National Water Research Institute
BRIEFINGS
VOLUME 12, NUMBER 3 FALL 2003

Conference Shows Worldwide Potential of Riverbank Filtration Technology

This September, NWRI held the second conference ever in the U.S. to address riverbank filtration (RBF) technology. The Second International Riverbank Filtration Conference — which featured field trips to RBF sites in Louisville, Kentucky, and Cincinnati, Ohio — was, in the words of one attendee, an "excellent opportunity to be among the best and brightest in the RBF business."

The "Research Needs" Panel (from left): Dr. Edward Bouwer of the Johns Hopkins University; Professor Vladimir Rojanschi of the Ecological University Bucharest; Dr. Monica Emelko of the University of Waterloo; Dr. Peter Fox of Arizona State University; and Dr. Thomas Grischek of the University of Applied Sciences Dresden.

Considered an "emerging" technology, RBF is a low-cost and effective treatment process that removes impurities from surface-water sources, such as rivers and lakes. It has been used for more than 100 years in Europe as a technology in the production of drinking water, but is relatively unknown in the U.S.

Attitudes are changing, however. The U.S. Environmental Protection Agency is currently developing the Long Term 2 Enhanced Surface Water Treatment Rule, which is the first U.S. drinking-water regulation that recognizes RBF can remove the disease-causing organism, *Cryptosporidium*, from drinking-water sources.

Because of the upcoming rule and its potential impact on RBF, NWRI organized the Second RBF Conference, which showcased over 40 speakers from around the world. The first conference was held by NWRI in 1999.

"The first conference brought forth broader and more intense RBF discussion and research in the U.S.," said Dr. Thomas Grischek of the University of Applied Sciences Dresden. "The second conference showed advances in research in the U.S. and Europe, including more field study presentations, and provided a chance to compare approaches and the main aims of RBF in the world."

Dr. Grischek was one among 15 conference Planning Committee members who spent months organizing the second RBF conference. The Chair of the Planning Committee was Dr. Chittaranjan Ray of the University of Hawaii at Mañoa.

"This conference was a good start for engineers and scientists in the U.S. to consider RBF as a pretreatment or alternate treatment technology to achieve water-quality goals," said Dr. Ray. "Utilities that are planning new RBF systems may be able to benefit from the topics presented at the conference."

The presentation topics varied from the costs and benefits of RBF systems to issues such as flooding and plugging to case studies from RBF systems around the world.

The Finland case study, for instance, introduced a new concept — sprinkler infiltration — as part of a study to examine microbial growth in artificially recharged groundwater. The Czech Republic case study looked at the effects of agriculture — specifically nitrate contamination — on the quality of water resources for RBF. And, on the opposite side of the world, the Bolivian case study evaluated the performance of infiltration galleries in alluvial deposits in the riverbed of the Parapeti River.

The purpose of the conference was to present the experiences of waterworks worldwide and address the issues faced by users of the technology, including operational experience, contaminant removal, riverbed dynamics, public policy, and research needs.

Dr. Douglas Schnoebelen of the U.S. Geological Survey, a hydrogeologist who presented on groundwater flow and water quality in Cedar Rapids, Iowa, hoped that his presentation would "stimulate new ideas and considerations for the future."

Continued on Page 8

In this Issue...

Water Softener Project Focuses on Consumer Trends

Hard water is a common nuisance in Southern California homes. Caused by minerals such as calcium and magnesium in groundwater and surface water, water hardness leads to difficulties in making suds for washing and to mineral build-up on taps and other fixtures. Water softeners are designed to alleviate these problems by exchanging calcium and magnesium for "softer" minerals, such as sodium; however, when large amounts of sodium chloride are added to the water, a waste stream that contains significant amounts of chloride is flushed into the sewer, creating salinity problems for wastewater treatment and the environment.

Principal Investigators Kim L. Knight (left) and David S. Kung, Ph.D., of the Claremont Graduate University in Claremont, California.

To help mitigate salinity issues that are caused by the use of water softeners in residential households, the Southern California Salinity Coalition is funding a water softener pilot project launched by David S. Kung, Ph.D., and Kim L. Knight of Claremont Graduate University in Claremont, California. Dr. Kung and Mr. Knight are evaluating consumer preferences regarding the use of water softening devices and different types of incentive programs to determine how to best modify water softener use.

Phase 1 of the project consisted of four major components: focus group sessions, focus group multiple questionnaires, a large-scale general survey, and an incentive program.

The focus group sessions — held at the headquarters of the Irvine Ranch Water District (IRWD) in Irvine, California, and attended by IRWD customers — revealed four distinct trends:

- Consumers were significantly misinformed or lacked information about the effects of water softeners on wastewater treatment.
- Participants without water softeners wanted to regulate the change-out of softeners as a primary solution to the problem.
- Participants with softening devices were willing to change or modify their use of water softeners, if appropriate justifications and adequate monetary incentives are offered.
- Consumers trusted water districts as sources of accurate information about water-quality issues.

As focus group participants became more aware of the effects of chloride-based water softeners on wastewater treatment and the environment, Dr. Kung and Mr. Knight noticed a significant change in attitudes toward water softening systems. Nearly 75 percent of the participants who used water softeners wanted an incentive to change their system, and only 7 percent of participants refused to change at all.

In addition to focus group sessions, 4,000 general

Chittaranjan Ray Receives Fullbright Award

NWRI is pleased to congratulate Dr. Chittaranjan Ray for receiving the Fulbright Senior Research Fellowship from the Council of International Education's Middle East, North Africa, and South Asia (MENASA) regional program to conduct research in India, Nepal and Bangladesh.

Dr. Ray, Associate Professor of Civil and Environmental Engineering at the University of Hawaii at Mañoa, is an expert on riverbank filtration (RBF). Considered a new technology in the U.S., RBF is a process in which horizontal and vertical wells placed on riverbanks can use soil and sand in the aquifer to filter out suspended and dissolved chemicals, as well as pathogens, present in surface water.

Because of his expertise in RBF technology, Dr. Ray chaired NWRI's Second International Riverbank Filtration Conference, held in September 2003, and co-edited the book *Riverbank Filtration: Improving Source Water Quality*, which was published by Kluwer Academic Publishers and NWRI in 2002.

Dr. Chittaranjan Ray

With the benefit of the Fulbright fellowship, Dr. Ray — a native of India — plans to put his expertise to further use. He will study the potential of RBF to produce drinking water in cities such as Dacca in Bangladesh, as well as Kathmadu, Nepal, Kanpur, Lucknow, Allahabad, Varanasi, and Patna in India. He will examine each city's current method of drinking-water production, as well as geologic and hydrologic potential for RBF during plant expansion. With assistance from the U.S. Educational Foundation in India, Dr. Ray also plans to organize a workshop in Roorkee, India, on the benefits of RBF.

How Water Softeners Work

Water picks up bits of whatever it passes through, including minerals found in the earth. Of these minerals, calcium and magnesium are of particular importance because they make our water hard.

One consequence of hard water is that soaps and detergents lose some effectiveness. Hard water also affects plumbing systems. Calcium and magnesium deposits can build up in pipes, reducing flow to taps and appliances. These buildups also reduce the efficiency and life of water heaters.

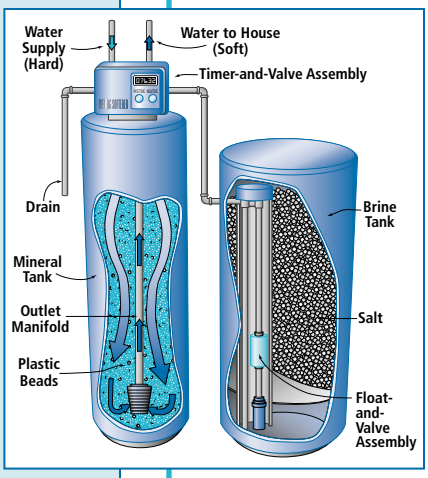
The solution to the problem is to remove calcium and magnesium — usually with a water softener.

The typical water softener is a mechanical appliance that is plumbed into a household water supply system. The heart of a water softener is a mineral tank, which is filled with small polystyrene beads that carry a negative charge.

Calcium and magnesium in water carry positive charges, meaning that these minerals will cling to the beads as hard water passes through the mineral tank. Sodium ions also have positive charges. When a very strong brine solution is flushed through a tank that has beads already saturated with calcium and magnesium, the sheer volume of the sodium ions is enough to drive the calcium and magnesium ions off the beads. Water softeners have a separate brine tank that uses common salt to create this brine solution.

Hard water poses no health hazard. Softened water, however, leaves a sodium residual, which gives it a slightly salty taste. The water softening process also creates brine, which when disposed of, introduces excess salt into the environment.

Source: www.popularmechanics.com



surveys were mailed to IRWD customers to gain their views on the effects of water softeners and their willingness to consider alternatives to chloride-based water softening devices, if offered cash incentives.

Similar to the focus group participants, most of the survey respondents supported an environmentally friendly change. Sixty-six percent of water softener owners and 53 percent of non-owners were in definite support of the effort to remove chloride-based softeners. Only 11 percent of respondents stated that they would refuse to change their present systems. The majority of water softener users who expressed an interest in changing systems chose either a non-chloride based system (54 percent) or a high efficiency salt-based system (26 percent) as their preferred replacement.

Included with the survey was an incentive program with cash awards. The incentive program — funded by a separate grant from the California Department of Water Resources — provided consumers with three cash payment options for removing or significantly modifying their existing water softening systems. Of water softener users, 8 percent chose to change to a portable exchange service or a non-chloride unit, and an additional 8 percent chose to change to a high efficiency unit. Of those households planning to buy new water treatment systems, 8 percent chose non-chloride-based water softeners.

Nearly 75 percent of the participants who used water softeners wanted an incentive to change their system, and only 7 percent of participants refused to change at all.

Follow-up interviews are planned for focus group members and for households taking part in the incentive program. According to Mr. Knight, "Having ongoing communication with consumers, educating them, providing them with alternatives to chloride-based water softeners, and subsequently studying their behaviors will provide the Coalition with invaluable information on possible motivators and courses of action in dealing with their customers and salinity in the future."

Phase 2, which begins in October 2003, will specifically look at consumer characteristics.

◆ ◆ ◆

The Southern California Salinity Coalition was formed in 2002 to address the critical need to remove salt from water supplies and to preserve water resources in California. The non-profit organization is administrated by NWRI and is composed of 11 member agencies, including the Calleguas Municipal Water District, Central and West Basins Municipal Water Districts, City of Los Angeles Department of Water and Power, Inland Empire Utilities Agency, Irvine Ranch Water District, Sanitation Districts of Los Angeles County, Metropolitan Water District of Southern California, Orange County Sanitation District, Orange County Water District, Santa Ana Watershed Project Authority, and San Diego County Water Authority.

NGT Workshop Cleans Up CALFED Drinking-Water Goals

During the summer of 2003, NWRI — in cooperation with the CALFED Bay-Delta Drinking Water Quality Program and U.S. Environmental Protection Agency (EPA) Region IX — held an intensive 2-day workshop to address CALFED drinking-water goals.

The CALFED Bay-Delta Authority is a cooperative effort of over 20 state and federal agencies working with local communities to improve the quality and reliability of California's water supplies and to revive the San Francisco Bay-Delta ecosystem. The Drinking Water Quality Program was formed to provide safe, reliable, and affordable drinking water to the 22-million Californians who rely on the Delta for all or part of their drinking water.

Workshop participants Dr. Bruce Macler of the U.S. Environmental Protection Agency, Dr. Pankaj Parekh of the Los Angeles Department of Water and Power, and Dr. R. Scott Summers of the University of Colorado, Boulder, worked on identifying a common, statewide definition of "safe" drinking water.

As described in the Record of Decision, the CALFED water-quality goal is to achieve either (a) an average concentration at Clifton Court Forebay and other south and central Delta drinking-water intakes of 50 micrograms per liter of bromide and 3.0 milligrams per liter of total organic carbon or (b) an equivalent level of public health protection using a cost-effective combination of alternative source waters, source control, and treatment technologies.

However, many water experts felt that these goals needed to be reexamined. "The goals were written a long time ago," said NWRI Executive Director Ron Linsky. "We have to ask, in terms of 2003, are they still realistic?" To address this issue, NWRI agreed to facilitate a nominal group technique (NGT) workshop in cooperation with EPA.

Thirty-one workshop participants — representing commercial, municipal, agricultural, and other interests throughout California — met at the Kellogg West Conference Center and Lodge at the California Polytechnic University at Pomona to address the question: *What are the most important actions that must be taken to meet the CALFED drinking-water quality goals in a cost-effective and equitable manner?*

The NGT process allowed participants the opportunity to identify, prioritize, and develop 86 issues and 26 overarching themes that best addressed the question.

For workshop co-organizer Bruce Macler, Ph.D., National Microbial Risk Assessment Expert for EPA, one of the most important actions was to identify a common, statewide definition of "safe" drinking water suitable for use as the CALFED drinking-water quality goal of "equivalent level of health protection."

"The phrase doesn't mean anything: equivalent to what?" said Dr. Macler. "Some alternatives could be less toxic, some more toxic. I felt that we had this big unknown in 'equivalent level of health protection.' I wanted to see what other people consider 'safe' because that could help CALFED define its goals."

Other workshop participants agreed, identifying the issue as one of ten significant priorities.

The first priority was to develop integrated water-quality improvement strategies at local and regional levels. Participants recommended that each agency develop its own Equivalent Level of Public Health (ELPH) plan, with input from local stakeholders. In addition, CALFED and its implementing agencies should form partnerships with local and regional agencies to conduct the needed technical studies and to develop cost information. Participants also suggested that CALFED establish a Technical Advisory Committee comprising local agency representatives to help design guidelines for the development of an ELPH plan and related background materials.

Additional priorities included developing a long-term finance plan for water-quality improvement, understanding and managing the impact of population growth and various land-use practices on water quality, and identifying the most significant sources of degradation of Delta water quality.

> ***"If you don't have goals, you don't know where you're headed. We conceived of this workshop to get at the goals of CALFED drinking water."***
>
> ***~ Dr. Bruce Macler***

"If you don't have goals, you don't know where you're headed," said Dr. Macler. "We conceived of this workshop to get at the goals of CALFED drinking water. What's interesting is that many of the old goals have shown up, as well as some new goals. For example, participants are much more interested in economic analysis and in determining the worth of water for different uses, which is really the result of NWRI's work on the value of water."

"It's kind of fun to see what people who've been involved for a long time now see," he added. "We're all evolving. You can't see day-to-day change, so it seems like thinking has evolved in one big step. It's like watching the kids grow up."

Joint Scholarship Furthers Middle East Desalination Research

NWRI and the Middle East Desalination Research Center (MEDRC) have joined forces to help alleviate water concerns in the Middle East and North Africa by co-funding a $75,000 doctoral fellowship in the field of desalination.

MEDRC was established in Muscat, Oman, in 1996 as a result of NWRI-led discussions in the Multilateral Working Group on Water Resources, and represents one of the concrete benefits of the multilateral Middle East peace process. With the support of member countries — including the Sultanate of Oman, Israel, Japan, Republic of Korea, and United States — MEDRC conducts, supports, and coordinates basic and applied research and development in water desalination and supporting fields, with the overall objective to reduce the cost of desalination.

Desalination — a water treatment process that removes dissolved mineral salts and other dissolved solids from water — is crucial to the Middle East and North Africa (MENA). According to Dr. Mousa Abu Arabi, Research and Development Project Manager for MEDRC, over 50 percent of the desalination capacity worldwide is taking place in the MENA region. This is because more than half of the countries in the region have fallen below the World Health Organization's benchmark at which chronic water scarcity is considered to impede development and harm human health (1,000 cubic meters per person per year), and the rest of the region is not far behind. As a result, all MENA countries use desalination to augment their water supply, and countries like the United Arab Emirates, Kuwait, Bahrain, and Qatar depend solely on desalination for water.

Desalination will become even more important as drought conditions worsen, populations grow, and water demand increases due to the expansion of industrial activities and the development of tourism. Within the next 20 years, it is estimated that the MENA region will become so dependent on desalination technology for sustainable water that a minimum of 50,000 additional technical experts of various professional levels will be needed to service the desalination industry; however, desalination-based education programs within the region are limited. A more coordinated education and training approach is necessary to meet the estimated needs for industry growth.

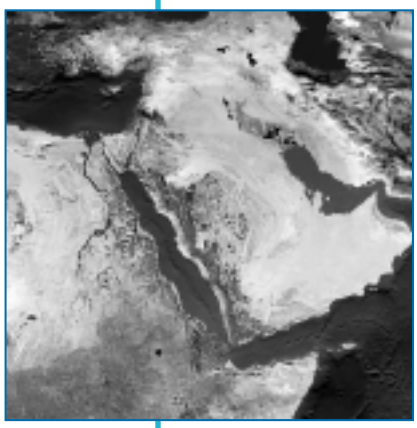


Photo courtesy of NASA.

To address this issue, MEDRC has formed a scholarship program that offers graduate students from the MENA region the opportunity to study at world-renowned universities while participating in a MEDRC research project. The NWRI-MEDRC joint fellowship marks the first co-funded initiative for the program. Partnership with NWRI compliments MEDRC's goal to establish ties with global research organizations and universities to create desalination-focused capacity building programs for regional students.

To qualify for the fellowship, candidates must be nationals of countries from the MENA region who are accepted by an American university. The award is renewed annually at $25,000 per year based on continued progress toward achieving the doctoral degree.

For further information, please contact MEDRC at scholarships@medrc.org.om.

RESEARCH IN PROGRESS

Evaluating Filter Loading Technologies for Water Reuse

Dr. Bahman Sheik

Dr. Bahman Sheikh and his research team have begun a project to address the limitations of current regulations on treatment for water reclamation in California. The Filter Loading Evaluation for Water Reuse project will determine if tertiary filters producing recycled water can be operated at higher loading rates than the mandated rate imposed by Title 22 (Water Recycling Criteria). During the two-phased project, the team will run pilot-sized filters and then full-scale filters at five collaborating treatment plants — Monterey, San Jose, Santa Rosa, Los Angeles County Sanitation Districts, and West Basin MWD — at a series of different loading rates. Particle counters, turbidity meters, coliphage seeding, and pathogen monitoring will provide the data for determining any correlations and statistical analyses. Currently, pilot filters, piping, instrumentation, chemical feed, and automated monitoring equipment have been constructed and installed, and are being tested at the tertiary facilities of the Monterey Regional Water Pollution Control Agency.

Workshop Looks at Ocean as New Source of Water Supplies

Over 70 water professionals attended the Ocean Water Desalination Workshop, hosted August 8, 2003, by West Basin Municipal Water District in Carson, California. The daylong workshop featured speakers from England, Spain, and the United States who shared their expertise in a variety of disciplines, ranging from desalination plant operation to the economic value of water.

NWRI Executive Director Ronald Linsky spoke about the value of water at the Ocean Water Desalination Workshop in August 2003.

Attendees showed great interest in the operation of functioning desalination plants, particularly in Spain. Spanish water agencies have put desalination into practice across the Iberian Peninsula and Mediterranean Sea. Since the first desalination plant was built in 1972, seven plants have been assembled along the coast. Currently, over 2-million Spanish residents are drinking water produced from seawater.

"We refer to Spain as the California of Europe," said workshop participant Tony Rachwal, Innovation and Development Director for Thames Water in the United Kingdom, "[because] Spain has an ever increasing population base with scarce water resources." Therefore, lessons learned in Spain are especially important to California water planners, who also face an increasing population and decreasing water source. According to workshop speaker Ron Linsky, Executive Director of NWRI, California water agencies and planners need to locate 36-million gallons of additional water per day for the estimated 366,000 Californians born each year. As a result, Californians — like the Spanish — need to continue to recycle water by expanding reclamation and conservation programs and by ultimately moving toward seawater desalination.

Another important issue addressed by participants was the cost of desalination. Speaker David Furukawa of Separation Consultants, Inc., in California, revealed that project delivery methods and new technology have dramatically reduced the cost of seawater reverse-osmosis technology in the past 20 years. According to Mr. Furukawa, the biggest gains have been made in membrane salt removal and energy recovery.

To continue to lower costs and increase the energy efficiency of desalination, workshop participants suggested that water planners actively promote desalination in the legislature. "It is up to water planners to promote desalination in Congress and to encourage the same investment for desalination as any other water supply," said Hal Furman of the United States Desalination Coalition. The Coalition has proposed legislation for a competitive, performance-based federal program that would provide funding — in the form of Energy Assistance Payments — to water agencies and utilities developing seawater or brackish water desalination projects in the United States.

At the end of the day, many workshop participants shared the view of the Spanish water experts, who had one clear message: water professionals need to look at a portfolio of options. Besides water recycling and conservation, Californians — as well as national and international water planners — need to look to the ocean as a potential unlimited resource.

◆ ◆ ◆

For more information about the workshop, please contact Michele Ramos at micheler@wcbwater.org or at (310) 660-6225.

Conference Announcement

The Association for Environmental Health and Sciences and the Naval Facilities Engineering Service Center present:

The 14th Annual West Coast Conference on Soils, Sediments, and Water
March 15-18, 2004
Marriott Mission Valley, San Diego, California

For the past 13 years, the Soils, Sediments and Water Conference has helped to bring the environmental science community closer together by providing a forum for the presentation and debate of important issues related to soil, sediments, and water. This year, the conference promises to be an exciting opportunity for water professionals who are concerned with developing creative, cost-effective assessments and solutions to pressing environmental issues.

Sessions will feature more than 20 topics, including acid mine drainage and recovery of metals; bioavailability; contamination at military installations, and environmental forensics, among others.

For more information, please visit www.aehs.com or contact Brenna Bartell at brenna@aehs.com or (413) 549-5170.

Summer Internship Adds Water Research to Student's Environmental Concerns

With interests ranging from environmental studies to classical music, Francine Yeung is the epitome of the well-rounded student and a welcome addition to NWRI. This summer, Francine — who is a native of Hong Kong — spent 5 weeks working as a research assistant for NWRI and the Orange County Water District (OCWD).

"I heard about NWRI through a friend, and was really interested because it deals with water research and development — a field I'd never touched upon at the time," said the 18-year-old. "I visited the website and realized it was associated with the Orange County Water District, which was very appealing since I could relate the problems in Orange County to one of my college courses about local aquifers and what was being done to solve water problems."

At OCWD, Francine worked with a number of senior scientists, including Jana Safarik and Menu Leddy at Water Resources and Technology and Stephen Lyon at Field Headquarters. She was responsible for cleaning and stocking supplies, as well as assisting with more specific tasks, such as filtering, preparing bacteria cultures, and dyeing, counting, and recording bacteria samples.

"It was an enjoyable experience," she said, "and probably would have been even more so if I had stayed longer." In August, she returned to the University of Southern California (USC) in Los Angeles, where she is pursuing a B.S. degree in Environmental Studies, emphasis in Geology.

A second-year student, Francine lives on campus and participates in numerous activities, including the Asian American Christian Fellowship. Last year, she received the Leadership Award from the International Office of USC for her contributions to the Hong Kong Student Association and the International Student Assembly. This year, she wants to take part in the Asian-American Tutorial Project to tutor elementary school students every weekend. This is in addition to a demanding academic schedule, which currently includes classes in religion, East Asian societies, chemistry, and geology.

"The first two classes are general education classes," she said, "so they give me some diversity from my major, which I feel is important for my future career. I want to understand and appreciate people from various backgrounds. I feel that it will enhance how I work with others on environmental issues in the future."

Francine herself comes from a varied cultural and environmental background. Last year, she came from Hong Kong to the United States to attend USC. In Hong Kong, she spent 6 years at an English-based secondary school — King George V School in Kowloon — that fostered her interest in environmental issues. In addition to a rigorous academic curriculum, the school is dedicated to an environmental policy of raising awareness and enabling action among its students and the Hong Kong community. Many students are members of Environment Defense Educate Nurture, a student-run non-profit organization led by Student Environmental Protection Ambassadors (SEPAs) such as Francine, who served as a SEPA during her last year of school in Hong Kong.

"Basically, I encouraged students in my high school to be environmentally friendly by setting a good example," she said. "Apart from reducing, reusing, and recycling, I involved myself with tree-planting, fundraising events such as saving pink dolphins, and organizing environmental competitions for the school." Since the SEPA program is supported by the Environment Campaign Committee and the Hong Kong Education Department, she also recorded all of her activities in a log book and mailed it back to the government organizations after 1 year, making her something of a government representative as well.

Menu Leddy (left) of the Water Resources and Technology Department at the Orange County Water District was a mentor to 18-year-old Francine Yeung (right), an Environmental Studies major at the University of Southern California.

In addition to her environmental duties, Francine was also involved in the Hong Kong Award for Young People, a worldwide organization dedicated to forming well-balanced students. After fulfilling a number of criteria over the course of a year — including community service, expeditions such as hiking and camping, and skills such as playing the piano — she received the Silver Award, the highest level offered at her school.

But her interests don't end there. Francine has studied French, worked for a student-run company in the Young Enterprise Program, studied vegetation in Vietnam, and mastered the piano and musical theory under the Associated Board of the Royal Schools of Music. She even has previous intern experience; in 2002, she worked at the Hong Kong branch of Onyx, a leading international waste management company, where she learned about the Hong Kong government's views on waste, water, air, and noise pollution, and how it aims to control these problems — issues that continue to concern her today. "Hong Kong has significant air and noise pollution — something I want to reduce!"

As a result of her internship with NWRI, Francine also has become more concerned with water-related issues: "Water is one of the most important resources in the world. The amount of useable water is diminishing, and there has been speculation about going to war for water in the future. I haven't decided whether to pursue a career in water research, since this is only my second year in college; however, it does look very promising."

RBF Technology Showcased at Conference

Continued from Page 1

"There are many things that we do not fully understand," he said, "about the many physical and chemical changes that occur as water moves from the stream to the aquifer. Scientists will be able to provide much in terms of research that will help water plant operators and managers. The key will be getting the research out to those that need it. I hope that RBF will be useful for many developing countries in the future."

One of the most intriguing elements of the conference was the difference between American and European approaches to RBF. Keynote speaker Dr. Martin Jekel of the Technical University of Berlin pointed out that RBF research in the U.S. focuses on quantity, whereas the European focus is on quality.

Purchase the *Second International Riverbank Filtration Conference Program and Abstracts* and the PowerPoint Presentations CD-ROM together for the discounted price of $35.00. Visit the NWRI bookstore at www.NWRI-USA.org for details.

In Germany, for instance, there is a minimum 50-day travel time of water from the surface-water body to the well, in which RBF acts as an artificial aquifer recharge method and in which groundwater is withdrawn a significant distance away from the water body. This 50-day travel time forces more contaminants out of the water, which improves quality. In the U.S., RBF wells are located closer to the water body, and the natural filtration process occurs in a much shorter time frame, without significantly considering travel time. Due to the fast pace, this process produces more water, but does not filter out as many contaminants, which means the filtered water may require further treatment and disinfection.

According to Planning Committee member Stephen Hubbs of the Louisville Water Company, "The most interesting thing that I realized at the conference is that we all base our perceptions on our history. In Germany, the 50-day rule was developed based on a knowledge of how devastating the cholera outbreaks in 1890 were, and how effective RBF was in avoiding this public health scourge. In the U.S. during the early 1900s, the same association with public health and water quality was drawn, but in the U.S., the association was specific to the filtration and chlorination of river waters. Now, we are all looking at the process from a rigorous science background, and I am sure that in the future we will develop design and operation criteria based on modern science."

Another lesson learned was that U.S. water utilities can use the technology to their benefit in meeting upcoming regulations.

"As we proceed with new drinking-water regulations for surface waters," said Keynote Speaker Dr. Edward Bouwer of the Johns Hopkins University, "there are some new incentives to use RBF to obtain pathogen removal credit. The proposed techniques on monitoring and the use of surrogates, as discussed as the conference, will help establish site-specific behavior and should eventually lead to favorable negotiations with regulators to increase the pathogen removal credit."

Conference attendee John McDaniel of the Ohio Environmental Protection Agency (EPA) was also supportive of RBF's potential, saying: "RBF can be a very important alternative source of drinking water." His interest in the conference stemmed from the fact that Ohio's aquifers have tremendous potential for RBF. A colleague at Ohio EPA, Dan Cloyd, agreed: "Ohio EPA will be challenged in the future regarding new concepts of water treatment, with RBF becoming an essential treatment component."

Altogether, over 120 people attended the conference, which was held in Cincinnati, Ohio. No less than 13 countries were represented, with some traveling from as far away as Eastern Europe, Japan, and China to learn more about RBF.

For instance, Zsuzsanna Varadi, a doctoral student in civil engineering at the Technical University of Budapest, Hungary, sat through a 14-hour flight to "learn what the world knows about RBF." She was pleased to find out that Hungary is up-to-date in its research and technology.

Conversely, Dr. Jun Ma of the Harbin Institute of Technology in Harbin, China, was so impressed that he intended to spread the word about RBF as soon as he returned to China, where there are great possibilities for — but little knowledge of — RBF.

Overall, the conference left participants with eye-opening lessons about RBF and its potential as a drinking-water treatment technology.

Barry Beyeler of the City of Boardman, Oregon — and a presenter who spoke from the perspective of the owner of an RBF collector well — hoped that attendees went home with a greater appreciation and awareness of the benefits of the technology.

"RBF can provide a level of treatment to provide quality water and quantities that are capable of sustaining growth at an economical price," he said. "Traditional treatment methods are more complex and expensive to build and operate, and do not provide superior treatment. The natural process of RBF is both effective and economical, even if conditions require additional treatment."

The conference was so successful that two new RBF conferences are being planned: one in China in 2005 and one in North America in 2006.

National Water Research Institute

10500 Ellis Avenue
P.O. Box 20865
Fountain Valley, CA
92728-0865

(714) 378-3278
Fax: (714) 378-3375

www.NWRI-USA.org

Editor: Gina Melin

Editorial Assistant: Kristin Wehner

E-mail: gmelin@NWRI-USA.org

Graphic Design: Tim Hogan