UPDATE

STONE ENVIRONMENTAL NEWS ON FIFRA AND ENVIRONMENTAL FATE ISSUES

FALL 1999

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Can We Use NAWQA Results?

An increase in the number and size of regional groundwater and surface water studies seems certain. Since the National Water Quality Assessment Program (NAWQA) sponsors—USGS—do such fine, widely respected work, more and more people are wondering if there is a way to use existing NAWQA data for future studies. If so, this approach could result in a significant savings in time and money. SEI is currently exploring this question for one of its clients.

The USGS began implementing the NAWQA program in 1991 in 20 study units across the nation. Since then, additional studies have been launched in another 40 study units. Every state has at least part of one study unit within its borders. The first 20 study units have completed their initial work, and the USGS has already published many of the findings. Much of the information is available on its Web site at wwwrvares.er.usgs.gov/nawqa/natsyn.html.

The goals of the NAWQA program are to assess the status and quality of the nation's groundwater and surface water resources, and to try to link water quality with land use or other human factors. The USGS plans to compare information across 60 of the most important river basins and aquifers in the country and provide an unbiased basis for decision-making on research and regulatory actions.

The USGS set up detailed procedures to collect data consistently across the country. Analytical methodologies were established for over 200 analytes including a suite of pesticides.

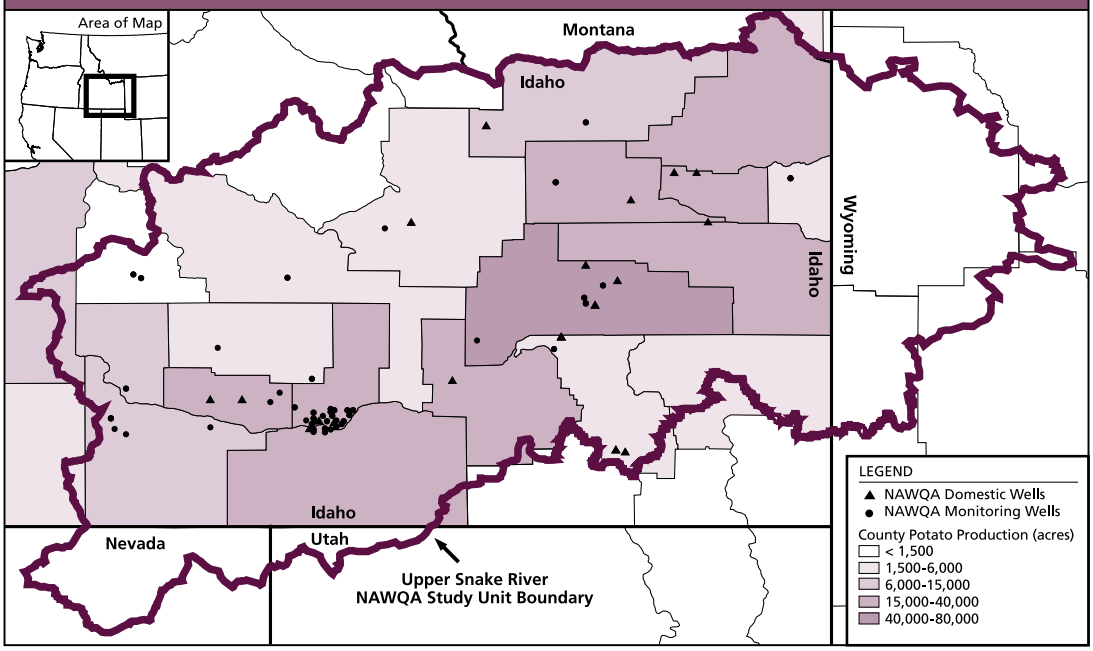
How SEI Applied the NAWQA Data

SEI interviewed the principal investigators for each of five study units in the NAWQA program and obtained their databases. While the number of parameters varied, we generally found very good well information, including depth to water, coordinates of the well, well age, and construction details. We queried the databases and captured all the wells that met our study criteria. The tricky part was figuring out if the NAWQA program wells were in areas where the pesticide was applied. With help from our GIS group, we were able to overlay the well locations with land use and chemical sales data coverages. The end result was a GIS map indicating where to focus our site selection efforts.

The map showed a number of domestic supply wells and monitoring wells that could possibly be used in lieu of new data points. We

(see NAWQA, page 4)

GIS Map of NAWQA Wells Within 1,000 Feet of Irrigated Land and County Potato Production in the Upper Snake River Basin Study Unit



Road Warriors Join New Sampling Team

Sampling has always been a large part of the work we do for FIFRA projects. Because these projects have been growing in size and scope, SEI decided it was time to invest in an in-house team whose sole responsibility is sampling. So far, our sampling team has proven to be cost-effective and has improved the quality of the resulting data.

The sampling team currently consists of three full-time staff technicians sampling in six states. They are Jim Reardon, G. Hampton Uzzelle, and Michael Nuss, road warriors spending 50% to 70% of their time in the field. They are supported by additional SEI staff members as needed, as well as SEI-owned sampling vehicles and storage facilities located in key regions.

GLP-trained in the sampling of soil, soil-pore water, and groundwater, the sampling team is comfortable with a wide range of equipment including hydraulic soil-coring devices, bladder pumps, flow-through cells, and water-quality meters. The team is currently sampling for small-scale prospective groundwater studies as well as large regional groundwater and tap water studies.

We anticipate that the team will grow in the next 6 months, as new studies require sampling in seven additional states.

State Databases Work Best for Surface Water Studies

In our cover story about surface drinking water in last spring's *Update*, we mentioned how helpful state databases can be. Here is some additional information about why state databases are preferable to the federal databases that are more widely available.

State databases are usually more detailed than the commonly used federal databases, such as SDWIS and BASINS. A typical state database contains the community water system (CWS) name, address, contact name, and phone number; the latitude and longitude of the intake location; and the river or lake name of the surface water source.

The federal SDWIS (Safe Drinking Water Information System) database contains only the CWS name, county, state, population, and primary source, referred to as "surface water" or "groundwater" only.

A second commonly used federal database, called BASINS (Better Assessment Science Integrating Point and Nonpoint Sources), is a little better: it contains the CWS name, city, state, latitude and longitude of the intake location, and river or lake name of the surface water source.

Note that neither federal database has a contact name or phone number, which are necessary, and harder than one might imagine to get. "It's no easy task to find this information, as we've found out," said Project Geoscientist John Hanzas. "You call directory assistance and ask for a water treatment plant and you get the number of a water-purifying manufacturer. Sometimes the numbers aren't listed, so we have to call city hall for them—we wind up making a surprising number of calls."

State databases aren't yet as accessible on the Internet as the federal ones. However, SEI now has approximately half the state databases on hand, and is making an ongoing effort to gather the rest of the data. "What we're doing is contacting the states, finding out who has the databases and what the time frames are for getting them," said Hanzas. "We're doing the footwork now so we can procure the most current databases quickly when our clients need them."

FQPA: The Science of Risk in Transition

An Editorial by Tammara L. Estes

In assembling this *Update* issue, we became convinced that the topic of the Food Quality Protection Act (FQPA) must be addressed. A subject so critical to how our scientific community addresses pesticide risks cannot be ignored. Clearly, it will be a dominant force in the pesticide registration process in the future.

We at SEI conducted an informal survey of some 30 of our industry contacts. Though perspectives differed, there was general consensus that FQPA may tie up EPA and industry resources for the next few years. Currently, industry is delaying internal product decisions until EPA provides more details and direction.

At the same time, the Office of Pesticide Programs (OPP) is in the process of reorganizing to accommodate the FQPA requirements. Inside sources at EPA estimate that it may be another 6 months to a year until the reorganization settles down and FQPA is fully implemented. OPP reorganization has been further complicated by the overwhelming volume of pesticide tolerance reviews (more than 3,000 to date) required per the FQPA law.

Many of these reviews have uncovered missing information, especially for older compounds on the market. As pesticide science has progressed over time, changes in scope, such as more extensive research on metabolites, and changes in study design have naturally evolved. Previously, older pesticides registered before guidelines were changed were usually "grandfathered" per their registration agreements. This will no longer be the case with FQPA. As a result, many agrochemical companies may need to stop pursuing new product registrations to save their limited resources for existing product support.

Having no time to attain concrete information and under pressure from several environmental lobbies, EPA has been forced to make ultraconservative assumptions as "filler" for the missing information. As expected, the use of ultraconservative assumptions has resulted in residue estimates exceeding tolerances for many compounds and may result in many adverse registration decisions. Industry representatives question whether these assumptions have a sound scientific basis, and the American Crop Protection Association has been involved in a grass-roots campaign to promote the passage of the Regulatory Fairness and Openness Act of 1999, H.R. 1592, by Congress. If passed, this law would limit EPA's power to make decisions under FQPA based on conservative assumptions.

"Passage of the FQPA law with its set deadlines does not automatically create good science."

The FQPA risk cup approach is innovative and requires the development of new systematic scientific methods. How to combine the effects of multiple pesticides from multiple sources along with their metabolites is a complex question, especially for those of us involved in the exposure side of the risk assessment process. For this reason, how the risk cup approach should be implemented is an important but very open question, and not entirely answerable by EPA alone. Passage of the FQPA law with its set deadlines does not automatically create good science, an issue with which EPA is struggling.

It seems as if communication between EPA and the agrochemical industry has broken down. I recommend that scientists from both communities work cooperatively to develop scientifically sound methods addressing FQPA issues. The proposed "Standard Operating Procedures of the HED FQPA Safety Factor Committee" is currently available for review at the OPP Web site, at www.epa.gov/opp00001/SAP/1998/december/sopreprt.htm. I encourage agrochemical scientists to review this document. It is a good starting point to examine some of the scientific issues raised by FQPA.

Section C of this document, "Dietary Drinking Water Exposure Considerations," is of particular interest to those of us who work in the environmental fate area. This section emphasizes the need for new methods of estimating pesticide concentrations in drinking water sources, especially on a large geographical scale. Tap water studies, surface water monitoring, and watershed level modeling may all be needed to adequately evaluate risk at this level.

If you have any insights or opinions you'd like to share about FQPA, please e-mail them to update@stone-env.com or mail them to *Update* Editor, SEI, at the address below. We'll print interesting and appropriate letters and editorials, as we have room, in our next issue of *Update*, which will be out in spring 2000. We hope to have much more clarity about this complex issue by then.

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Published each spring and fall.
Printed on recycled paper.


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NEWS BRIEFS

SEI Grows to 40

How big are we? Some people out there assume we're still a 15-person company and don't realize we're now a 40+ person firm currently managing one of the largest tap water studies in the nation. Here are some of our newest employees.

Amy Huetz, staff scientist in the GIS group, worked at Geographic Data Technology before joining SEI. She has a B.S. in Earth Science, Physical Geography Option, from Montana State University, Bozeman, Montana.

Terrianne Klein, staff engineer in the RASC group, returned to SEI after a leave of absence.

Patrick Larsen, staff geoscientist, came to SEI from the University of Nebraska Water Center. He has an M.S. in Geology from the University of Vermont.

Michael Nuss, staff technician and sampling group member, came to us from Chemlawn and is very familiar with pesticide application issues. He has a B.A. in Environmental Protection from West Virginia University.

Barbara Patterson, project database specialist, obtained her data management experience while with the Washington State Department of Ecology and with Patient Infosystems in Rochester, New York. She has an M.S. in Environmental Studies from Evergreen State College, Olympia, Washington.

Jerry Pelfrey, staff geoscientist, served 20 years in the Air Force before returning to college. He has an M.S. in Geology from the University of Southwestern Louisiana.

Jim Reardon, staff technician and sampling group member, recently switched from part-time to full-time. He has a B.A. in Geography and Environmental Science from San Francisco State University.

Kirsten Talmage, staff scientist, taught environmental science at Middlebury College, and has an M.S. in Environmental Studies from the University of Montana, Missoula.

G. Hampton Uzzelle, staff technician and sampling group member, holds a B.S. in Geology from the University of the South, Sewanee, Tennesee.

ACS Presentation

Chris Stone and **Michael Pottinger** attended the ACS meeting in New Orleans last August. They presented two posters and gave a presentation on GIS and surface water monitoring studies SEI is conducting. The trip gave Pottinger, a Tulane University graduate, a chance to revisit his old stamping grounds.

WIND2 Implemented

SEI has finished the conversion to an accounting and project management software package specifically designed for architectural and engineering firms. This investment will improve our financial management and project management, enabling us to obtain detailed budget updates on demand.

All SEI employees—not just project managers—recently attended a multi-day workshop on project management skills and how to use the WIND2 project management tools.

Site Selection Tips for Large-Scale Monitoring Studies

Large-scale regional and national studies are not new to the agrochemical industry, but they're likely to become more prevalent with the influence of FQPA, especially in the area of tap water exposure. Based on SEI's experience with three regional groundwater studies (the largest of which includes 1,000 sites), here are some insights for how to improve the site selection and study design of a large project.

The success of site selection is primarily affected by four things: (1) how clearly the goals of the project are defined up front, (2) whether the criteria are well defined and take into account local conditions, (3) landowner cooperation, and (4) public perception and community relations. If you address these four elements early, you'll be off to a good start.

Clear Study Goals

With the advent of FQPA, it's increasingly important to clarify study goals, because there is little published guidance for these large-scale monitoring studies. Is it a human exposure study or a regional groundwater study? Are you looking at the concentrations in tap water? Or at groundwater? Are you looking at past use based on past labeling requirements or current use representative of current labeling restrictions? The answers to these questions may have a significant impact on your study design as well as the sites you ultimately select. When you are establishing study goals, it is also important to keep in mind how they will influence statistical design.

Site Criteria

For many projects, high use is the first criterion. But what does high use mean? Used within the past 5 years? Applied 10 times within the past 10 years? Soil type, depth to groundwater, and slope are other common criteria that can play a large role in assessing vulnerability.

It often seems that one set of criteria is established for the entire study, even though the study encompasses several regions across the country. A criterion such as 50 feet to groundwater works in the Florida Central Ridge with high precipitation and low topography, but may not work in eastern Washington, which is characterized by arid conditions and deep river valleys.

"We think we should look at deeper wells in certain areas," said Project Geoscientist Susan Alexander. "We're trying to show if there is a hydraulic connection between what's going on at the surface and what's happening in deeper aquifers. Vulnerability may have little to do with depth—it may have more to do with other characteristics of the aquifer." For example, in a study area in Washington, the average depth to water is 140 feet. "But there were nitrates showing up in this aquifer. Why are surface-applied chemicals showing up in deeper aquifers? Because these are vulnerable areas," Alexander concluded.

Sometimes states are involved in setting criteria because they have special concerns, but this varies greatly. California, Florida, New York, and Wisconsin all have strong regulatory groups. For SEI's three recent regional studies, one was heavily influenced by a state; in the second, our client enlisted the aid of the states involved to expedite the process and sign off on sites; in the third, there was very little state involvement. *(see Tips, page 4)*

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NAWQA

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still need to "land locate" each well and see if it is within the distance specified for the pesticide application. Even if all these wells qualify, they will still represent a very small percentage of the total points we need for the study.

How NAWQA Can Help

Based on our evaluation, we're cautiously optimistic that NAWQA data can enhance future studies in two major ways: by replacing data points, and by directing studies to vulnerable areas. "In addition to looking at soil type and precipitation and depth to water to determine what areas are vulnerable, you can use NAWQA data to see where leaching is actually occurring," said Michael Pottinger, FIFRA group leader. "Certain areas not considered vulnerable in the classical sense can have nitrates or other chemicals in groundwater." NAWQA can also help with setting study criteria.

To maximize the benefits of the NAWQA research, look at the NAWQA studies in the areas where your product is used *before* finalizing your study criteria. NAWQA was flexible about criteria, taking local conditions into account. If you can factor local conditions into your criteria as well, you have a chance to save time and resources for large-scale studies.

Tips

(continued from page 3)

Application data is pivotal to expediting site selection. The best case scenario is when application records are available digitally and provide information at the field or section level. The state of California mandates this level of record-keeping and reporting. The next best is when application records are kept on a county-by-county basis. This is often done by independent marketing research companies. Unfortunately, these scenarios are the exception, not the rule.

Pesticide sales data is more readily available than application—or use—data. The sales data that the sponsor provides is generally at the county level. Sales reps can often provide the names of the people they sold to and the amounts sold, but usually not the exact field locations where the compound was applied or the application rates. The only way to find this out is to call the individual growers/farmers directly, which can take a lot of time. Ideally, dissemination of sales data is coordinated between the regulatory and marketing departments of a company. Other sources of application data include crop associations, agricultural extension agents, custom applicators, and the network of friends and relatives of the growers/farmers you have already spoken with.

Soil type is often included as a project criterion. Our library includes most of the soil surveys in the country, which provide soils data at the field level. We are able to quickly locate soils that meet the study criteria by querying NRCS regional databases. We can either look at broad categories of soils—such as sandy soils or hydrologic group A or B soils—or do very specific soil modeling to assess the leaching potential of a compound and its degradates over a range of crops, soil types, weather patterns, irrigation scenarios, application rates or methods, or regions of the country.

Landowner Cooperation

We use a combination of methods to find landowners who may be willing to cooperate in a study. Such methods include consultation with the sales reps, custom applicators, or extension personnel; direct mailings; press releases to trade journals; and meetings with members of the farm community. It is helpful to have a local resource such as a dealer, sales rep, or growers association introduce or directly refer us to landowners.

Prior to meeting landowners, we try to anticipate their questions and concerns about participation in a study. They often ask such questions as, "What will happen if there are significant detections? How often will you collect samples and will I need to be present?" It helps to develop and distribute to each potential cooperator the answers to frequently asked questions.

We also provide a site access agreement during the initial and sometimes only meeting with landowners.

Compensation can be a complex issue, and may consist of a certain amount of cash or product, or a token of appreciation. For one study, compensating landowners seemed to increase their willingness to cooperate. However, for another study, the landowners were quite willing to cooperate even though there was no compensation.

Public Perception and Community Relations

These studies often involve a vast range of people and perspectives. It's important to be sensitive about the information shared, and the impact it will have on the sponsor's community relations. We recommend planning in advance what information will be shared and preparing for the possibility of questions from the media.

These are just a few ideas from the various large-scale projects we have worked on. If you, the reader, have other tips you'd like to share with your colleagues, please don't hesitate to e-mail them to update@stone-env.com or mail them to *Update* Editor, SEI, at the address on page 2.