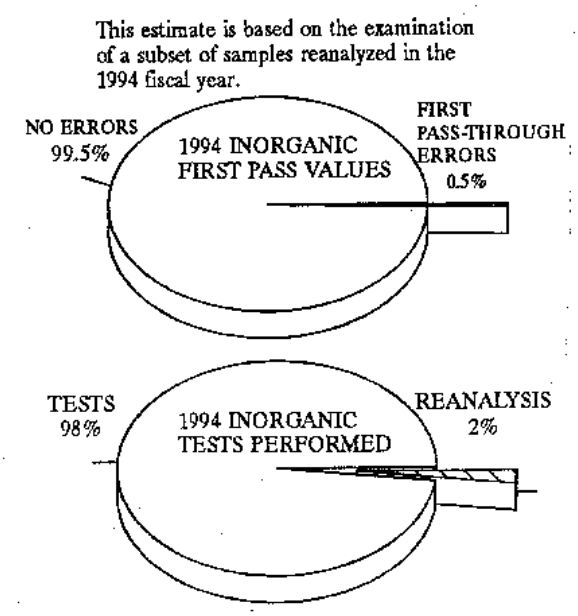
Recent seminars at NWQL listed

Barry Amon, NWQL, "ENABLE applications for monitoring production efficiency and quality control," August 17; Dan Hippe, Georgia District, USGS, "Water quality--Flooding in Georgia caused by tropical storm Alberta," October 19; Tommie Ann Gard, Reference Librarian, "Services available at the USGS Library, Denver Federal Center," November 29; Gerald Hoffman, NWQL, "In-bottle digestion procedure--Rationale for using it," November 30; Paul Gates, NWQL, "Analysis of environmental samples for explosives and explosives degradation products by liquid chromatography-mass spectrometry," December 7.

Quality Assurance tracking system helps improve service

The Quality Assurance Unit (QAU) of the Quality Management Program is taking an active role to improve customer service throughout the U.S. Geological Survey. One way that service has been improved is by developing tracking systems as quality indicators. Examples of tracking systems include statistics on in-house reanalyses--requested by QAU as part of the data-review process--and on customer-requested reanalyses. On the basis of data from past years, the number of inorganic reanalyses has decreased despite an increased sample load.

The accompanying chart also shows that the number of reanalyses makes up only about 2 percent of the total analyses of inorganic samples. Of this 2 percent, reanalysis shows that only 25 percent was in error. This means that only 0.5 percent of inorganic data produced is in error on the first pass-through. Furthermore, most of the analytical errors are corrected through in-house reanalyses prior to data release to NWQL's customers.



Laboratory quality-Inorganic Chemistry Program tests performed in relation to reanalysis.

The QAU believes the reanalysis tracking system is a useful tool for helping to assess the performance of other NWQL units and also demonstrates the high quality of NWQL data.

For example, the QAU is tracking the amount of missing data and the number of Log-in errors. This information is provided to NWQL units so that they may assess their performance and set goals for improvement. Moreover, QAU is

tracking sample load by state and by region. This information will be used to improve communication between NWQL and its customers throughout USGS.

by Kailin Terry

Branch Chief selects Maloney and Driscoll for Quality Management Program

The NWQL is pleased to announce two new appointments in the Quality Management Program (QMP).

Tom Maloney has been appointed Program Chief. Tom joins the NWQL after 5-1/2 years with the Branch of Quality Assurance where he headed up the Blind Sample Project to assess data quality produced by Water Resources Division laboratories. Prior to that, Tom was Studies Chief for the Maine District for 8 years. He started his career with the Survey in Illinois. Tom brings a background of district field work and project experience combined with many years' experience working with the Branch of Quality Assurance. He also has extensive experience as a supervisor and manager. Tom can be reached at (303) 467-8041 (EDOC: TMALONEY).

The NWQL is also pleased to announce that Al Driscoll has been appointed Chief of the Quality Assurance Unit within the QMP. Al joined the NWQL 15 years ago and has been a technician, a chemist, and a supervisor in the Inorganic Chemistry Program. Al's extensive experience as an analyst and as supervisor of the Trace Metals Unit will ensure implementation of joint solutions for producing top-quality data from NWQL. Al can be reached at (303) 467-8042 (EDOC: DRISCOLL).

Thank you Al for your fine job of acting as both the QMP Chief and the QAU supervisor for the last year. I appreciate your efforts to keep both the Program and the Unit operating well, and especially for the developing sense of teamwork with the Organic and Inorganic Programs. Good Job!

Please help us welcome Tom and Al to their new positions at NWQL.

by Pete Rogerson

NAWQA Leadership Team – Members of the National Water-Quality Assessment (NAWQA) Program National Leadership Team met November 3 at the National Water Quality Laboratory to review analytical methodologies and chemical measurements. From left (clockwise) are Bill Wilber, National Synthesis Coordinator, Reston; Mike Yurewicz, Acting Assistant Regional Hydrologist for NAWQA, Reston; Mark Sylvester, Assistant Regional Hydrologist for NAWQA, Menlo Park; Ivan James II, Assistant Regional Hydrologist for NAWQA, Lakewood, CO; Pat Leahy, Deputy Assistant Chief Hydrologist for NAWQA, Reston; and Jeff Armbruster, Assistant Regional Hydrologist for NAWQA, Norcross, GA.

Sample handling and analysis--Questions and Answers

What happens to the bottle after you put it in the mail?

Editor's Note: This column contains questions that originally were part of the Water Resources Division (WRD) training class "Water-Quality Principles." Through this question and answer format, Paul Capel (Minnesota District) and Ed Furlong (Method Research and Development Program) answer some of the more common questions that WRD personnel

ask the NWQL. If you have a question about the Laboratory, please send it to EFURLONG on EDOC. Selected questions and answers will be printed in future columns.

It seems like we are always hearing about changes in schedules and reporting limits from the NWQL. Why not keep things the same, so that you don't confuse us all the time?

Schedule and reporting-limit changes result primarily from several driving forces: New technologies, cost-effectiveness improvements, and, most importantly, requests from our customers for new analytes and lower method detection limits. Schedule 2001--our new solid-phase extraction (SPE), gas chromatography/mass spectrometry (GC/MS) method--reflects these driving forces. Customer demand dictated that we combine the most commonly applied pesticides from several schedules, plus additional analytes, into a single schedule. Schedule 2001 is more reflective of pesticide use than any single, chemical class-based schedule. The new extraction technology SPE allowed us to extract these different chemical compounds effectively, while GC/MS provided improved sensitivity and specificity. These improvements are offered at a very low cost.

I need an analysis for hexamethyl-chickenwire, and it is not on any of your schedules. Why not? Can you help me out anyway?

Yes, we are happy to help you but first an explanation. There are several possible reasons why this analyte is not on a schedule, the foremost of which is lack of demand. We add analytes to schedules as demand increases. A second reason could be that there are severe analytical problems with this compound. However, if the analyte is needed, we may have or will develop a custom method. This method would not have the extensive methods testing that standard schedules would provide, so any reported values would have qualifiers attached. We may also be able to arrange for analyses through our contracts with private laboratories. Again, call the NWQL's Method Research and Development Program (MRDP) (Mark Sandstrom, Program Chief, 303/467-8086) when you need determinations of a compound not contained in existing schedules.

How can you analyze something that is not in the USGS manuals? Can you invent a new analysis out of the clear blue?

We do analyze compounds that are not in our schedules. If you provide an analyte name, we will search the literature to see if (a) we can add it to an existing method, or (b) find out if there are any documented analytical methods that we can adapt, or (c) if there are no reported methods, we can develop a method. The cost increases from (a) to (b) to (c), since increasing amounts of development time are required. Please do not hesitate to call the NWQL when you are developing a project for an unlisted analyte. We may have analyzed samples of this compound previously on a custom basis, or may know of a method that we can implement. There is a lot of analytical and environmental expertise in the NWQL that is available to you, the user.

The methodical Marv Fishman

Marv Fishman, the author/editor/collaborator of 60 separate articles, reports, and manuals, has been the last word in methods at the Branch of Analytical Services (BAS) for close to 40 years, now. He has developed analytical methods since 1960, 4 years after he started with the Survey at the Quality of Water Branch.

Fishman

He became fully involved with BAS in March 1987 when he took over as Chief of the Methods Development Unit. He served as Acting Chief of the Inorganic Program and thereafter as Assistant Chief of BAS. And then in October 1990, he

retired--officially. Two months later, he hired on again as a part-timer, continuing to contribute his highly appreciated expertise in methods development to Lab projects.

However, come the summer of `95, Marv has decided he wants to be fully retired. He says he will still volunteer some of his time here, but he will no longer come regularly to the office. He and Florine, his wife of 37+ years, have other things to which they would like to commit their time. Gardening and bowling will absorb some of the hours; prowling the zoo with four grand-children will take up many more. Marv has also volunteered as treasurer of Four-Mile Historic Park, the oldest home in the Denver area, for 5 years and will continue his service there. (The Park is a working farm in southeast Denver; Marv strongly recommends its old-time atmosphere, especially the Fourth of July when a brass band accompanies the celebration *a la* Sousa.)

Travel will undoubtedly be on the Fishman Retirement Agenda as they have already toured England, Scotland, Ireland, Spain, the Rhine, Czechoslovakia, Yugoslavia, Alaska, and the Panama Canal. And though we will no longer be able to count on him every Tuesday and Thursday, Marv the consultant will surely bring home to us stories of faraway places.

by Karlin Allen

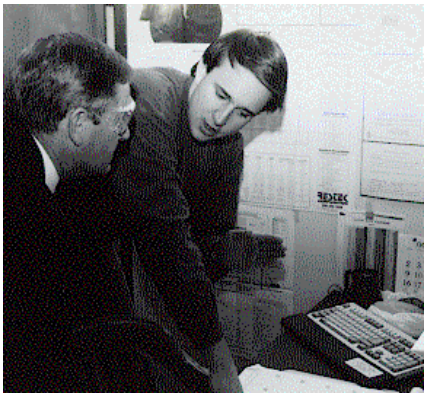
Organic Chemistry Program sets up small library, room 66

Ron Macklberg and Rob Fishburn have set up a small library for the Organic Chemistry Program. It is in room 66 (near the Carbon Unit laboratory and office) on the main floor of the West Building. The library contains computer software, software documentation, many open-file reports, and assorted journals.

The following journals and magazines make up part of the collection: Environmental Solutions (formerly HAZMAT WORLD), Environmental Protection, Office Systems, Today's Chemist, Journal of AOAC International, Inside Word (Microsoft Word), Excellence (Microsoft Excel), Scientific Computing and Automation, some U.S. Environmental Protection Agency manuals, and USGS publications.

If anyone at the National Water Quality Laboratory would like to check out or use these materials for a 2-week period, contact Macklberg (MACKLBER) or Fishburn (FISHBURN) via EDOC, telephone extension 8167, or stop by room 34.

Pete Rogerson (left), Chief, Branch of Analytical Services, describes the operation of a colorimetric continuous flow analyzer while guiding Congressman Dan Schafer of Colorado. Harold Ardourel (right), a supervisor in the Inorganic Chemistry Program, assisted with the tour. Congressman Schafer was invited to tour the National Water Quality Laboratory after expressing an interest in the U.S. Geological Survey.



Jamie Alexander (right), Physical Science Technician in the Organic Chemistry Program, explains to Congressman Dan Schafer how computer automation is used to collect data for determining pesticides in water samples. The Congressman spent about an hour November 3 touring the Laboratory's production operations. He was particularly interested in leaks in the roof, and in air-handling and temperature problems in the 17-year-old outdated facility.

Newsletter Staff

Jon Raese, Editor

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