Wisconsin Water Association Research Award

This annual award is given to recognize individuals who have made research contributions to water science and water supply. Wisconsin-based people working in or to the benefit of the drinking water industry are eligible for the award.

2009

Research Award Winners
Research Committee
The descriptions of the WWA Research Award winners written here are examples of the people who make up the Wisconsin drinking water community.

These portraits show that Wisconsin has a fine tradition of exploration and innovation in water science and technology.
Research Award Winners

2009 Becky Hoffman, M.S.
Improving Methods for Detecting Waterborne Pathogens

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Bridging the Gap Between Research and Application

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1996 Jonathan Standridge
Laying the Foundation for Microbiological Water Research in Wisconsin
Wisconsin Water Association

Becky Hoffman, M.S.
Improving Methods for Detecting Waterborne Pathogens

The 2009 winner of the WWA Research Award is Becky Hoffman, M.S., an advanced microbiologist at the Wisconsin State Lab of Hygiene (WSLH) in Madison. During the past 15 years, the focus of her work has been improving methods for detecting waterborne pathogens and applying these improvements to occurrence and water treatment studies. The studies have included a variety of parasites and bacteria, including Cryptosporidium parvum, Giardia lamblia, microsporidia, Legionella pneumophila, Mycobacterium avium complex organisms, and E. coli O157.

Under Becky's direction, the WSLH Flow Cytometry Laboratory has become the nation's resource for precisely enumerated parasite suspensions for both research and method-related quality control applications. Becky has received funding as both a principal investigator and co-investigator from the Water Research Foundation, the EPA, the Water Environment Research Foundation, and private corporations. Becky collaborated with a number of researchers locally, nationally, and internationally. Most recently, Becky has been working with collaborators at Texas A&M University to develop a standardized protocol for speciating Cryptosporidium isolated using EPA method 1623.

In addition to research, Becky has been active in WWA and AWWA, serving on the Wisconsin Water for the World Committee, the Organisms in Water Committee, as a member and committee chair; and other committees, such as the Waterborne Pathogens Manual Committee, the AWWA Algae Manual Committee, planning committees for the 2006 and 2010 International Symposia on Waterborne Pathogens, and the 2009 Global Conference on Waterborne Contaminants. She has served on a number of AWWA Technical Advisory Workgroups and Research Foundation project advisory committees. Becky will be recognized at this year's Water Technology Conference in Seattle with 2009 Golden Spigot Award for outstanding service to AWWA.

Becky is originally from Little Chute, Wis., and is a graduate of the University of Wisconsin. After finishing her undergraduate degree, she completed a Master of Science degree at UW, studying the effects of media components on the growth rate and the antimicrobial resistance of Mycobacterium avium subspecies paratuberculosis. Becky worked for a time in Connecticut as the research coordinator for a family practice residency program. Returning to Wisconsin, she joined the WSLH staff, performing flow cytometry work for the laboratory and various researchers on the UW campus. Becky was instrumental in collaborating with the Water Microbiology group at the WSLH to develop an improved method for detection of Cryptosporidium in water.
Douglas Cherkauer, Ph.D.
Linking Science and Public Policy on Water Use and Conservation

Water is essential for life as we know it, and natural water systems have developed with a balance that supports all living organisms. Yet humans treat water with disdain, as a commodity, as if it is an infinite resource.

We know we need it, and we will do anything to get it. We think nothing of transporting water hundreds of miles - taking one area's supply to support another. Then after we use that water, we dump our wastes in it and throw it away. This shortsighted approach has now led to increasing water shortages, as well as massive alteration of ecosystems and even local climatic changes. It is time to try better approaches to handling this precious resource.

Since getting his BA at Harpur College, MS at Arizona (both in geology) and PhD at Princeton in water resources and geology, Doug Cherkauer has spent 37 years as a hydrogeologist at the University of Wisconsin-Milwaukee. His research has evolved through time. It began by looking at direct human effects on ground and surface water flow systems, then moved to a focus on measuring exchanges between ground and surface water systems (especially lakes), and then to characterizing the geologic materials through which ground water flows. All these endeavors dealt with the science of hydrology, with an inherent assumption that the information produced would be useful to policy and decision-makers.

But a revelation occurred in the late 1990’s with the advent of the Smart Growth concept in Wisconsin. Participating in his own community's planning, Professor Cherkauer realized that the link between science and policy was missing. Communities dependent on ground water for their water supply did not have to assess that supply in their planning! And even when planners did want to incorporate water supply, they did not have access to resource information in a usable or readily understandable form.

That led Dr. Cherkauer to take a fundamental principle of hydrology, the conservation of mass (or water budget) and re-express it in terms analogous to the monetary budgets with which everyone deals. Communities, their planners and leaders need their future development to be sustainable (to live within the limits of their supply), and for their use of ground water to minimize impacts on surface waters (streams, lakes, wetlands and springs that rely on ground water as a source) and on the quantity and quality of ground water supplies. He is now attempting to bridge the gap between science and policy.

The process has been successfully tested at the community scale. The Village of Richfield has embraced sustainability and has adopted an ordinance to protect its ground water supply. New developments must be designed to maintain recharge rates and recirculate treated wastewater to the aquifer system.

Now the process is being incorporated into the regional water supply plan being developed by the Southeastern Wisconsin Regional Planning Commissions. This is the largest scale to which the water budget concept has been applied. The plan will be completed by the end of 2008.
Wisconsin Water Association

2007

Greg Harrington, Ph.D.
Bridging the Gap Between Research and Application

Professor Greg Harrington of the University of Wisconsin-Madison Civil and Environmental Engineering Department does not sit in an ivory tower. He is a hands-on engineer, bridging the gap between research and application.

With an undergraduate degree in Chemical Engineering and a Masters Degree in Environmental Engineering, he worked at Malcolm Pirnie in Newport News, Virginia from 1987 to 1991. In the consulting world, he spent much of his time doing research in support of the EPA’s development of disinfection byproduct regulations. Another significant percentage of his time was spent doing treatability research for utilities all across the country. He enjoyed the research a bit more than his other consulting work, so he decided to give a research career a try and returned to graduate school.

This background has given Professor Harrington an “incredible knowledge about the water treatment industry”, as one colleague describes it. Examples of practical implications in his five areas of drinking water research interests are as follows:

**Waterborne pathogens.** Professor Harrington has defined the essential criteria and optimal conditions for removing waterborne pathogens, such as cryptosporidium and a variety of viral, bacterial, and protozoan agents, with a pilot-scale conventional water treatment plant at the university.

**Natural organic matter.** He has studied the mechanisms by which Natural Organic Matter (NOM) found in water forms carcinogenic compounds with disinfection chemicals and has defined the treatment requirements to remove NOM.

**Nitrification.** He has defined strategies for controlling nitrification, the growth of microorganisms that use nitrogen as a nutrient in chloraminated distribution systems, by using a pilot-scale water system located in his laboratory. He has even developed a handy method of monitoring a chloraminated distribution system to determine if the potential for nitrification exists, allowing for pro-active changes in water chemistry to prevent the full-blown problem from occurring. This concept has been extended to general biostability concerns in all distribution systems, creating a method to determine the proper dosage of disinfection required to control the growth of microorganisms.

**Mathematical modeling of water quality changes.** He has developed a computer model to simulate and define mechanisms of carcinogenic disinfection by-product formation during water treatment.

**Physical/chemical treatment processes.** He is well-versed in the design of ozonation, chloramination, coagulation, ultraviolet radiation, activated carbon, and membranes and has used this process design knowledge to set up systems to study. He has recently designed ultraviolet radiation installations for the 2005 Research Award Winner, Dr. Mark Borchardt’s study of viruses in groundwater and their effect on the health of water consumers.

Although Professor Harrington’s studies and work took him to California, Virginia, and North Carolina, he is an Oshkosh boy. He jokes with Tom Konrad and Mel Kiefer of the Oshkosh Water Utility that their water made him the person he is today. But, on the serious side, Professor Harrington feels strongly that without the support and ideas received from many of the utility folks here in Wisconsin, he would not be where he is today. He equally credits his research collaborators and students for his successful and satisfying career.

Research colleagues appreciate Professor Harrington’s consulting background. Microbiologist Jon Standridge (1996 Research Award Winner) says, “This real world view of the drinking water industry can be seen in the research projects he chooses as well as the atmosphere of the graduate student group he mentors. The students are given high levels of responsibility on their projects. The graduate student office operates and feels much like a consulting engineering group. This atmosphere results in master degree graduates with a strong sense of the value of research coupled with an ability to quickly fit into the consulting engineering field.”

Professor Daniel Noguera (2006 Research Award Winner) says, “He always looks for the practical implications of his research. Whenever a student comes to my office and asks about the practical side of the projects, I always send them to Greg. (He) is a wonderful motivator on the practicality of their scientific and engineering discoveries.”
Microorganisms — you can’t live with them and you can’t live without them. Professor Daniel R. Noguera easily accepts this dilemma because he has the upper hand. With an understanding of microbial ecology, Prof. Noguera and his research team can enhance wastewater treatment processes such as phosphorus and nitrogen removal or can prevent negative effects of microbiological growth such as destructive nitrification in drinking water systems.

Prof. Noguera’s research has yielded a toolkit for working with biotechnology. These tools include:
• methods for the identification of nitrifying bacteria in drinking water distribution systems and in activated sludge,
• methods for the identification and quantification of phosphorus accumulating organisms,
• a process for minimizing the release of phosphorus from biosolids into the environment,
• mathematical models for the study of microbial activity within biofilms,
• methods for assessing viability and identity of microorganisms in biofilms, and
• the development of mathematical models to understand how fluorescently labeled DNA probes can attach to the RNA of microorganisms.

In the drinking water area, his group’s research focuses on the microbial ecology of the bacteria that inhabit distribution systems. The researchers have developed tools to determine the identity and viability of microorganisms present in biofilms, as well as tools for assessing what type of nitrifying bacteria and heterotrophs grow in distribution systems.

In collaboration with Professor Gregory Harrington, the research team has been studying nitrification in chloraminated drinking water for several years. They have analyzed the problem of nitrification from two points of view.

First, their applied research focuses on looking at treatment modifications that could be implemented to control, retard, or prevent nitrification in chloraminated water. For instance, the researchers have found that using enhanced coagulation to maximize the removal of Total Organic Carbon from the treated water retards nitrification episodes.

Simultaneously, the research team’s basic research is directed to better understand the microbial communities that cause the problems of nitrification. The team has found that *Nitrosomonas oligotropha* is the prevalent ammonia oxidizer in nitrification episodes while nitrite oxidizing bacteria have been found to be ubiquitous in drinking water environments experiencing nitrification problems.

The caliber of Noguera’s research in drinking water has been recognized with two Academic Achievement Awards from AWWA, for the work that he did with his students on the kinetics of inactivation of *Nitrosomonas europaea* by monochloramine and on the microbial ecology evaluation of nitrifying communities. In addition, he was the recipient of the 2005 Paul L. Busch award from the Water Environment Research Foundation.

Prof. Noguera received a Bachelor of Science degree from the University of Los Andes in Colombia and Masters and Doctorate degrees from the University of Illinois at Urbana-Champaign. He joined the University of Wisconsin-Madison, Department of Civil and Environmental Engineering in 1997 and was promoted to full professor in 2005.
Wisconsin Water Association

Mark Borchardt, Ph.D.
On the Trail of Viruses in Groundwater

Groundwater is typically thought of as being naturally purified from pathogens as water moves downward to the aquifer and is filtered through the soil. However, viruses are extremely small, smaller than the wavelengths of visible light, so they are not filtered as effectively. Perhaps groundwater is not free of viruses, after all. A handful of studies have demonstrated about 1/4 to 1/3 of municipal wells in the United States are indeed contaminated with human viruses.

And, if viruses are in groundwater, do they cause acute illnesses? Using an indirect, risk assessment approach, the US Environmental Protection Agency (EPA) has demonstrated there are some groundwater-borne virus infections. A more definitive link between illness and non-disinfected groundwater as a drinking water source is being pursued by scientists at the Marshfield Clinic Research Foundation led by Dr. Mark Borchardt, the Director of the Public Health Microbiology Laboratory. The study is called WAHTER, that is, Wisconsin Water And Health Trial for Enteric Risks, and is funded by EPA.

As principal investigator, Dr. Borchardt has elegantly designed experiments to compare virus counts in drinking water sources. The study will then determine the effectiveness of ultraviolet light disinfection in the reduction of not only viruses but also the reduction of childhood acute illnesses in the community served.

The project has been highly interdisciplinary and depends on a novel blend of collaborators in civil and environmental engineering, clinical medicine, hydrogeology, epidemiology, microbiology, and public health practitioners. Indeed, Dr. Borchardt and his colleagues have persuaded the population of entire cities to participate as subjects in the studies, which are epic in their proportions.

An Appleton native, Dr. Borchardt earned a Bachelors degree at the University of Wisconsin (UW) in Madison and then began a four year study in basic hematoloy research at the UW Hospitals. He returned to school for his Ph.D. degree from the University of Vermont, specializing in aquatic microbial ecology and evolution. He was awarded a Joan Stroud Memorial Scholar post-doctoral fellowship at the Philadelphia Academy of Natural Sciences to work on microbial food webs in rivers. Returning to Wisconsin, Mark taught for one year in the Biology Department at UW- Eau Claire before joining the Marshfield Clinic in 1995.

Dr. Borchardt and associates have attracted funding from prestigious agencies such as the National Science Foundation, National Institute of Occupational Safety and Health, and the Centers for Disease Control and Prevention. He and his colleagues help make Wisconsin one of the leading water research sources in the country.
Michael Arndt, Ph.D.
Radionuclides Can’t Escape This Fisherman’s Net

Confined to his laboratory at the Wisconsin State Laboratory of Hygiene by contract to the US Environmental Protection Agency (EPA), Michael Arndt, trout fisherman and physical chemist, could only dream of sweet Wisconsin trout streams glinting in the sunlight. But, in the glow of his spectrometer, he could still use his fisherman’s patience to quantify radionuclides and their progeny in samples of Wisconsin water.

The problem with these elusive creatures had been defined previously by Don Swailes, who at that time was Chief of the Wisconsin Department of Natural Resources (WDNR) Drinking Water Quality Section, along with Miguel Del Toral, Representative of the US EPA Region 5. Something was fishy with the gross alpha analysis.

The gross alpha analysis was originally used as a screening test for radionuclides in drinking water. If the gross alpha activity was high, then analyses were performed for specific radionuclides. In 1976, regulatory limits based on the gross alpha analysis were set. Two maximum contaminant levels were established:

If the gross alpha activity is greater than 5 pCi/L, then analyses must be performed directly for radium-226 and radium-228 and radium must be removed from the water. If the “adjusted” gross alpha particle activity is greater than 15 pCi/L, then radionuclides must be removed from the water. (The adjusted gross alpha particle activity is the activity including radium-226 but excluding radon and uranium.)

The problem that first frustrated Don and Miguel was that the gross alpha activity from one well or one water system was rarely stable. Water systems would fluctuate in and out of compliance with the regulations from sample to sample.

Then, they began to wonder what was actually contributing to the activity. How can you notify the public of health threats if you don’t know what the public is threatened by? How can you remove the threat from the water if you don’t know what you are removing?

A grant from the US EPA to study the problem was applied for and awarded in 1999. The plan included the collection of about one hundred samples from Wisconsin drinking water systems by WDNR personnel with analysis of the samples at the Wisconsin State Laboratory of Hygiene. Michael Arndt was hired as the researcher for the project. Having just finished his doctorate at the University of California in Berkley, the Green Bay native returned to Wisconsin.

Continued on next page
The results are now in from Mike’s research. The great variance of gross alpha activity has now been defined. He found that many analytical factors affect the results of the analysis:

- The calibration method for the analysis
- The time between sample collection and sample preparation
- The time between sample preparation and sample analysis
- The concentration of dissolved solids in the sample
- The physics of the detector in the analytical instrumentation
- And, for the “adjusted” gross alpha activity where the activity of uranium is subtracted, the method used to determine the activity of uranium

Mike has also identified the radionuclides that significantly contribute to the gross alpha activity. Radium and uranium contribute greatly. However, the decay products (also called “progeny”) of radium-226 and radium-224 which are never routinely measured must be accounted for. For a sample that is analyzed shortly after collection, radon-222 and radon-220 along with their progeny must be taken into account as these radionuclides are short-lived but significant contributors to the activity.

Mike has developed a mathematical model of the radionuclide activity that can predict the gross alpha results. “The use of the model developed in this work should be of assistance in helping a water utility with a gross alpha violation determine the reason for the violation, and, therefore, should be helpful in determining how to treat the gross alpha violation.” (http://www.slh.wisc.edu/ehd/radiochem/research.php)

Mike has the US EPA intrigued. They have awarded him another grant. This will aid in refining his model and in testing water from outside of Wisconsin.

It is hoped that his research results will be obtained by the fall of 2006. After that time, there will be much human activity in establishing a more stringent protocol for the gross alpha test so that both accuracy and precision of the analysis are increased. There will also be efforts to convince the US EPA to return the gross alpha test to its original screening test status removing it as a regulatory standard.

In the meantime, utilities that are out of compliance with the gross alpha maximum contaminant level will be allowed to wait to take action until after Mike's new research efforts are completed.

Michael Arndt is the Wisconsin Water Association’s 2004 Research Award recipient. His research is the first to quantitatively account for gross alpha activity. Don Swailes states, “Mike Arndt has done an UNBELIEVABLE job with his research and I believe it will force EPA to reconsider whether to even regulate gross alpha as a separate standard.”
The First Two Membrane Processes For Drinking Water Treatment in Wisconsin:

Manitowoc Public Utilities Microfiltration Plant

Kenosha Water Utility Microfiltration Plant
Milwaukee Water Works: A Contrast Between Old and New Standpipe, Filter Beds, and Ozone Generators
Wisconsin Water Association

2001

Carrie Lewis
Particle Counting and Support of Water Quality Research Projects

Carrie Lewis, Superintendent of the Milwaukee Water Works, is passionate about promoting water quality research projects. Carrie was selected as the Wisconsin Water Association’s 2001 Research Award recipient in recognition of her involvement with particle counting research projects and her strong support of AwwaRF projects and general support of research in other ways.

Prior to coming to Milwaukee Water Works, Carrie was a Co-Principal Investigator on three research projects related to particle counting. Since becoming Superintendent twelve seems to be the magic number. She has served on twelve AwwaRF Project Advisory Committees (PACs), Milwaukee Work Works (MWW) Staff has served on twelve other PACs, and MWW has been a participating utility in twelve projects. Carrie supports and encourages staff involvement because she believes it is critically important to expose them to new developments and also to expose researches to some practical input!

The Milwaukee Water Works serves 833,000 wholesale and retail customers in 15 communities. Over 40 billion gallons of water are treated and distributed annually. The MWW AwwaRF subscribership incorporates each of the ten wholesale customers which allows them to receive all the benefits of being a subscriber. Carrie’s objective for including them was to give the consecutive systems access to research and resources that they might not otherwise have had.

The particle counting research conducted by Carrie resulted in the design and implementation of a system to add polymer to filter influent. This process resulted in substantial improvement to filter water quality. Carrie has also pursued applied research projects to solve water quality concerns in the MWW treatment plants and distribution system. She has strongly promoted the credibility of the utility locally and nationally.

Originally from Massachusetts, Carrie obtained a Bachelor of Science Degree - Biology from McGill University, Montreal, Quebec and a Master of Science Degree - Civil Engineering, University of Calgary, Calgary, Alberta. She now lives in Milwaukee with her husband and two sons.
Evaluating Technologies for the Inactivation and Removal of Cryptosporidium

Water treatment is an evolving science. Roger Johnson, Manager of the North Shore Water Commission, is one of the dedicated researchers working to improve water quality through new technologies. His most recent work has been in the inactivation and removal of Cryptosporidium.

Unlike most waterborne pathogens, cryptosporidium is highly resistant to conventional chlorine disinfection. For many surface water plants, this limits treatment to just one process, filtration. One operational mistake or one malfunctioning piece of equipment can cause particulate matter such as cryptosporidium to breakthrough. With no subsequent treatment, the health of every water customer is at risk.

Membrane filtration, ozone disinfection, and ultraviolet disinfection are a few of the treatment processes that Roger has researched to remove or inactivate cryptosporidium. In line with another treatment process, these technologies can be used as a barrier treatment allowing for complementary means of treatment. This configuration allows both old and new plants a means to design facilities to protect public health.

However, these new technologies are easier done in theory than in practice. Like all equipment, there are certain features and design principles that make all the difference. By participating in pilot studies and research projects, Roger was able to evaluate the reliability and ease of maintenance of new products.

In the case of ozone, Roger focused on methods of diffusing ozone into water. Traditional means of diffusion required large baffled chambers. Equipment that was evaluated at the North Shore Water Commission used an alternative configuration that enhanced diffusion and had a smaller footprint.

Research in membrane filtration demonstrated efficacy in removal of cryptosporidium. Although efficient, this technology requires a robust design to make operation reliable yet cost-effective. Along with research partners, Roger was able to determine designs that reduced operating and maintenance expenses while still meeting removal requirements.

Ultraviolet disinfection, a non-chemical means of disinfection, is successful only when designed just right. Factors such as hydraulics, lamp configuration and sensor technology greatly affect performance. Evaluation was especially crucial in developing sensor technology. North Shore Water Commission has installed ultraviolet disinfection as a barrier treatment in their treatment process utilizing current regulations.

Roger Johnson has over 40 years of experience in water treatment. Starting in the Air Force, Roger served as a water and waste water processing specialist. Supervising the Oshkosh Water Filtration plant and then the Appleton Water Treatment Plant, Roger moved to Glendale to manage the North Shore Water Commission Treatment Plant.
Wisconsin Water Association

1998

Jerry Selin
Pursuing a Bold Approach to Water Treatment

In 1994, the Kenosha Water Utility began planning the upgrade of their 40 MGD water treatment plant. The existing plant consisted of the “West Plant” treatment facilities (constructed in phases in 1917, 1926, 1932, and 1951) and the “East Plant” treatment facility (constructed in 1963).

In the fall of 1995, Montgomery Watson was contracted by the Kenosha Water Utility to design a conventional treatment plant. At the time, the cost of designing and building a microfiltration plant was more than $50 million.

Halfway through preliminary design, however, the cost of microfiltration technology decreased significantly. At this time, Jerry Selin, the Director of Operations for the Kenosha Water Utility suggested to Utility General Manager O. Fred Nelson that it might be in the Utility’s best interests to look at this newer technology. O. Fred Nelson agreed and a pilot study was conducted to prove the performance of membrane filtration on cold Lake Michigan waters. The pilot plant met the project goals and resulted in the planning and construction of a new 22 MGD membrane microfiltration treatment plant and modifications to the existing “East Plant”. The new $29.5 million microfiltration water treatment plant cost almost 40 percent less than the original design two years earlier.

On December 19, 1998, the plant was given conditional approval by the Wisconsin DNR to begin delivery of treated water to customers. It was the first membrane plant to be put on line in the state of Wisconsin and the largest of its kind in the world.

Jerry Selin was well known among his counterparts as a person who had a passion for technology. He often looked at new technologies to solve old problems at both the Kenosha Water and Wastewater Treatment Plants. It was this passion and his vision that enabled the Kenosha Water Utility to implement this state of the art technology at its treatment plant at a cost well within the Utility’s means.
Catching the First Wave in Water Treatment

Nilaksh Kothari, General Manager of Manitowoc Public Utilities, is a “crewmaster” of the water industry. “Crewmaster” is a term used by surfers that refers to “the dude” that has the knowledge and leads his close-knit group of surfers into the best surfing conditions. Mr. Kothari has been honored with the WWA Research Award for leading the Wisconsin drinking water community into water treatment by means of membrane processes.

In the early 1990’s, the Manitowoc water treatment system needed increased capacity and replacement of the aging plant facilities. There was also a need to protect against water borne pathogens, in particular, cryptosporidium.

At that time, the Marquette Michigan Utility was piloting a micro filtration water treatment plant. Mr. Kothari, who was Water Systems Manager at Manitowoc Public Utilities, was impressed. He realized that a micro filtration plant solved a number of problems. The treatment process did not require an increase in staff, required only minimal pre-treatment, made use of the existing facilities, offered greater process simplicity, and produced less sludge than a conventional filtration plant. Most importantly, the membrane process protected against water-borne pathogens.

Within the year, Mr. Kothari had a similar pilot plant in operation at Manitowoc. Six months later, a second pilot was in operation in order to compare membrane manufacturers. These were the first explorations into a membrane water treatment process in Wisconsin.

Mr. Kothari also thought it important to communicate this knowledge. He hosted a West Shore Water Producers meeting at the Utility to introduce his Wisconsin colleagues to the technology.

Nilaksh Kothari began his professional life in Baroda, India where he earned a Bachelor of Science in Civil Engineering. He came to the United States to learn the state-of-art treatment technologies in water and wastewater field. Here, he earned a Masters Degree in Engineering at South Dakota State University. He is currently General Manager of Manitowoc Public Utilities, overseeing electric service to 17,600 customers and water service to 13,500 customers.

Manitowoc’s micro filtration plant went on-line in May 1999. In 2006, there are six membrane plants in operation in Wisconsin with two more in the planning stage. Nilaksh Kothari has helped to advance this water treatment technology in the State of Wisconsin.
In the 1970’s, Jonathan Standridge began working at the Wisconsin State Laboratory of Hygiene (WSLH) running standard analyses for microorganisms in water. As he did so, he began to notice interesting test results and developed many questions about his work. Armed only with a Bachelor’s degree in microbiology, he needed more knowledge to understand what he was seeing in the data. So, he found a main source of information in Edwin Geldreich of the U.S. Environmental Protection Agency. Mr. Geldreich was a contributor to “Standard Methods for the Investigation of Water and Wastewater”, a main laboratory reference book, and had developed membrane filtration techniques for microorganisms in water. Jon had taken a water testing certification course from him. Mr. Geldreich made it clear to Jon that the answers to his questions were not known by anyone. He encouraged Jon to find the answers himself, to obtain grants, and to publish his conclusions.

Only later did Jon realize that, in the early 1970’s, the only research performed on the microbiological aspects of drinking water and recreational water was by the U.S. Environmental Protection Agency and a few state health departments around the country. When Jon began to ask his first questions on the microbiological analytical methods, the research scene was in transition. A relatively new microbiology professor at the University of Arizona, Charles Gerba, was producing his first groups of doctoral students who were graduating and moving on to other universities. These students were upholding Professor Gerba’s research traditions and drinking water research was beginning to be produced from a number of universities, a phenomenon which Jon calls “the Chuck Gerba diaspora”. The U.S. Environmental Protection Agency and its Public Health Service had begun to participate in the academic research projects. Jon’s contact, Mr. Geldreich of EPA was part of that research momentum and the quest for knowledge in water microbiology.

And so began the microbiological water research at the WSLH. Jon obtained grants for his department and he and his staff began revising and improving analytical methods for microorganisms in water.

In 1993, another major change occurred in Jon’s department at WSLH. The cryptosporidium outbreak occurred. Based on Jon and his department’s reputation in method development, the public looked to WSLH to improve methods to detect cryptosporidium in water. Jon now found that, instead of grants on the order of $20,000, the grants available to him were $200,000. His department was up to the task. They improved techniques to concentrate cryptosporidium for testing; they improved the fluorescent antibodies which they attached to the cryptosporidium for detection; they studied the occurrence of cryptosporidium in watersheds and tracked how the microorganisms jump from animals to the water supply.

Jon’s work was not bounded by the microbiology laboratory alone. He also supervised the bio-monitoring laboratory improving aquatic toxicity testing as well.

Of all his accomplishments that resulted from his keen eye to identify problems in microbiological water testing and his pursuit to answer his questions, Jon says, “I was just stirring the pot for the other folks. I can’t take much credit except for providing the opportunities and the encouragement to my staff.”