

Dr. Vernon L. Snoeyink Receives 2004 Clarke Prize

For over a decade, the Athalie Richardson Irvine Clarke Prize has been awarded to outstanding scientists for excellence in water research. This year, the Prize was presented to Vernon L. Snoeyink, Ph.D., for his commitment to water research and education.

The Eleventh Annual Clarke Prize Award Ceremony and Lecture was held on July 15 at the St. Regis Monarch Bay Resort & Spa in Dana Point, California. Mrs. Joan Irvine Smith, patron of the award, presented Dr. Snoeyink with the Prize's gold medallion and \$50,000 award. Family, friends, and distinguished admirers — including President George W. Bush and Governor Rod Blagojevich of Illinois — offered their congratulations.

"I applaud Dr. Snoeyink for your contributions to your profession," wrote President Bush in a letter of commendation. "Through advancements in science and technology, we will continue to improve the quality of life for countless people."

For the past 35 years, Dr. Snoeyink has made major advancements in the understanding, engineering, and teaching of processes that enhance drinking water.

The three areas in which Dr. Snoeyink has made groundbreaking discoveries include the control of corrosion products that form in drinking-water distribution systems; modeling the behavior of granular activated carbon to remove trace contaminants from drinking water; and innovative combinations of powdered activated

carbon with membrane filters to enhance the performance of membranes. His procedures are now widely used by major water utilities in the United States and Europe.

In recognition of these accomplishments, Dr. Snoeyink has received 20 awards for outstanding research throughout the years, and has been an invited speaker at 20 technical meetings in countries such as Australia, China, The Netherlands, Lebanon, Turkey, Singapore, Japan, and France. In 1998, the members of the engineering community in the United States elected him to the National Academy of Engineering — the highest honor an engineer can receive.

In 2002, Dr. Snoeyink was named Director of the Science and Technology Center for Advanced Materials for the Purification of Water with Systems (Water CAMPWS), which will be funded for 10 years by the National Science Foundation. The primary mission of Water CAMPWS is to develop new materials and technologies for drinking-water treatment.

While Dr. Snoeyink is actively involved in drinking-water research and in advisory boards and committees to develop solutions to global water-quality problems, he is, above all, a teacher.

"The best part of my professional career has been the opportunity to work with students, to be part of their lives in some small way, and to reap the significant benefits from interacting with them," he said.



Dr. Vernon Snoeyink

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NWRI Co-Founder Honored for Contributions to the Community

This May, NWRI co-founder Mrs. Joan Irvine Smith of San Juan Capistrano, California, was honored by the Youth Employment Service (YES) of the Harbor Area, Inc., for her dedication in supporting the Southern California community through philanthropy.

According to YES Board President David Calderon, "The history and heritage of California, and Orange County in particular, would be incomplete" without mentioning Mrs. Smith and the Irvine family's "many contributions to our economic growth, cultural landscape, and social development."

A longtime environmental advocate, Mrs. Smith is the great granddaughter of James Irvine I, who formed the Irvine

Ranch from 120,000 acres of land in what is now Orange County, California. She spent much of her childhood on the ranch with her grandfather, James Irvine II, who would take her along to inspect his wells, dams, and lakes. It was he who taught her the importance of water, pointing out that the land was a desert and needed water to produce the crops he grew.

In 1957, Mrs. Smith became Director of the Irvine Company, which was originally established in 1864 by her great-grandfather for agriculture and grazing, but is now best known for the communities it has planned and developed in Orange County. As Director, she was a prime force in leading the company to donate 1,000 acres of land for what is now the University of California, Irvine (UCI).

After dissolving ties with the Irvine Company in 1991, Mrs. Smith and her mother, Athalie Richardson Irvine Clarke, resolved to glorify the beauty of nature through art by founding The Irvine Museum, which showcases California Impressionism. Located in Irvine, California, this museum is the most active institution in the United States devoted to educating people about this genre, and is not shy in spreading its message of protecting the environment and responsibly developing our natural resources.

Mrs. Smith's passion for protecting

and maintaining natural resources, especially water, resulted in the establishment of NWRI in 1991. With financial support from the Joan Irvine Smith & Athalie R. Clarke Foundation, NWRI is now the third largest research organization in the United States devoted to water science and research.

Along with NWRI, Mrs. Smith also devotes funds from the Joan Irvine Smith & Athalie R. Clarke Foundation to numerous UCI research efforts, including atmospheric chemistry research under Nobel Prize winner Sherwood Rowland and projects in UCI's Earth Sciences Department. In addition, in 1999, she jointly established the Reeve-Irvine Research Center with actor Christopher Reeve to pursue research in the treatment of spinal cord injuries and disease, with the goal of finding a cure for paralysis.

For the sake of the community, she also founded the Friends of the Mission to support the preservation of the Mission at San Juan Capistrano, as well as founded the Crystal Cove Conservancy to maintain the natural beauty of Crystal Cove State Park and to support the preservation and protection of all park resources.

These are just a few of Mrs. Smith's contributions over the years, which is why YES chose to honor her as 2004's "Most Remarkable Woman in California."

YES is a non-profit organization based in Costa Mesa, California, that helps young people search for jobs, as well as develops job opportunities within the community, teaches the use of office equipment, and provides job search counseling.



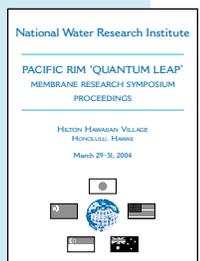
Assemblyman Ken Maddox presents Mrs. Joan Irvine Smith with a California Legislature Assembly Resolution in her honor at 31st Annual Roman Feast & Charity Auction held by YES.

Pacific Rim "Quantum Leap" Membrane Research Symposium Proceedings Now Available

NWRI is pleased to announce that the *Proceedings* from the March 2004 symposium on encouraging "quantum leaps" in membrane research among five nations pursuing the technology are now available for purchase.

At 446 pages, the *Proceedings* are a compilation of papers, PowerPoint presentations, questions and answers posed during the symposium, and photos of events such as the field trip to the Honolulu Membrane Bioreactor Pilot Study Site, located at the Honouliuli Wastewater Treatment Plant in Honolulu, Hawaii. Contributor contact information is also included.

Available only on CD-Rom, the *Proceedings* can now be purchased for \$47.95 on the NWRI website at www.NWRI-USA.org.



Workshop Builds an Economic Framework to Promote Water Reuse

Around the world, communities are facing water supply challenges due to increasing demand, drought, depletion and contamination of groundwater, and dependence on a single source of supply. For many communities, investing in recycled water solves several problems simultaneously. The product water may relieve a difficult pollution control problem, help restore a wetland or marsh, irrigate agriculture or urban landscaping, suppress dangerous fires, provide drought protection, or offset the need to purchase additional water from an external supplier.

In recognition of the variety of services provided by water produced from reuse or recycling, water experts from across the nation attended the Water Reuse Economic Framework Workshop this May at the California Polytechnic University in Pomona, California. Facilitated by NWRI on behalf of Stratus Consulting Inc., the workshop was the first step in a project funded by the WaterReuse Foundation to develop a framework for the economic analysis of the costs and benefits associated with water reuse projects.

“The workshop was planned with the aim of identifying a full range of potential benefits and costs related to the projects, and the issues that are most important to the community of water utilities, project stakeholders, academics, regulators, and consultants,” said Jim Henderson, Senior Associate at Stratus Consulting, Inc. “One of the goals was to elicit and understand perspectives other than those of an economist, which would allow the project team to better communicate with a wide audience involved with reuse projects, including project stakeholders.”

To achieve this goal, 20 participants dedicated 2 days to answering the question: *What are the essential components of an economic framework that would promote broad recognition of the full range of services and benefits that water reuse provides?* This question was intended to prompt discussions among workshop participants not only about the types of benefits, costs, and services, but also about how to embrace stakeholder perspectives of value.

When evaluating the costs and benefits of water reuse, workshop participants agreed that the top priority is to focus on the value of a diverse portfolio and a regional approach to project formulation.

The portfolio approach provides experts and regional populations with an easy-to-understand model for water reuse. The diversification of investment portfolios has been shown to enhance and protect return on investments. This approach reduces risks by averaging across a collection of different risk characteristics. Managing a community’s water-

supply options follows the same principles. By broadening the choices and developing projects with varying characteristics, there is less risk and more benefit in the overall water-supply portfolio.

A regional approach also was recommended because the “days of planning and constructing single-purpose water projects are over,” as attendees James Cromwell, Jerry King, and Richard Martin noted in their working group report. Developing water reuse projects on a regional level increases cost-effectiveness, reliability, and environmental and water supply sustainability.

After addressing the approaches to project formulation, workshop attendees determined that the second priority for building an economic framework is accounting for stakeholder perceptions in conducting and reviewing an economic analysis of water reuse projects. Stakeholder perceptions of benefits may be the deciding factor in the success of water reuse projects. Workshop participants recommended that utilities make fundamental changes, including:

- ◆ Demonstrating that reclaimed water is a resource and not a waste product to be disposed of.
- ◆ Using terminology that better communicates the value of the water.
- ◆ Emphasizing aesthetic features, such as public fountains or lakes, as highly visible and valuable applications of water reuse.
- ◆ Acknowledging the public’s negative perceptions and providing factual and balanced feedback.

Other recommendations for building an economic framework included dealing with risk, reliability, and uncertain values when analyzing water reuse projects, as well as satisfying social obligations and improving living conditions by maintaining community assets and supporting community values.



For more information on how to order the workshop report, please visit the “Publications” section of the NWRI website at www.NWRI-USA.org.



Brian Good of Denver Water, James O'Brien of Santa Clara Valley Water District, and Steve Kasower of the United States Department of the Interior, Bureau of Reclamation, determined that the key to implementing an economic framework is in assessing community sentiments, values, and desires.

Ashley Hyde Joins NWRI Staff as Administrative Support Assistant

NWRI is pleased to welcome its newest staff member, Ashley N. Hyde.

This March, Ashley, 20, joined NWRI as an Administrative Support Assistant. In her new role, she is responsible for telephone and mail communications, travel arrangements for conferences and meetings, and planning for events such as the Athalie Richardson Clarke Prize Award Ceremony and Lecture.

When not working at the NWRI front desk, Ashley can be found at home in Westminster, California, with her 2-year-old daughter, Brooke Madison Hyde, whom she fittingly described as “a water baby.” “Brooke loves going to the beach and playing outside, especially with her cousin, Eddie,” she said.

Ashley’s interests are as active as her daughter’s. In addition to spending time with Brooke, Ashley enjoys driving cars, playing guitar, and singing, especially karaoke. In high school, she put her musical skills to use in a girl band called No One Else. She even joined the school newspaper, becoming entertainment editor, “so I could put articles about my band in the paper,” she said with a laugh.

Ashley grew up in San Clemente, California, and Durango, Colorado, with her sister, Vanessa, and parents, Tim and Madonna, who will soon be moving to Oregon. “I love and admire my parents for being such good role models,” she said. “They’ve always supported me.”

They are especially proud of her now. In addition to her roles as Administrative Support Assistant and dedicated mother, Ashley is also an ambitious college student. She is currently attending Golden West Community College in Huntington Beach, California, and plans to transfer to the University of California, Irvine, to pursue a degree in mechanical engineering and a career in car design.

“I love cars, especially the new fuel-efficient cars, and I’ve always wanted to help the environment, so it’s the perfect career,” she said.

Since starting work at NWRI, she has also become interested in designing water technology and promoting water awareness.

“I’m very proud of the fact that NWRI helps improve water all over the world,” she said. “Before I started working here, I never even knew water quality was an issue.”



Ashley N. Hyde

RESEARCH IN PROGRESS

Novel Membrane Biofilm Reactor for Groundwater Treatment and Remediation

Increased demands on limited water supplies around the country and abroad have made many municipalities use groundwater contaminated by a variety of inorganic and organic oxidized contaminants. The wide range of chemical properties that characterize these compounds has forced many utilities to install multiple physical or chemical unit operations, which often concentrate the contaminants in residual streams that require special handling or additional processing. To address this problem, Dr. Samer Adham of MWH and Dr. Bruce Rittmann of Northwestern University are developing a single process called the hydrogen-fed membrane biofilm reactor (MBfR). So far, the MBfR has achieved high degrees of reduction of selenate and chromate, and experiments with chlorinated solvents will begin soon. The research team is also using computational fluid dynamics to model and understand the mixing and mass-transfer properties inside the MBfR. The goal is to optimize both properties in preparation for designing pilot- and commercial-scale MBfR systems.



(From left) Dr. Bruce Rittman and Dr. Samer Adham with two members of their MBfR research team, Dr. Kuang-ping Chiu and Geno Lehman (both with MWH).

Bromate Project Tests Validity of Drinking Water Chemical Risk Extrapolation

According to the United States Environmental Protection Agency (EPA), bromate is a probable human carcinogen that is introduced into public drinking water supplies and bottled water during disinfection, as a contaminant of chlorine or a result of the oxidation of bromide during ozone treatment. To protect the public, regulations require water bottlers and utilities to remove bromate to below 10 parts per billion, which requires additional and costly treatment steps. Due to the projected risk, there is some pressure to make the standard even lower.

But what if the EPA method of determining cancer risk — testing rats at high dose rates to estimate the risk to humans at very low dose rates — is invalid for some types of chemicals, or is at least overly conservative? What if the human body can decompose some of the bromate in the stomach before it can reach the target organ (the kidney) and cause any harm?

These are the questions raised by Dr. Joseph Cotruvo, a health and environment consultant with over 20 years of experience at EPA as former Director of the Drinking Water Standards and Risk Assessment Divisions. Dr. Cotruvo, along with

Dr. Gilbert Gordon of Miami University in Oxford, Ohio, is leading a project to determine the rate of bromate decomposition in the human stomach.

Funded by NWRI, the Southern Nevada Water Authority, and the International Bottled Water Association, the project is “one of those novel ideas that bridges together principles not commonly dealt with by combining toxicology, biochemistry, technology, economics, and regulatory policy,” said Dr. Cotruvo. After all, this project has the potential to affect risk assessment methodology and future drinking-water standards for reactive chemicals.

According to Dr. Cotruvo, even if bromate is not entirely decomposed in the stomach, if it is shown that the rate of decomposition is fairly rapid relative to absorption, then the EPA process of calculating risk should be modified.

The first phase results look promising. With the help of Jason Keith, a second-year doctoral student at Miami University, Dr. Gilbert Pacey, Associate Dean for Research and Scholarship at Miami University, and Dr. Richard Bull, Professor of

Pharmacology and Toxicology at Washington State University and former Chair of the EPA Science Advisory Board Drinking Water Committee, the research team has completed preliminary experiments with chemicals that are present in the stomach or blood, such as cysteine, glutathione, hydrogen chloride, and hydrogen sulfide.

“When we discovered that hydrogen sulfide was present at low levels, we knew it was probable that it would decompose bromate in the stomach,” said Dr. Gordon, “but the proof is in the pudding.”

Using dose levels of only 1 micromole of hydrogen sulfide, the research team obtained bromate reductions of 39 percent in 30 minutes and 68 percent in 60 minutes.

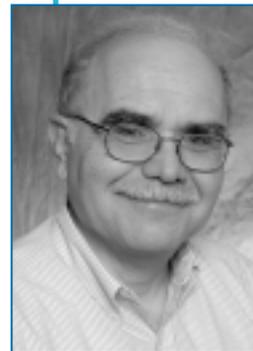
“With a bit more hydrogen sulfide, within minutes, bromate was reduced by more than 90 percent,” said Dr. Gordon. “And that was only looking at the stomach. The experiments on transport, on bromate passing through the stomach and into the blood, have not been done yet.

“These results are important,” said Dr. Cotruvo, “because they say that the danger of ingesting low levels of bromate,

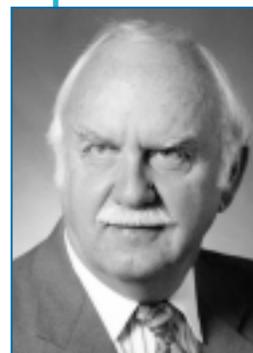
such as would be found in drinking water, could be significantly less than is predicted by the response calculation extrapolation from high-dose experiments in rats. And, what’s more, there should be a scientific way to prove it based upon the rate of decomposition under stomach conditions.”

With the initial success of the first phase to motivate them, the research team will soon begin phase two, studying bromate reactions in a variety of stomach conditions and examining other selected toxic chemicals to determine how they survive in the stomach.

“We’re going into more detail and reality — how bromate reacts with food, on an empty stomach, with antacids, and in both highly and less-acidic stomach conditions,” said Dr. Cotruvo. “We have shown that the rate of bromate decomposition is highly dependent on the acidity of the stomach — the more acid, the better — so we know it will be much slower as the acidity decreases, but we have to figure out what to expect in all kinds of people and under typical ingestion conditions.”



Dr. Joseph Cotruvo



Dr. Gilbert Gordon

According to Dr. Cotruvo, even if bromate is not entirely decomposed in the stomach, if it is shown that the rate of decomposition is fairly rapid relative to absorption, then the EPA process of calculating risk should be modified.

Meet Our Newest Research Advisory Board Members

At the heart of NWRI's success is its Research Advisory Board (RAB). Representing diverse fields of expertise, RAB members help shape NWRI's research goals by reviewing NWRI-sponsored projects, participating in Blue Ribbon Panels, assisting in reports and publications, and recommending students for fellowships and awards.

This summer, NWRI is pleased to announce the addition of its newest RAB members:

Soroosh Sorooshian, Ph.D.

Distinguished Professor, Department of Civil & Environmental Engineering and Department of Earth System Science

UNIVERSITY OF CALIFORNIA, IRVINE

Hydrologist Soroosh Sorooshian joined the University of California, Irvine (UCI) in 2003 as Distinguished Professor in the Departments of Civil & Environmental Engineering and Earth System Science, and is the Director of the Center for Hydro-meteorology and Remote Sensing at UCI's Henry Samueli School of Engineering. His areas of interest include surface hydrology, hydroclimate modeling, remote sensing application in hydrology, rainfall-runoff modeling, flood forecasting and control, and water resources systems



Dr. Soroosh Sorooshian

analysis and management. He is a member of the National Academy of Engineering and the International Academy of Astronautics, and has served on numerous committees and councils for groups such as NASA, National Academy of Sciences, American Geophysical Union, and the National Oceanic and Atmospheric Administration. Sorooshian received a B.S. in Mechanical Engineering from California State Polytechnic University, San Luis Obispo, and an M.S. in Operations Research and Ph.D. in both Systems Engineering and Engineering (specializing in Water Resources and Hydrologic Systems Analysis) from the University of California, Los Angeles.

H.S. Muralidhara, Ph.D.

Vice President, Corp. Plant Operations and Manager, Process Technology

CARGILL, INC.

"Murali" Muralidhara has over 28 years of industrial experience in Chemical, Food Processing, and Environmental Engineering. He currently serves as Vice President and Director of Operations and

Process Technology at Cargill, Inc., a major food processor, where he specializes in developing separations technology research for application in membrane technologies and membrane fouling research, the separation/purification of natural products, and other water-related processes. Muralidhara has edited two books on advances in solid/liquid separation, has over 25 patents, and has received numerous awards and honors, including being inducted into the Chemical Engineering Academy of West Virginia University. Recently, he was also appointed as Adjunct Professor of Chemical Engineering at the University of Arkansas at Fayetteville. Muralidhara received both a B.S. in Physics and Chemistry and an M.S. in Chemistry at the University of Bangalore, an M. Tech in Chemical Technology at the University of Nagpur, an M.S. in Thermal and Environmental Engineering at Southern Illinois University, and a Ph.D. in Chemical Engineering at West Virginia University.



Dr. H.S. Muralidhara

***M. Kevin Price (RAB Liaison Member)
Manager, Water Treatment Engineering
and Research Group***

**UNITED STATES DEPARTMENT OF THE INTERIOR,
BUREAU OF RECLAMATION**

Kevin Price is the Manager of the Water Treatment Engineering and Research Group with the Bureau of Reclamation's (Reclamation) Technical Service Center. His group manages the Desalination and Water Purification Research and Development Program, Advanced Water Treatment Research Program, and the Water Reuse Research Program at Reclamation. In addition, his group provides water and wastewater engineering services within the agency. Price is currently serving on the boards of the American Membrane Technology Association



M. Kevin Price

and the International Desalination Association, and is a member of the WaterReuse Foundation's Research Advisory Committee. He is the United States Technical Representative (through the United States Department of State) to the Middle East Desalination Research Center in Muscat, Oman, and has worked in desalination with other Middle East countries. Price received a B.S. in Zoology from Albertyson College of Idaho, an M.S. in Chemical Engineering from Columbia University, and an M.B.A. in Finance from the University of Denver.

NGT Workshop Sets Priorities for Improving Subsurface Monitoring

What improvements to subsurface monitoring are needed to properly evaluate the fate and transport of petroleum and fuel oxygenate contaminants?

This is the question that 22 experts sought to answer at a workshop facilitated by NWRI on behalf of British Petroleum and the Santa Clara Valley Water District.

In June 2004, participants from California to Connecticut met at the Hilton Costa Mesa in Costa Mesa, California, to discuss subsurface monitoring — the investigation of designated suspended water and groundwater locations to determine the efficiency of treatment and compliance with standards. The goals of the workshop were to improve current monitoring strategies and to offer insights into planning monitoring programs with new technologies that can provide cost-effective means to protect drinking-water resources.

“Over time, new investigation tools and concepts have been introduced, but not used much,” said Christine Tulloch, Water Quality Specialist at Santa Clara Valley Water District and a member of the workshop planning committee. “The old way of conducting investigations may not provide the necessary data to make cleanup decisions, particularly with ether oxygenate contamination. We wanted to know what could improve subsurface monitoring to better understand subsurface contamination.”

Using the nominal group technique (NGT), which according to Tulloch “was the best way to convene a group of experts to identify improvements that could be made,” workshop participants addressed a focused question to identify issues and define options to approaching a resolution. They identified seven priorities for improving subsurface monitoring.

The first priority is to base any plans — including goals, data quality objectives, and data management requirements — on the site conceptual model (SCM). An SCM is used to develop a hypothesis regarding the location and movement of contaminants of concern at the site, as well as any potential impacts that may occur to human health, the environment, or beneficial uses of resources.

Following SCM development, stakeholders must form a consensus to plan remedial efforts and long-term monitoring. Then, data quality objectives should be set to identify chemicals of concern, geochemical changes, laboratory analyses, detection limits, and monitoring frequency.

To promote the effective use of SCMs and data quality objectives, workshop participants recommended significant changes, including amending California Health and Safety Codes to require SCM and data quality objective development at the beginning of the corrective action process, revisiting State Water Resources Control Board policy, and creating incentives for consultants and regulators to change current practices.

Other workshop priorities included implementing three-dimensional site characterization, improving characterization to better understand fate and transport in the heterogeneous subsurface, validating site investigation and monitoring methods, promoting better decision making by more effective communication and interpretation of data, and selecting target parameters to evaluate petroleum and fuel oxygenate contaminants in groundwater.

“The overall tone [of the workshop] was that improvements are needed and new tools and techniques should be employed,” said Tulloch. “The challenge left is to educate the environmental community of needed changes and actually enact some change to the way investigations are conducted.”



To order the workshop report, please visit the NWRI website, www.nwri-usa.org, and click on “Publications.”



Workshop attendees at the June 2004 workshop on Subsurface Monitoring Strategies.

Upcoming Event

OzAquarec International Conference “Integrated Concepts in Water Recycling”

FEBRUARY 14-17, 2005

Novotel Northbeach Conference Centre
Wollongong, New South Wales, Australia

The OzAquarec International Conference will focus on identifying and addressing holistic synergies in water recycling.

Topics include:

- ◆ Contexts and incentives.
- ◆ Organizational and technical responses.
- ◆ Integrated strategies for reuse.

Field trips to innovative water recycling schemes, including Sydney Olympic Park Authority, Gerringong-Gerroa Sewerage Scheme, and Taronga Zoo, are planned.

For more information, please visit www.uow.edu.au/eng/cme/research/ozaquarec/conferences.html.

Honoree Committed to Research and Education

Continued from Page 1

In the course of his 35-year career, Dr. Snoeyink has influenced students around the world. He has taught at the University of Karlsruhe and the National University of Singapore, where he recently became Visiting Professor and Chair of the Environmental Engineering and Science Program Steering Committee. He has also toured universities throughout North America as the 2001 Distinguished Lecturer for the Association of Environmental Engineering and Science Professors. As co-author of *Water Chemistry*, considered to be one of the most comprehensive textbooks in the field, he has educated generation after generation of environmental engineers and scientists about the chemical principles relevant to water-quality control.

Through it all, he has remained a steadfast figure at the University of Illinois at Urbana-Champaign, where he began his career in 1969 and where he continues to teach as the Ivan Racheff Professor of Environmental Engineering. Among the Fighting Illini, he has supervised the research of over 100 graduate students, many of whom are now water industry leaders and university professors. In addition, he holds a dozen awards for outstanding teaching, including the student-awarded Excellence in Advising Award for the College of Engineering, which he received 3 years in a row, and the William L. Everitt Undergraduate Teaching Excellence Award — one of the most coveted faculty awards — which he has received twice.

“Dr. Snoeyink’s record in teaching is outstanding,” said Dr. George Tchobanoglous, the 2003 Clarke Prize Laureate and a fellow professor of engineering. “All of his former students praise him highly as a devoted and caring teacher concerned with the transfer of information and understanding.”

In fact, Dr. Snoeyink inspires an incredible level of enthusiasm among his students. Upon hearing of his Clarke Prize nomination, former student Dr. Samer Adham, Manager of the Applied Research Department of MWH, wrote in support of his thesis and academic co-advisor: “All I can say is that he is simply the BEST!”

Similarly, Dr. Kerry J. Howe, Assistant Professor of Civil Engineering at the University of New Mexico, who worked with Dr. Snoeyink on his Ph.D. committee, praised Dr. Snoeyink’s tradition of having lunch with every student in his water chemistry class and of hosting Cultural Awareness and Speech



Clarke Prize Laureates (from top left): Dr. George Tchobanoglous (2003), Dr. James Morgan (1999), Clarke Prize Patron Mrs. Joan Irvine Smith, Dr. Joan Rose (2001), Dr. Walter Weber (1996), and Dr. Perry McCarty (1997); (from bottom left) Dr. Harry Ridgway (2002), Dr. Vernon Snoeyink (2004), and Dr. Rafael Bras (1998).

Enhancement (CASE) study groups for students to practice their communication skills and to learn about the experiences of students from other countries.

“These activities go beyond the traditional role of the professor, and speak to Vern’s commitment to education and training and his belief that well-rounded engineers need practical experience and communication skills,” he said.

This commitment has not gone unrecognized by the students, the university, or the water-science community.

“I continue to be impressed by the numerous awards that have been presented to [Dr. Snoeyink] during a long career,” said Dr. James J. Stukel, President of the University of Illinois. “[He has] contributed to the university’s mission of excellence in teaching, research, and public service in a way that is truly exemplary. Were I to describe

the qualities that make for an outstanding teacher and researcher at the University of Illinois, I would be describing [him] ... [He has] made us all a bit prouder today to be a part of this fine institution.”

And Dr. Snoeyink’s contributions are far from over. He plans to give the Clarke Prize’s \$50,000 award to the University of Illinois at Urbana-Champaign to fund graduate fellowships in the environmental engineering and science program.

He also intends to continue his research on minimizing water-quality changes in treated-water distribution systems, and to pursue new research in developing hybrid membrane filtration systems with optimal pretreatment.

“Dr. Snoeyink’s record in teaching is outstanding. All of his former students praise him highly as a devoted and caring teacher concerned with the transfer of information and understanding.”

— Dr. George Tchobanoglous
2003 CLARKE PRIZE LAUREATE

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