Atlanta: *Coping With a Water Crisis*

By Geoff Bilau

As IAPMO embarks full speed into an era of "greener" codes and the certification of increasingly more environmentally conscious products, it is appropriate that we meet in a city located smack dab at the center of the issue. Atlanta, perhaps more than any other major American city, is suffering from a lack of fresh water, and residents have been forced to pay more than lip service to the concept of conservation.

Last year, the state of Georgia, which averages about 40 inches of rainfall each year, got only 20 inches. Lake Lanier, the main reservoir servicing Atlanta, receded dramatically, leaving stranded boats to list motionless on dry, cracked mud shores. Restrictions on outdoor watering have been in place for months. In November, the forecasts were so dire that Georgia Gov. Sonny Perdue, having already declared a state of emergency, organized an official multi-faith service and prayed for rain.

Some concerned citizen has even set up a blog — atlantawatershortage.com — to update residents on the latest news about the city's efforts to conserve what water remains.

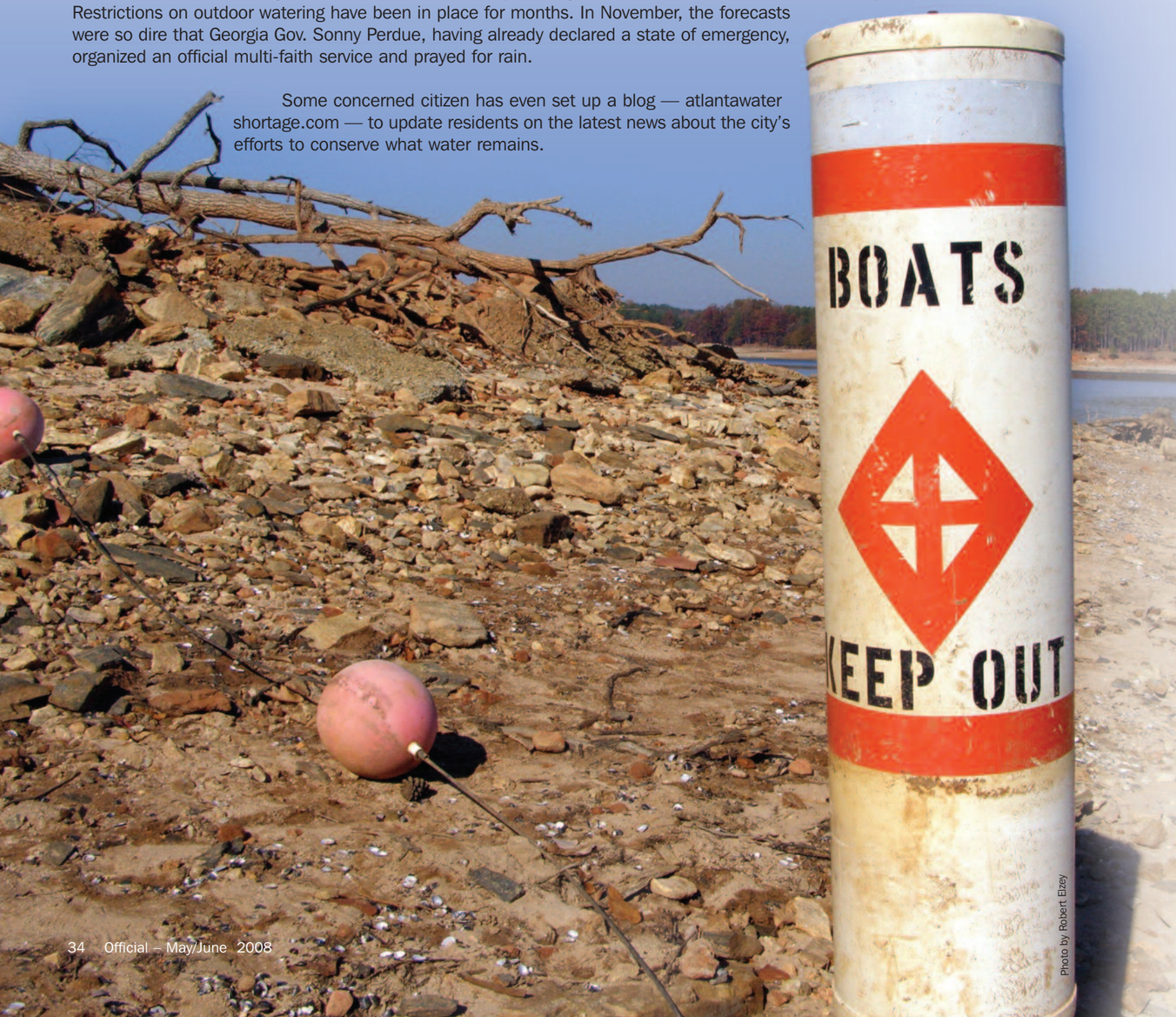


Photo by Robert Elzey

Photo by Brian Hursey / bhursey@gmail.com

Shallow depth markers that traditionally serve warning to boaters instead illustrate the drought's ravaging effect on Lake Lanier.

Thankfully, the spring has brought consistent rainfall and many of the area's watersheds, Lake Lanier included, are returning to pre-drought levels. But the Southeast is still a long way from being out of the woods. Much more rainfall is required before the drought can be officially termed "over," and even then the potential for heated legislative water wars has already reared an ugly head on a number of occasions.

"The Southeast has not yet come to grips with the fact that it has a water problem, that it needs to plan for its water usage, that it can't take for granted that all the water it needs will always be there," Robin Craig, a law professor and water expert at Florida State University's College of Law, told *USA Today*.

The question for those in Georgia, Florida and Alabama is no longer how did things reach this point — some blame rapid development for which existing infrastructure and water supplies could not keep up — but rather how do they solve the problem quickly and effectively?

A big part of the solution is going to begin with perception. According to a poll published March 11 in the *Atlanta Business Chronicle*, Atlantans' biggest concern with the water shortage isn't usage restrictions or long-term environmental effects — it's the economy. The poll, conducted by Atlanta consulting firm The Schapiro Group, revealed that 32 percent of Atlanta residents believe negative impact on the state economy is the worst part of the drought, while 19 percent expressed concern over potential water wars with neighboring states. Conservation concerns placed third, with 17 percent citing the need to be cautious about how much water they use. Perhaps that's a good thing. The poll could be interpreted to mean that Atlantans have not been as inconvenienced by conservation measures as anticipated. This might indicate openness to even more ramped-up water efficiency programs.

Photo by Robert Elzey

The retaining wall of Buford Dam power generation plant on Lake Lanier clearly displays how much the lake's water level has receded.

Photo by Robert Elzey

A floating dock and boat near Buford Dam in Cumming, Ga., appear to have run ashore, but are actually resting upon what was once the bottom of Lake Lanier.

Photo by Robert Elzey

Old Thompson Creek Road, typically 8-10 feet beneath Lake Lanier, once again became visible as a result of receding waters. The road was submerged in the 1950s when the lake was created.

Photos by Brian Hursey / bhursey@gmail.com

Before and after at Lake Lanier: top image is from March 4, 2007; bottom was taken Feb. 11, 2008.

Photos by Ann Steckel

The Fountain of Rings at Centennial Olympic Park has remained dry for months as the city explores ways to conserve water.

"Our population has increased by nine percent, and our water withdrawal has decreased by five percent in the past five years," Atlanta Mayor Shirley Franklin told BBC News in November. "It means we're repairing our pipes, using conservation techniques and new technology, and [doing] some of those repairs that should have taken place 60 years ago. But this billion-dollar program is a demonstration of what the City of Atlanta is willing to do in order to be not just a safe city, but also a healthy and a growing city."

It should be noted, however, that significantly decreased water usage also means a significant decrease in revenue collected via the city's water service. This has prompted the city council to consider a temporary 15 percent rate increase for customers who use more than 3,000 gallons per month. (On average, customers in Atlanta use 6,000 gallons each month.) City officials say without the increase the city lacks the funds necessary to complete the $3.9 billion in improvements to the water and sewer system.

Residents, whose water bills would rise about $8 a month, have criticized the proposed increase as a tax burden placed on users for being part of the solution. Officials say they understand the frustration, but with the city expecting to lose around $33 million this year due to conservation efforts, and court-ordered infrastructure improvements only halfway complete, they see no better options for making up the difference. Despite economic concerns from both the citizens and the government, all parties seem to understand the overriding need to conserve and have begun to embrace previously unconventional methods of doing so.

In Gwinnett County, for instance, landscapers, contractors and other water-reliant outdoor businesses that have been negatively affected by the drought are able to use gray water for irrigation, street and sewer cleaning and other non-potable applications. The county, located just to the east of Atlanta, processes 18 million gallons of wastewater at its F. Wayne Hill Water Resources Center, from which the newly cleansed water is pumped to the Chattahoochee River to be reintegrated into natural fresh water reserves.

With the new lessened restrictions, for a yearly fee these businesses can truck the treated wastewater directly to their job sites and use it for a number of applications. The water cannot be used, however, for washing cars or filling swimming pools, both of which have been restricted during the drought.

Even with the recent rains, there remains a great deal of uncertainty about when, if at all, certain restrictions can be lifted. As the blog watercrunch.blogspot.com opined, "Droughts are like a recession in a way: it's hard to tell exactly when they first occur and hard to know exactly when they are over." One thing seems certain in Atlanta, though: for better or worse, richer or poorer, and whether out of desperate necessity or forward thinking preparedness, water conservation is there to stay.

Photo by Justin Bridges

The fountain at Underground Atlanta, which once provided relief from the summer heat, has been shut down and fenced off. It is unknown how much, if at all, the fountain will operate this summer.

A fisherman walks past a depth marker at Lake Lanier which displays the extent of the drought's impact upon the city's main reservoir.

Photo by Brian Hursey / bhursey@gmail.com

Wastewater Management in an Amish Village

By Ben Baeder

For building officials in some parts of the country, local ordinances are not the only laws they have to worry about. Many must contend with a higher law: the first amendment to the United States Constitution, which established the freedom of religion.

Recently in Barr Township, Penn., a local authority asked a judge for permission to fine members of an Amish group if the group continued to dump waste from outhouses on their fields, according to a February story covered by national media and broken by local media outlets. Amish groups are often resistant to certain types of technology, as well as government interference in private life, according to experts.

Neighbors, however, are worried about the health threats posed by exposed human waste, according to statements from local health officials quoted in the story. And they are also worried about the effect the waste could have in nearby drinking-water wells.

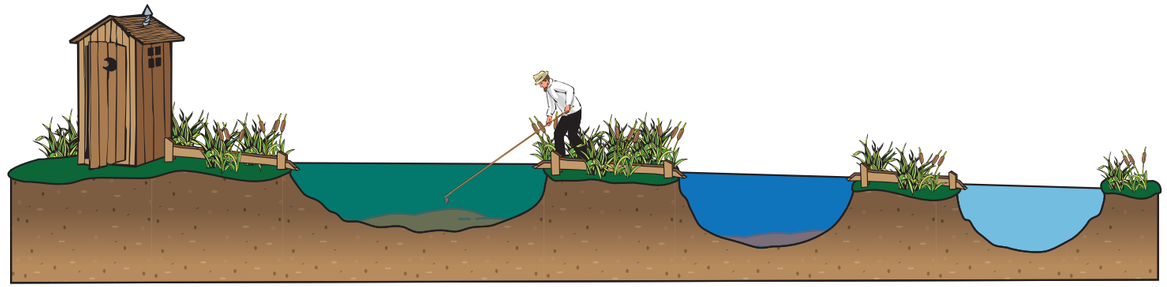
In such a situation, what is a building or health inspector to do? Of course, he or she could always wield the big stick and start fining the group. Then again, fines alone are not likely to lead to the construction of a sewage treatment system. And what about respecting the religious beliefs of the Amish? How does an official balance individual religious beliefs with the needs of the surrounding community? Extra doses of creativity, caution and understanding seem to be necessary when an official runs into to such a situation, experts say.

Wastewater

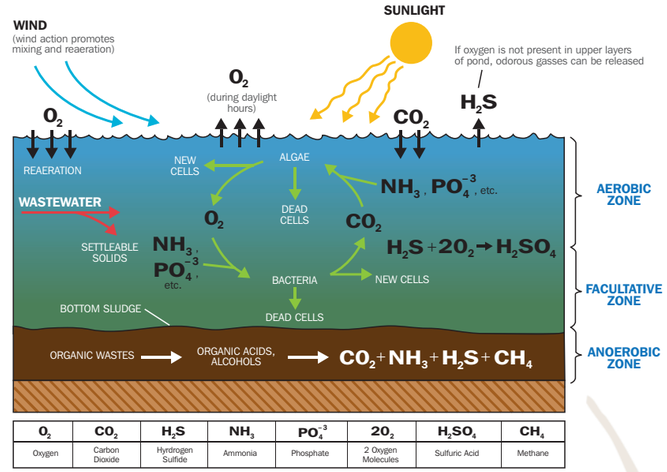
Disposing of human waste and gray water is possibly the stickiest issue when it comes to groups who decline to use modern technology. Neighbors usually will not stand for human waste being left out in the open.

Mechanical sewage treatment plants process most of the wastewater in large urban centers, but sewage from cities and villages all over the world is also treated in more low-tech, less-expensive ways, according to Joe Middlebrooks, coauthor of “Natural Wastewater Treatment Systems.”

Systems used by Middlebrooks and other pioneers in his field usually involve a series of ponds of different depths in which wastewater is dumped. To leave out most of the technical details, the ponds work by using dams or pumps to move the water from pond to pond. Along the way, naturally occurring algae and bacteria kill pathogens. The varying depths of the ponds encourage the increase of certain types of waste-fighting organisms in the water.



THE POND TREATMENT SYSTEM: By building a series of ponds at various depths, the sun and naturally occurring algae and bacteria do the work of killing dangerous pathogens in wastewater. In this diagram, waste is dumped into the highest pond. After a prescribed period of time, water is moved from the first pond, via dam or pump, into the second pond. The process repeats to a third pond, and eventually the water moves through a sand filter into a clean water well. The end result can be safely used in a farm-like setting.



O_2	CO_2	H_2S	NH_3	PO_4^{-3}	$2O_2$	H_2SO_4	CH_4
Oxygen	Carbon Dioxide	Hydrogen Sulfide	Ammonia	Phosphate	2 Oxygen Molecules	Sulfuric Acid	Methane

A cross-section of a filtration pond illustrates the natural chemical processes employed in cleansing wastewater. These same processes are used at water filtration facilities, just much faster.

“I think this would be a great way for a group like the Amish to get along with their neighbors and still take care of their wastewater,” Middlebrooks said.

Maintenance costs are almost zero and the only energy needed comes from the sun — as well as a little elbow grease to occasionally churn the ponds, experts say. After the waste flows from pond to pond over a proper period of time, the final water product can usually be safely used on farms, Middlebrooks said. And the killing off of pathogens happens naturally, he said. “When you flush the commode, all the things you need, the ingredients I guess you can call them, are already there,” Middlebrooks said. “You’re pretty much good to go.”

The one must-have for this type of system is a big piece of land for the ponds — something common in most rural areas. The ponds can be created by moving dirt around; for instance, by digging holes or piling up levees, he said.

Duncan Mara of Leeds University in the United Kingdom, another expert on the pond systems, agreed that such a system would likely suit the needs of a group like the Amish, because it requires almost no energy nor technology except for that provided by the sun.

Such systems have been time-tested all over the world, according to technical articles, and have been popular in Europe for more than 25 years.

In the United States, the systems are treated more like an emerging technology, although, according to Middlebrooks and dozens of technical articles, they are becoming more common.

Middlebrooks said he did not want to oversimplify the systems, because they must be built properly. There are plenty of experts and consultants to work with landowners and cities, he said.

Groundwater Safety

Another way an inspector can help resolve such a situation is to make sure nearby water wells are as safe as possible.

One of the main concerns expressed by residents regarding the wells was the effect the human waste could have on drinking water wells, according to an article published on WJACTV.com, the Website of the local television station. The problem of excrement being found near wells is not a new one, according to one expert.

Ever since wells have existed, animals have relieved themselves near the wells, said Cliff Treyens, a spokesman for the National Ground Water Association. Although improperly maintained septic systems are a great risk to wells, there are steps a well owner can take to keep water safe, he said. A good grout job around the wellhead, for instance, is one of the main things a well operator can do to keep nasty germs from seeping into water sources.

In addition, industry research has yielded data about how far from certain activities a well should be located. For instance, a well should be at least 200 feet from any facility

that accepts raw sewage or at least 20 feet from the outside edge of any road, according to data from the National Ground Water Association.

"A qualified water well contractor should really go out to look at any situation like this," he said. And human waste being dumped near wells would definitely be cause for concern, he added. "If somebody was cleaning out a latrine and dumping it five feet from a wellhead, I could not absolutely be sure that would cause bacteria to get in the well," he said. "But I would say that is too darn close."

Cooperation with Group Leaders

It seems that in many cases when dealing with Amish groups, a building official has to also play the role of diplomat. In many situations in Pennsylvania and Ohio, inspectors and public health officials negotiate with Amish groups to find a solution that everybody can live with, according to Donald Kraybill, a senior fellow at the Young Center for Anabaptist and Pietist Studies at Elizabeth Town College in Pennsylvania.

"Most local municipalities work directly with their local Amish leaders in flexing with Amish religious beliefs and practices," he wrote in an e-mail for this story. The book "The Amish and the State: Second Edition," edited by Kraybill, tells the story of Jacob Hershberger, an Amish man who, in 1989, decided to go to jail rather than build a sewage-treatment system at his home. He thought an outhouse, often called a privy, would be fine for his family.

The local municipality wanted him to build a system that would treat about 400 gallons of waste water a day, according to the book, which was probably far more than his family would produce.

According to Kraybill and other experts, the resistance to government authority plays an important role in why Amish sometimes will not comply with government regulations. The members of the groups often live quiet, simple lives and feel like they are not bothering anyone. Then someone shows up at the door one day and tells them they must spend thousands of dollars to change a practice that has been in place for hundreds of years.

That is why some counties with large Amish populations write zoning laws with the Amish in mind, according to the book. And it is very common for government officials to spend time negotiating with Amish about how their lifestyles affect neighbors.

Experts say that the Amish do not think technology is evil, just that some Amish groups believe that adopting things like electric appliances, television or automobiles could lead to vanity, which they believe leads to distraction and separation from their relationship with God and community. So, groups may not be as opposed to change so much as they oppose being forced to have contact with societal habits that they feel conflict with communal and religious values. In certain cases, exceptions are made. It has been reported, for instance, that an elderly Amish man was allowed by his community to buy a tractor because he had no sons to help work on his farm.

The beliefs of each Amish group vary, and there is not simply one umbrella organization with which to deal, Kraybill said. An inspector may find himself having to negotiate on a case-by-case basis with different Amish groups in the community.

And results of such negotiations are met "sometimes with considerable collaboration, but in other cases with conflict," Kraybill wrote.

Like all negotiations, sometimes an impasse is reached and Amish leaders would rather face legal consequences than change. But the inspector should at least make a hearty effort to find a solution that works for everyone. After all, he or she, just like the Amish leaders, is trying to obey a higher calling: in this case, unselfishly looking out for the needs of everyone in the community.

Drugs in Tap Water: How Significant is the Risk?

By Deanna Glick

Recent reports that a vast array of pharmaceuticals has been discovered in drinking water supplies have touched a nerve within communities, government agencies and environmental watchdog groups across the country. When this news reached Bob Shepherd from Technical Support Services at IAPMO, it was met with a tinge of helplessness.

"If this is public water supplies, that's beyond our codes," Shepherd said. "That's not the scope of the plumbing codes. Our water sources, whether that be lakes, rivers or aquifers, the code doesn't really address that at all and never will, probably."

An Associated Press investigation, the results of which were published in March, revealed various pharmaceuticals — including antibiotics, anti-convulsants, mood stabilizers and sex hormones — have been found in the drinking water supplies of at least 41 million Americans.

Environmental Protection Agency officials say drinking water supplies are safe, while critics call for more efforts to uncover potential problems and inform the public of risks. Either way, wastewater and drinking water treatments do not remove all drug residue. And while the federal government doesn't require any testing and hasn't set safety limits for drugs in water, some municipalities do screen for contamination. Still, the public remains largely unaware of the results. In addition, some claim water tests came back clear, but independent testing showed otherwise.

The AP's investigation uncovered contamination in water from major providers, as well as those serving smaller communities, and within aquifers and watersheds, the natural sources of most of the nation's water supply. Well water for rural consumers might also become contaminated by way of failed septic systems. Bottled water and home filtration systems don't necessarily remove traces of pharmaceuticals, either. Bottlers and filtration manufacturers don't typically test for contamination, according to the AP.

The concentrations of the drugs are minute, measured in quantities of parts per billion or trillion and far below the levels of a medical dose, according to the AP. Utility officials interviewed by the AP claimed little or no risk is associated with the levels of pharmaceuticals that end up in water, as did the pharmaceutical industry.

But the presence of so many prescription drugs — and over-the-counter medicines like acetaminophen and ibuprofen — in much of our drinking water has heightened

worries among scientists of long-term consequences to human health, the AP reported.

EPA scientist Christian Daughton, one of the first to draw attention to the issue of pharmaceuticals in water in the United States, confirmed many of the details from the AP investigation. He said after most of a prescribed medication is absorbed in human systems, the rest of it is excreted and flushed down the toilet. Also, expired medication is often flushed as a disposal method, but its effects have not completely disappeared. The AP also reported some contamination comes from animals, such as cattle treated with steroids and pets treated with veterinary medicine. What's more, the AP originally reported and Daughton confirmed, adding chlorine, a common process in conventional drinking water treatment plants, makes some pharmaceuticals more toxic. Daughton said adding chlorine changes the molecular structure and therefore creates a "new chemical," the effects of which would not be the same as the two original substances and therefore could be harmful – or not.

Researchers do not yet understand the exact risks, if any, from decades of persistent exposure to random combinations of low levels of pharmaceuticals, according to the AP. Some scientists have said the outcome can't be good. But Daughton said that doesn't necessarily mean it will be bad.

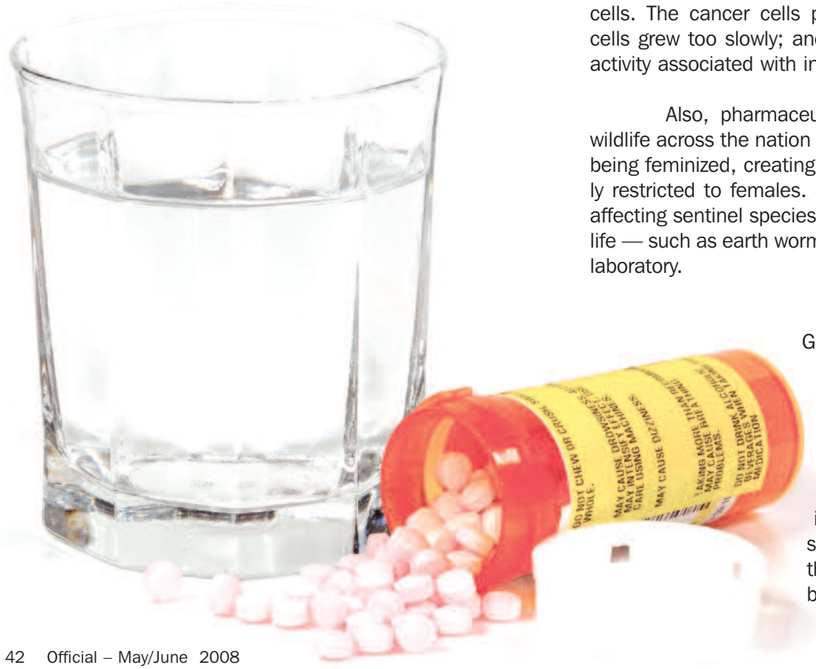
"This is all about risk perception, which doesn't really go to the heart of the science," said Daughton, who works in the EPA's Las Vegas-based Office of Research and Development. "These are chemicals out of place. I refer to them as chemical weeds. So people think, 'they aren't

supposed to be there, therefore I want them removed,' " Daughton said. "There are things with respect to human risk that do need to be ruled out. It takes a long time for science to sum up evidence into a meaningful body of knowledge. There's a lot we do know. At EPA the way we think of evidentiary science is in the risk paradigm."

An EPA Website devoted to the issue – www.epa.gov/ppcp/ – states that the agency "is committed to investigating this topic and developing strategies to help protect the health of both the environment and the public. To date, scientists have found no evidence of adverse human health effects from (pharmaceuticals and personal care products as pollutants) in the environment."

However, the AP reported that recent studies have found alarming effects on human cells and wildlife. According to its investigation, recent laboratory research has found that small amounts of medication have affected human embryonic kidney cells, human blood cells and human breast cancer cells. The cancer cells proliferated too quickly; the kidney cells grew too slowly; and the blood cells showed biological activity associated with inflammation.

Also, pharmaceuticals in waterways are damaging wildlife across the nation and around the globe; male fish are being feminized, creating egg yolk proteins, a process usually restricted to females. Studies also suggest the drugs are affecting sentinel species at the foundation of the pyramid of life — such as earth worms in the wild and zooplankton in the laboratory.



The Environmental Working Group (EWG), a nonprofit watchdog entity for various environmental issues, is among those voicing concern over the issue of pharmaceuticals being found in water supplies. An EWG analysis showed that of the top-200 drugs in the United States, 13 percent list serious side effects at levels less than 100 parts-per-billion in human blood, with some causing potential health risks in the parts-per-trillion range. The EWG is among critics who are calling on the EPA to take action to protect the public, particularly children and others most vulnerable to health risks from exposure.

"Environmental Working Group's studies show that tap water across the United States is contaminated with many industrial chemicals, and now we know that millions of Americans are also drinking low-level mixtures of pharmaceuticals with every glass of water," said Jane Houlihan, EWG vice president for research in a press release. "The health effect of this cocktail of chemicals and drugs hasn't been studied, but we are concerned about risks for infants and others who are vulnerable. Once again, the press is doing EPA's work when it comes to informing the public about contaminated tap water."

There's some indication the EPA is reacting to concern, but mostly in the form in detecting water contaminants rather than studying effects. According to the AP, the EPA analyzed 287 pharmaceuticals for possible inclusion on a draft list of candidates for regulation under the Safe Drinking Water Act. However, only one, nitroglycerin, made the final list. Nitroglycerin can be used as a drug for heart problems, but the key reason it's being considered is its widespread use in making explosives.

Meanwhile, the effect of combinations of drugs, mixtures of drugs and chemicals, interactions and the amount of contaminated water consumed by human bodies over long periods of time are all unknown and may continue as question marks since studies involve lab animals as opposed to humans.

For now, reverse osmosis (RO) is the only technology that provides nearly complete protection. Daughton said the process removes nearly all pharmaceutical contaminants. He said RO, used in conjunction with other home filtration systems, would provide reasonable home-based protection for those uncomfortable with the unknown, or who simply want to be cautious. But Shepherd said, and others have agreed, the expense of using RO to filter public water supplies and the gallons of polluted water for every one that is made drinkable is unrealistic in a world faced with water shortages, tight budgets and a population that relies on prescription drugs.

"The EPA is going to have to step up to the plate through the Safe Drinking Water Act," Shepherd said, adding that even that won't address all of the issues related to filtering pharmaceuticals from water. "They can establish all kinds of criteria, but ... we're running out of water as it is and it all comes down to dollars and cents."

Shepherd said he didn't believe IAPMO is in a position to lobby for change or put pressure on the EPA. At least that hasn't been the role of the association, historically.

"We can stand back and point fingers, yet we the people created this problem and I don't know how we're going to correct it," Shepherd said. "We can't stop taking medicines. This didn't happen overnight. It's been happening for years and years. We have to rely on the EPA."

IAPMO Convenes Annual Technical Committee Meetings in Denver

By Geoff Bilau

On May 5-7 in Denver, IAPMO convened its annual Technical Committee Meetings to process public comments toward the development of the *2009 Uniform Plumbing Code (UPC), 2009 Uniform Mechanical Code (UMC), 2009 Uniform Solar Energy Code* and *2009 Uniform Swimming Pool, Spa and Hot Tub Code*.

The meeting to act on all comments represents one of the final stages of the three-year ANSI-accredited *Uniform Code* development cycle. Each of the latter two codes is participating in the ANSI process for the first time.

During the meetings, four separate task groups of individuals with select expertise

Many people from the crowd had opportunities to express their opinions before the Committees voted on items.

were formed to provide focused guidance on specific areas of the code: the Access Task Group, the Fat, Oil and Grease (FOG) Task Group, the Gray Water and Reclaimed Water Task Group and the Horizontal Wet Venting for Bathroom (Groups) Task Group.

The scope of the Access Task Group included the identification and review of the various sections of the *UMC* that address appliance and equipment access as published in the *UMC Report on Proposals (ROP)*, Items 13, 23, 94, 96 and 97. Their objective was to develop recommendations that serve to eliminate redundancy and conflict, and consolidate requirements in Chapter 3. The task group also addressed technical and editorial inconsistencies associated with other proposed changes to the *UMC*.

The scope of the FOG Task Group included reviewing current *UPC* proposed revisions as published in the *UPC Report on Proposals (ROP)*, Items 147-153. Their objective was to provide an in-depth analysis and develop recommendations for the *UPC* Technical Committee to consider as public comments.

The scope of the Gray Water and Reclaimed Water Task Group included reviewing current *UPC* proposed revisions as published in the *UPC ROP*, Items 76 and 217-225. Their objective was to identify opportunities to refine proposed or existing language, potentially expand the applications of water reuse systems and address conflicting or unnecessary provisions while maintaining public health and safety.

The scope of the Horizontal Wet Venting for Bathroom (Groups) Task Group included reviewing current *UPC* proposed revisions as published in the *UPC ROP*, Items 135-137, addressing horizontal wet venting for bathroom (groups). Their objective was to provide an in-depth analysis and develop recommendations for the *UPC* Technical Committee to consider as public comments.

Discussions at the meetings also highlighted a number of issues regarding sustainable environments, including green building, energy conservation and water reuse, according to Lynne Simnick, IAPMO director of Code Development.

"The voluntary consensus system (ANSI process) operates on the principle that all who will be affected by the outcome should be freely afforded a voice in creating IAPMO's standards for the *2009 Uniform Codes*," Simnick said. "Bearing this in mind, these meetings were extremely successful as each public comment at the hearings was discussed and acted upon."

The following is an overview of the actions taken on the proposed changes to the *UPC, UMC, Uniform Solar Energy Code* and *Uniform Swimming Pool, Spa and Hot Tub Code* at the Denver meetings.

UNIFORM PLUMBING CODE (UPC)

Out of 121 public comments regarding the *UPC*, 41 were approved as submitted and 13 approved as amended by the Technical Committee, representing 45 percent approval.

Air Admittance Valves (Item No. 3)

The Technical Committee voted on public comments that were submitted regarding Air Admittance Valves (AAV), which are one-way valves designed to allow air to enter the plumbing drainage system when negative pressures develop in the piping system.

As a result of a committee action in the 2007 Report on Proposals that amended the original proposal submitted, the committee rejected the comments. This action, which is also relative to Item No. 239, may potentially place a definition regarding AAVs in Appendix L.

Water-Conserving Fixtures and Fittings (Item No. 38)

The Technical Committee voted on several comments that were submitted regarding water conservation and

One of the benefits of the ANSI process is that anyone is able to speak on proposed code changes. Their statements are considered by the Committees prior to votes being cast.

Chairman Tim Collings (center) listens to a speaker at the mic. Collings was assisted by Standards Council Secretary Gaby Davis (right), and other IAPMO staff members in moderating the plumbing portion of the T.C. meeting.

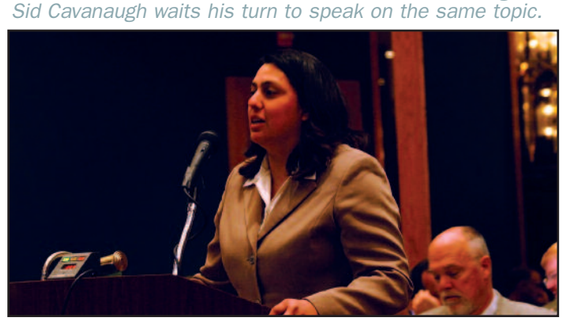
Gary Klein, former California Energy Commission representative, offers his expert insight on hot water transfer.

Amir Tabakh, Los Angeles chief mechanical engineer for Building and Safety, states his position on a proposed item on the agenda.

John Halliwill, former IAPMO director of Code Support, represented himself and offered his input to the Committees.

Joe Sternola and John Taecker listen to another Committee member offer his opinion before they vote.

Steve Tokarz of BrassCraft offers a manufacturer's insight as Sid Cavanaugh waits his turn to speak on the same topic.



Maribel Campos, IAPMO standards manager, defends the proposal of including IGC (IAPMO Guide Criteria) Standards into the Uniform Codes.

the applicability of conservation when applied to plumbing fixtures, construction design and installation practices. The proposals and comments voted on by the Technical Committee support the 1992 EPAct (the Energy Policy Act) and eliminate water waste by eliminating the various means of exceeding the flow rate requirements of the federal law.

The Committee reviewed commentary that detailed data relative to efficient showerheads being one of the major tools for reducing urban water demand. The EPAct mandates a maximum flow rate of 2.5 gpm for showerheads. At the time EPAct was approved, the prospect of multiple showerheads in a single stall was not discussed nor considered. Comments presented to the Technical Committee elaborated upon the fact that EPAct's core purpose in the language of the policy was to limit water waste and the act was not intended to allow multiple showerheads to be used simultaneously in a single shower compartment. The committee entertained remarks that stated the multiple showerhead design feature has been the customary functional interpretation and these multiple showerhead applications are negatively impacting the energy and water benefits of the legislation.

Identification of Potable and Non-Potable Water Systems (Item No. 76)

The Technical Committee voted on public comments that were submitted regarding piping that shall be identified with a colored pipe or band and coded with paints, wraps and materials compatible with the piping. The Gray Water and Reclaimed Water Task Group developed a report. The task group agreed with the submitter's substantiation regarding the simplification of pipe marking systems and recommend to the Technical Committee further modifications to consolidate, harmonize and clarify gray water and reclaimed water pipe material, marking and information provisions of Chapter 6 and 16. In developing this recommendation, the task group also considered similar comments at Items 217, 220, and 221.

Siphonic Roof Drainage System (Item No. 157)

A new section to potentially be added as new text to the *2009 UPC* as follows: A siphonic roof drainage system shall be designed in accordance with ASPE 45. ASPE has published a new standard for siphonic roof drainage systems. This standard provides the design criteria that must be observed by engineering design professionals for the proper operation of a siphonic roof drainage system. By referencing this new standard, the engineering community and subsequently the Authority Having Jurisdiction will understand the installation criteria and advancements of this technology now becoming more prevalent as a traditional use in the United States.

Comments received by the committee stated that siphonic roof drainage systems are not a proven system. However, the system has been in use in Europe for several years and many U.S. manufacturers provide products for installation of siphonic roof drainage systems domestically and abroad.

UNIFORM MECHANICAL CODE (UMC)

Of 36 public comments regarding the *UMC*, 25 were accepted as submitted and two more were accepted as amended by the Technical Committee, 75 percent approval.

2008 National Fuel Gas Code (Item Nos. 4.01, 65, 68.05, 73.01 and 77.03)

The *2009 UMC* will have the most up to date extracts from the *2008 National Fuel Gas Code, NFPA 54.*

2008 Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations, NFPA 96 (Item Nos. 26, 58-61 and 63)

Several new definitions were added from *NFPA 96*, as well as new requirements for cooking equipment, including those pertaining to grease filters, support systems for grease duct systems and hood systems. The *2009 UMC* will have the most up to date extracts from the *2008 Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations, NFPA 96.*

Kitchen Hoods (Item No. 54)

Listed kitchen hoods must be installed in accordance with the terms of their listing and the manufacturer's instructions, and tested in accordance with UL 710 or equivalent per Section 508.6 of *2009 UMC*. This will make the *2009 UMC* more complete for requirements that pertain to kitchen hoods.

Plume Discharges (Item No. 92)

Plume discharges for cooling towers, evaporative condensers and fluid coolers will be located a minimum of 25 feet from any ventilation inlet to a building, in accordance with Section 1131.0. The *2006 UMC* requires 5 feet above or 20 feet away from any ventilation inlet to a building. This requirement is similar to ASHRAE Standard 62.1-2007.

Insulation Requirements (Item No. 94)

In Chapter 12, Sections 1201.5.1.3, 1201.6.1.3 and 1201.7.1.3 will be deleted because they are duplications of insulation requirements. These sections will be replaced with Section 1201.2.1.8 in the general section of the chapter. The *UMC* Access Task Group submitted this public comment after Identifying several redundancies pertaining to insulation.

New Standards (Item Nos. 96-97 and 103.01)

The following standards are proposed to be added to *2009 UMC*:

UPC *T.C. Committee Chaiman Tim Collings acknowledges the speaker at the podium.*

Vickie Lovell speaks on behalf of a proponent and offers her recommendation to the Committee as others wait their turn in line.

It appears members are unanimous in their voting to pass this particular item on the agenda.

IAPMO Code Support staff members Anthony Mancha and Adam Muliawan assist in tallying the votes and keeping the meeting on track.

Members of the audience follow along with one of the handouts provided by a proponent.

IAPMO Code Support staff members Alma Ramos and Norm St. Hilaire help to document minutes and service any of the Committee's needs during the meeting.

Tony Scarano and James Walls vote to reject a proposal made during the UPC portion of the meetings.

Pennie Feehan and Denise Beach review their electronic copies of the Report on Comments during the UMC meeting.

- ASTM F 2623-07 *Standard Specification for Polyethylene of Raised Temperature (PE-RT) SDR9 Tubing*
- ASTM F 1282-06 *Standard Specification for Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Composite Pressure Pipe*
- ASTM F 1974-04 *Standard Specification for Metal Insert Fittings for Polyethylene/Aluminum/Polyethylene and Crosslinked Polyethylene/Crosslinked Polyethylene Composite Pressure Pipe*
- NFPA 780 *Standard for the Installation of Lightning Protection Systems*

UNIFORM SOLAR ENERGY CODE

There were 15 public comments regarding the *Uniform Solar Energy Code*, with 13 gaining approval as submitted and one more approved as amended, 93 percent approval.

Polypropylene (Item No. 3)

Polypropylene (PP) is permitted to be used for piping and its hanger and support requirements are indicated in Table 3-1.

New Tables (Item No. 4)

Table 4-2, Minimum Airgaps for Water Distribution, and Table 4-3, Backflow Prevention Devices, Assemblies and Methods, have been proposed as new additions to the *2009 Uniform Solar Energy Code*.

Code proposals mentioned above recommend revisions that were made to information extracted from the *Uniform Plumbing Code* that was revised in the 2006 edition.

Photovoltaic Systems (Item No. 9)

The *2009 Uniform Solar Energy Code*, Chapter 10, will have Solar Photovoltaic Systems requirements extracted from the *2006 National Electrical Code NFPA 70*. This code change will provide correllation in accordance with the *National Electrical Code, NFPA 70* – 2006 version.

Material Standards Table 11-1 (Item Nos. 10-15)

Material Standards Table 11-1 has been revised to feature standards that apply to solar energy installations. In addition, Table 11-1 index has been deleted. Proposed standards to be added to Table 11-1 are used to evaluate products associated with solar energy installations.

UNIFORM SWIMMING POOL, SPA AND HOT TUB CODE

Of 58 public comments regarding the *Uniform Swimming Pool, Spa and Hot Tub Code*, 49 were approved as submitted and five others were accepted as amended, 93 percent approval.

The Uniform Swimming Pool, Spa and Hot Tub Technical Committee was focused and committed to the ANSI process and concerns relative to maintain harmony within the *USPSHTC* document under the umbrella of the IAMPO family of *Uniform Codes*.

However, it was evident that the Technical Committee's commitment and expertise was to develop an authentic independent *Uniform Swimming Pool, Spa and Hot Tub Code* that would maintain family stability and continuity. Relative to this responsibility, the committee set a goal to begin maturing the 2006 edition by placing the proposals for the 2009 document upon a foundation of sound experience, certified standards and diverse information.

The Committee's determination was guided by identifying proposals and principles best suited to adequately protect the health, welfare and safety of the public; of paramount importance was that the 2009 edition of the *USPSHT* would be in of itself a certification of public safety.

Proposed amendments and modification were reviewed to establish and clarify that a fundamental intent of the *USPSHTC* language would be to make it independent of the *UPC* and that the representation of information contained in the *USPSHT*C document would be exclusive to swimming pools, spas and hot tubs and the associated piping and connections that are relative to the discipline of the swimming pool, spa and hot tub industry in general.

Abrasion Hazard (Item No. 17)

The committee acted to reject a comment seeking to define "abrasion hazard" as "a surface that presents an unreasonable risk of irritation to the skin upon contact." The committee determined the term "unreasonable" cannot be defined and is subjective, therefore this proposed change should be rejected.

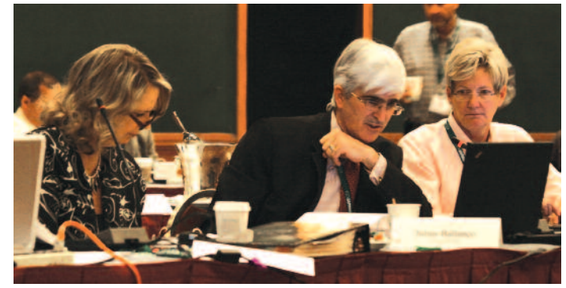
Air Blower (Item No. 23)

The committee acted to reject a comment seeking to define "air blower" as "a device that produces a continuous flow of air. (NSPI-3)" The committee felt the proposed definition is too broad and needs to be specific to this code.

Water Supply Inlets and Connections (Item No. 48)

306.3. Water supply connections to equipment, appliances or appurtenances shall be protected as provided

Lynne Simnick, director of Code Support, fields a question from a Committee member.



April Trafton (left) and Pennie Feehan (right), follow along as Jullius Ballanco analyzes a proposal.

The Uniform Swimming Pool, Spa and Hot Tub *Committee hammers out specific wording for the proposed change.*

Carvin DiGiovanni of the Association of Pool and Spa Professionals and Ronald Lacher with Pool Engineering Inc. listen to statements regarding a proposed change.

for in the plumbing code. Besides the water supply connection to the pool inlet or filter as provided for in Section 306.1, there are connections to chlorinators and other equipment that are used in the treatment of the pool water and to cleanup around the pool area. Additionally, there are clear water pre-rinse showers installed in the pool area of some pools to allow people to rinse off before and after using the pool. Some of these connections and uses might not require the issuance of a plumbing permit and or having a plumbing installation inspection. The committee accepted this proposal as submitted.

Table 6-1 (Item No. 57)

Add new text as follows: Table 6-1, Material Standards. **Standard Number:** APSP 7-2006. **Standard Title:** American National Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs and Catch Basin. **Application:** Swimming Pools and Spas

The objective of this standard is to provide guidelines for suction entrapment avoidance in the design, equipment, operation and installation of new and existing swimming pools, wading pools, spas, hot tubs and catch basins for builders, installers, pool operators and service professional. The standard provides a model code for national, state and local officials and it will be of use to designers, builders and inspectors in protecting against entrapment hazards in aquatic facilities.

This APSP standard is the first comprehensive approach to engineering swimming pools and spas to avoid all five suction entrapment hazards: hair entrapment, limb entrapment, body suction entrapment, evisceration/disembowelment and mechanical entrapment. The design requirements and construction practices in this standard are based upon sound engineering principles, research and field experience that, when applied properly, provide for the delivery and installation of a safe product.

The new standard leaves the door open for new technology (e.g., automatic pump/motor shut-off systems) and includes options such as a single unblockable outlet (drain), dual and multiple outlets (drains), a single outlet swim jet system, gravity follow systems, listed manufactured SVRS and engineered vent systems. It includes an option for pools and spas to be built without a main drain (suction outlet). The options offered in the standard will provide the builder and the homeowner with safe choices on how to prevent suction entrapment.

This standard was prepared by the APSP-7 Suction Entrapment Avoidance Standard Writing Committee of the Association of Pool and Spa Professionals (APSP) in accordance with American National Standards Institute (ANSI).

The commitee acted to accept the proposal as submitted.

The Technical Committee Reports, consisting of the *Report on Comments* and the preceding *Report on Proposals*, will be presented at the Association Technical Meeting Convention, held during the IAPMO Annual Education and Business Conference in Atlanta from Sept. 28 to Oct. 3. The session covering the *Uniform Mechanical Code*, *Uniform Solar Energy Code* and *Uniform Swimming Pool, Spa and Hot Tub Code* will be held on Tuesday, Sept. 30, at the IAPMO conference hotel, the Sheraton Atlanta. The *Uniform Plumbing Code* session will be held on Wednesday, Oct. 1, at the ISH North America site, the Georgia World Congress Center.

The Regulations Governing Committee Projects at Section 4-5 address the membership action at the Association Technical Meeting Convention relating to the development of the *UPC* and *UMC*. Those wishing to suggest an amendment to any item appearing in the *ROC* or *ROP*, in accordance with the Regulations, are encouraged to bring overhead display materials to share while stating the case for said amendment.

Following each presentation and discussion, the assembled members will vote to advance or decline the suggested amendment by show of hands. This is the membership's final chance to voice its opinion with regard to the final content of the 2009 editions of the *UPC* and *UMC*.
If an amendment passes, it is balloted back to the Technical Committee for its ruling. Ballots produced by the Association Technical Meeting Convention will be received by Technical Committee members on Oct. 20 and are due back no later than Oct. 27. Where there are differences of opinion between the Technical Committee and IAPMO membership, the item will be heard as an automatic appeal before the IAPMO Standards Council [see section 1-6.2(b)].

On Nov. 12-14, the Standards Council will hear these appeals and rule on them.

The Regulations Governing Consensus Development of the *USPSHTC* and *USEC* describe the process that will be used to finalize content for the 2009 editions of those codes.

The *2009 Uniform Codes* will be published next spring.

2008 *UPC* Technical Committee

Plumbing Technical Committee: (Top row, l-r) Percy Brown, John Taecker, April Trafton, Jullius Ballanco, Larry Soskin, James Walls, Ian Chang, Sean Martin. (Middle row, l-r) Jim Stack, Michael Wynne, Amir Tabakh, Thomas Pape, Larry Brown, Bill LeVan, Ted Lemoff, Joe Sternola, James Dingman, Scott Hamilton, Paul Cabot. (Front row, l-r) Jack Fischer, Tony Scarano, Pennie Feehan, Bob Adler, Tim Collings, Nasser Nikravi, Jeremy Brown, Michael Cudahy, Arnie Rodio, Sylvanus "Roots" Bloice, Doug Kirk.

2008 *UMC* Technical Committee

Mechanical Technical Committee: (Tow row, l-r) Amir Tabakh, Harvey Kreitenberg, Steven Taylor, Michael Wynne, Ian Chang, John Taecker, Paul Cabot, April Trafton, Wes Davis, Tim Orris, James Dingman, Scott Hamilton. (Front row, l-r): DJ Berger, Ted Lowe, Tony Scarano, Bob Adler, Pennie Feehan, Nasser Nikravi, Ted Lemoff, Denise Beach, Dave Mann.

IAPMO Plants Seeds for Green Enhancement of *Uniform Codes*

By Geoff Bilau

IAPMO has always prided itself on producing the greenest codes in the business — they were the first to adopt provisions for environmentally friendly fixtures such as low-flush toilets and low-flow showerheads — and this is one area of leadership the association is clearly committed to sustaining.

Following through on its commitment to be the leader in sustainable model code provisions through the promotion of safe and reliable, environmentally responsible construction practices, IAPMO on April 9 in Chicago convened the inaugural meeting of its Green Technical Committee. This initial dialogue formally launches IAPMO's efforts to identify opportunities to make the *Uniform Family of Codes* more embracing of sustainable practices and technologies and develop the first ever green supplement for plumbing and mechanical codes.

Assembled from a host of top experts in water efficiency and the sustainable plumbing and mechanical industries, the Green Technical Committee seeks to develop and maintain a supplemental document establishing requirements for green plumbing and mechanical systems, while ensuring these practices are safe and reliable. The green plumbing and mechanical supplement will also serve as a repository for provisions that can ultimately be integrated into the *Uniform Codes* and supplement codes developed by other organizations.

"I consider it a great honor to be part of this pioneering effort to develop a whole new set of provisions that promote and ensure sustainability in our future building practices," said committee Chairman Bill Erickson of CJ Erickson Plumbing Co. "I have placed a very high priority in my work to see this to its fruition."

As a de facto code of practice, this supplement will establish, where applicable:

- Minimum sustainability provisions
- Health and safety provisions
- Minimum performance provisions
- Design considerations
- Installation requirements
- Maintenance requirements

The supplement will seek to meet these requirements through the use of high-efficiency fixtures, appliances and equipment, water reuse and conservation, and renewable energy sources; reexamination of sizing methods and design practices; placing more emphasis on maintenance; and many other tenets of the green movement.

"By creating a comprehensive green plumbing and mechanical supplement, many proactive jurisdictions will have the option of adopting the requirements or using them as a resource to complement their existing plumbing and mechanical codes," said Dave Viola, IAPMO director of Special Services. "Many municipalities across the country have been asking for such a document."

"The Green Technical Committee seeks to develop and maintain a supplemental document establishing requirements for green plumbing and mechanical systems"

At the meeting, clearly defined goals were established and task groups were formed to tackle specific issues in the development of the code supplement.

The committee's next meeting is tentatively scheduled for Aug. 21 in Chicago.

IAPMO GREEN™

Choosing to Be Green

Could the Voluntary Retrofitter Actually See Any Real Return on his Investment Besides a Clearer Conscience?

By Ben Baeder

Last November in Georgia, Gov. Sonny Perdue publicly bowed his head and prayed for God to end a drought.

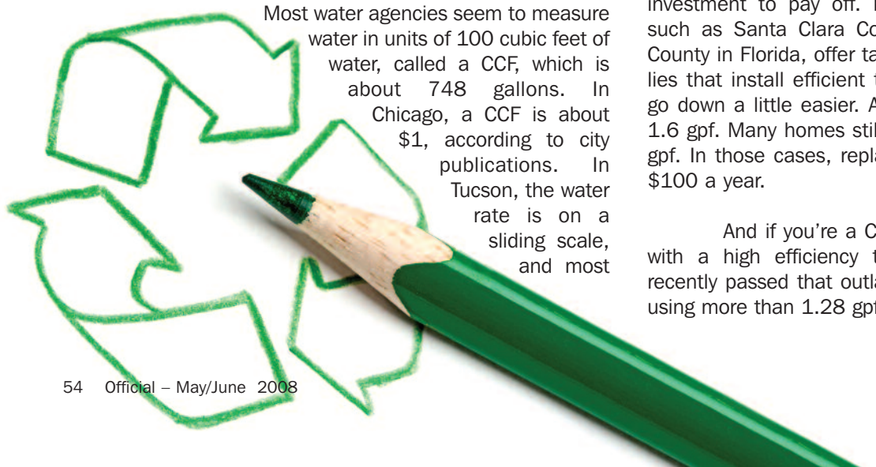
But down here on terra firma, many of us regular folks are not doing all we can to save water and energy. The cause may be that homeowners, many of whom would love to do their part for the environment by "going green" and installing water-efficient appliances, wonder if changing out old appliances would ever pay off.

For such families, there is good news. Not only would installing efficient appliances help reduce your impact on the environment, but research indicates it would in some cases be "green-friendly" for the pocketbook, too.

"There are definitely easy ways to save money," said Bob Markovich, home and yard editor for Consumer Reports Magazine. "And many things families can do are not about money, they are about reducing your carbon footprint and doing the right thing."

Most of the ideas discussed here will be about saving water. In addition, some easy ways to save energy will be discussed briefly at the end.

Before getting too far into this article, it should be noted that water costs vary in different parts of the country. Most water agencies seem to measure water in units of 100 cubic feet of water, called a CCF, which is about 748 gallons. In Chicago, a CCF is about $1, according to city publications. In Tucson, the water rate is on a sliding scale, and most families pay between $1-$4 a CCF.



In Gov. Perdue's Georgia, in the city of Atlanta, which also charges on a sliding scale, most families pay about $3 per CCF, according to city statistics.

So, for this article, assume the majority of us pay $1 to $3 per CCF, though it should also be noted that as water becomes more scarce, these prices will likely escalate in the years ahead.

All statistics are for a family of four. Regardless of region, there is money to be saved by installing efficient appliances in the home.

The Replacements

For most of us, the day starts in the bathroom — an activity that typically concludes with a swooshing sound. U.S. law requires retailers to sell toilets that use less than 1.6 gallons per flush (gpf). But toilets using less than 1.28 gpf are increasingly becoming available.

A person flushes about five times a day, according to the federal government. Over the course of a year, a family using a 1.28-gpf toilet flushes down 2,336 gallons less than a family with a 1.6 gpf toilet, which comes to an annual savings of $3-$9.

For a $150 toilet, it would take 17-50 years for the investment to pay off. But many water-starved counties, such as Santa Clara County in California or Miami-Dade County in Florida, offer tax rebates of $50 to $150 to families that install efficient toilets, which makes the purchase go down a little easier. And not every toilet out there uses 1.6 gpf. Many homes still have toilets that use 3 or even 5 gpf. In those cases, replacing the toilet could save $30 to $100 a year.

And if you're a Californian, you are going to end up with a high efficiency toilet anyway, because legislation recently passed that outlaws by 2014 the sale of any toilet using more than 1.28 gpf.

Next, the typical family member jumps in the shower, which ordinarily uses about 3.2 gallons per minute, according to information from Kane County, Ill. If a person is willing to put up with those showerheads that seem to tease us with just the tiniest mist, there can be a steady stream of savings.

Low-flow showerheads squeeze out as little as 1.2 gallons per minute, and the cheap ones only cost about $15. If every member of a four-person family daily takes a 10-minute shower, that's an annual savings of $40-$120. Most readers are probably thinking, "My shower is one of my few luxuries in life, and I am not changing a thing about it." But even the most shower-loving among us should consider giving a low-flow head a try. They are cheap, easy to install and are getting better customer reviews than ever. It is a very low-risk experiment.

After coming home from work, many families have to start a load of laundry. A standard washing machine uses about 41 gallons per load, according to the U.S. Environmental Protection Agency. And an efficient front-loading model can use as little as 10-15 gallons, according to manufacturers' claims, which would save about 10,000 gallons and $14-$42 yearly. A good washing machine costs about $700, so it would take 17-50 years for this one to pay off.

And finally, the dishes: An average dishwasher uses about 10 gallons per load, while a water-efficient model can use as little as six, according to the Massachusetts Water Resources Authority. Savings? About $2-$6 a year, which would make an efficient model pay itself off in 67-200 years, not too shabby, for a giant tortoise. (They live to 175 years).

So, let's recap our savings over a 10-year period:

Item	Cost	Savings
HET Toilet	$150	$30-$90
Shower head	$15	$400-$1200
Washer	$700	$140-$420
Dishwasher	$400	$20-$60
Total	**$1,265**	**$590-$1,770**

Counties, water districts and utility companies all over the country offer rebates for almost every kind of water-or-energy-conserving appliance. In some areas, the rebate programs are so aggressive they can cut the cost of an appliance by 70 percent. So, before making up your mind on any major appliance, those doing green retrofits should check for such programs.

Don't Forget About the Lawn

Families in most parts of the country can at least break even on their water bills within 10 years of buying their appliances. But that doesn't even take into consideration the water and expense saved by installing efficient irrigation systems, which account for about half of water use in some western states, according to experts.

Drip irrigation systems use 20- to 50-percent less water than sprinklers, according to the U.S. Environmental Protection Agency. Other water agencies advise customers to avoid any type of sprinkler that makes a mist, because much of the water is blown away by the wind.

Switching to a drip or soaker-hose irrigation system could save a family about $3-$9 a month, which represents a savings of $360-$1,080 over 10 years. This switch is definitely worth it.

Experts also say most lawns only need watering twice a week. And, finally, do not scrimp on your irrigation timer. Getting a good one that is highly customizable and easy to use will pay off in no time, according to water officials.

The Debate Heats Up

No article about conservation would be complete without mention of one of the biggest trends in home appliances: tankless water heaters. The selling point on tankless water heaters is that they instantly provide unlimited hot water. And they are supposed to be about 33 percent more efficient than conventional water heaters because they do not have to constantly keep hot a large amount of water.

But the federal government and consumer-watchdog groups caution that these devices are no messiahs and work better for different homes and different climates.

"Because they rely on the furnace or boiler to heat the water directly, tankless coil water heaters work most efficiently during cold months when the heating system is used regularly," cautions the U.S. Department of Energy. "That's why they can be an inefficient choice for many homes, especially for those in warmer climates."

But manufacturers claim a family can save money as long as they use the same amount of water they did with their conventional water heater. A family that spent $331 heating water in their conventional natural-gas water heater would spend about $222 with a tankless water heater, according to Lisa Nagamoto, a spokeswoman for Noritz Tankless Water Heaters in Orange County, Calif.

She said a tankless water heater would save even more money for a family that installed other water-efficient

appliances. So this change may be worth it, but not for all people at all times, according to experts. Consumer Reports plans to write a story about tankless water heaters soon, Markovich said.

Other Changes

Over the years, *Consumer Reports* has done plenty of research on how to save money and be earth friendly, and there are many easy changes that can yield big savings.

First, change out incandescent light bulbs to florescent, which could save $30 over the life of the bulb, according to Consumer Reports research. Next, buy a thermostat that is easy to use, Markovich said.

"There really is a difference," he said. "Some are hard to program and some are even cryptic. The more difficult they are to program, the more likely a person is to override the program, and then they lose all the efficiency." A well-programmed thermostat can cut energy bills by 20 percent, and a good one costs only about $80, he said.

Another relatively inexpensive fix is to insulate your house better, which could pay off in just a few years, he said. Insulating pipes is also an easy way to save on water-heating costs, he said. And that hot water should come from a slightly expensive water heater, Markovich said.

"The more expensive ones with the longer warranties really are better," he said. "We literally sacrificed a bunch of them. We chopped them in half and examined them. The expensive ones were better."

There are also a few improvements that sometimes are said to pay off, but actually take a long time to yield savings. Replacing windows, although it can reduce heating and cooling bills, usually costs too much to yield much savings, he said. "If they are rotting or just super ugly, it is good to think about energy efficiency when considering replacements," Markovich said. The same thing goes with replacing a heating furnace, he said. It is probably better to maintain or upgrade a furnace with caulk and insulation than to buy a new one.

All For One...

One thing to remember when thinking about replacing appliances is that all of us are in this resource-saving game together, said Chris Brown, executive director of the California Urban Water Conservation Council. When millions of people all save a little water or energy, the need for new reservoirs, water-treatment facilities and power plants goes away, he said.

"Individually, people may not see the savings right away," Brown said. "But we all flush the toilet five times a day, so that little bit of water saved each time, it really adds up."

Can people really think unselfishly when it comes to the environment, though? Markovich said its already happening. The magazine last year put out a special section on saving energy, and it was one of the most popular sections in magazine history, he said.

"We never dreamed it would do that well," he said. The trick now is to try to sort out the marketing gimmicks from the real thing, he added. He said a person who uses magazines, Websites and other resources to be a smart shopper can do well financially while doing the right thing for the environment.

"You have to go out there with your eyes wide open," he said. "But there are some great products available."

Down in Atlanta, Perdue's prayers were answered, sort of. A wet December ensured that 2007 would not be the state's driest year ever, according to an Associated Press story. But the rest might be up to us.

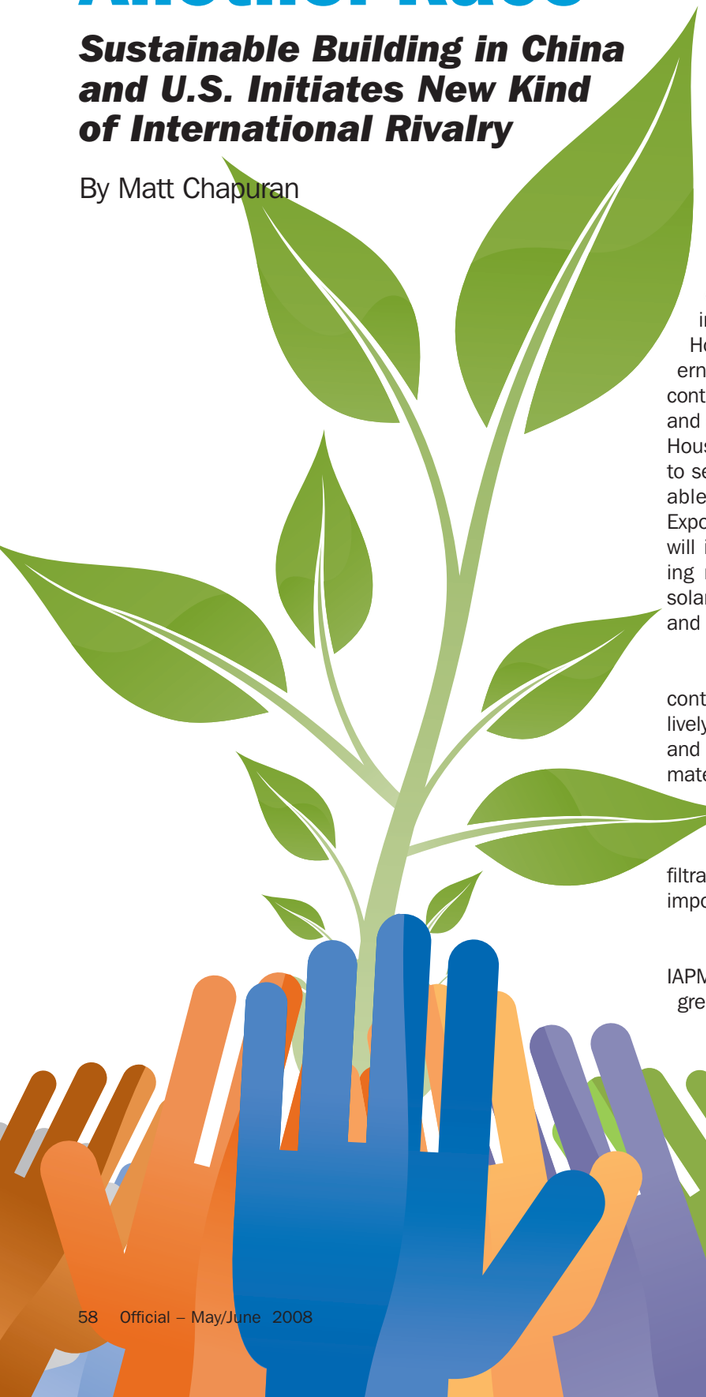
Here is a sampling of links to some rebate programs.

http://www.annapoliswd.org/pdf/RebateApplication.pdf
http://www.irwd.com/Conservation/rebates.php?a=res
http://www.marinwater.org/

Green Signals Beginning of Another Race

Sustainable Building in China and U.S. Initiates New Kind of International Rivalry

By Matt Chapuran



The World Bank estimates that by 2015 half of all new building construction worldwide will take place in China. The economic impact will be considerable as will the opportunity to innovate with Green design and building practices. With a number of projects, the Chinese government has embraced this opportunity, while simultaneously some high profile projects in the United States have begun their own greening. In the 21st century, have we left the Space and Arms Races behind in favor of a more collaborative Green Race?

The Tomorrow House

"In some areas we are not as advanced as the U.S.," concedes Yang Yong, chief engineer from the Shanghai Research Institute of Building Sciences in China (SRIBS). However, the Chinese government has awarded a contract to SRIBS to design and construct the "Tomorrow House," a residential project to serve as a model of sustainable building and construction at the 2010 World Exposition in Shanghai. The multi-layered eco-residence will incorporate several cornerstones of the "green" building movement, including natural ventilation, day lighting, solar energy, 3-R materials, a changeable building envelope and indoor gardens.

While the project itself is exciting, it stands in stark contrast to China's overall infrastructure. "The market is very lively," Yong says. "So things must be standardized more and more." SRIBS is positioned strongly in the building materials market, but Yong sees room for improvement with regard to water quality and efficiency. "In the U.S., water can be consumed directly from the pipe or hose. This is not so in China. We must do more with filtration before drinking. Improving that quality is most important to our moving forward," Yong says.

To that end, SRIBS has begun a dialogue with IAPMO. "It seems like a natural fit as they're pursuing a greater understanding of water quality and the plumbing side of building construction," says Dave Viola, director of Special Services for IAPMO. "We look forward to sharing our knowledge of safe and sustainable plumbing while benefiting from SRIBS' expertise in building sciences and energy efficiency."

New Towns Today

The Tomorrow House is not the only project where China is showing its growing appetite for green construction, nor its willingness to partner with American firms. Virginia-based architecture firm William McDonough and Partners provided the conceptual design work for the Guantang Chuangye Sustainable Development project.

Although the project ultimately did not move beyond the development phase, its green attributes speak to the scale and methodology in China's new wave of green building. The project focused on emphasizing nearby parks and existing landscape as a backdrop to a community where commuting by means other than car is encouraged through bike paths and close proximity to public transit.

Even more groundbreaking was the intricate plumbing system, intended to direct water from bathing and clothes washing into low-flow toilets. Wastewater could then be converted easily into fertilizer for nearby fields or in creation of saleable electricity. Covering more than 5,000 acres, the astonishing breadth of Guantang Chuangye and similar new towns in China prompts questions as to why similar scale projects haven't been realized in the United States.

The advantage that China has is in its centralized government. For good or ill, the public comment process so familiar and occasionally derided by developers in the United States has a limited role in China, allowing projects to move more quickly and affording architects more freedom to experiment with progressive design.

"In the United States, the demand is driven much more by incentives," explains Joe Marcotte, program manager for the China-U.S. Center for Sustainable Development. Founded in 1999, the China-U.S. Center for Sustainable Development places its focus on identifying projects that, according to its Website, "by design enable commerce, communities and nature to thrive and grow in harmony." Like other projects in this current wave, the China-U.S. Center has participated in a sustainable village design project. Centered on the rural area of Huangbaiyu, near Benxi City in Northeast China's Lianing Province, the team's master plan emphasizes local, sustainable resources in construction and increased quality of life.

Marcotte explains, "Rebates or tax credits are the prevailing model" for green investment as opposed to government-developed conservation policies. Although Marcotte points to some progressive cities, such as Portland, Ore. — where REACH Community Development recently completed Station Place, a partially city-funded project that uses the rooftop to harvest rainwater and flush up to 75 toilets — green development in the United States is based in local municipalities rather than extending from a central government. "The advantage of a city like Portland," explains Laurel Lyon, REACH's manager of Volunteers and Public Relations, "is that it's small enough so that change can be noticed, but big enough so that change can be a model for the rest of the country." However, while American efforts at green building are not on the same scale as those in China, they are interesting in their own innovations.

ECHO Can Be Heard

www.echovermont.org

Situated in Burlington, Vt., the ECHO Lake Aquarium and Science Center is the first building in the state to reach LEED (Leadership in Energy and Environmental Design) Platinum Rating — a designation made by the United States Green Building Council — for attributes such as sustainable site, water efficiency, materials and resources. Like the designs for the Chinese new towns, ECHO reduces carbon emissions by encouraging alternative forms of transportation. Located close to a bus route, ECHO also has bike racks installed adjacent to the property. Showers are available inside the facility for bike riders. Three electric car charging terminals are on site and preferred parking is earmarked for carpools.

According to ECHO's Website, "Americans extract 3,700 billion gallons more per year than they return to the natural water system." In an effort to reverse this trend, ECHO's design includes a site that directs rainwater runoff to native plants, which are better suited to adapt to the local environment without need for additional irrigation. Inside the facility, waterless urinals and dual flush toilets — which provide users the option of a 1.6-gallon or 0.8-gallon flush — decrease water usage.

In Little Rock, Ark., one of the bastions of the West, the William J. Clinton Presidential Library and Museum has met with similar success in energy and water efficiency. Kara Jensen, program manager for Leonardo Academy, one of the consulting organizations employed by The Clinton Library to achieve its green status, reports that the Library received a

LEED Platinum Rating. The building received points for green cleaning plan and green purchasing, including using cleaning chemicals that are Green Seal Certified and adhere to EPA procurement guidelines. The performance period for green certification can be anywhere from three months to two years. Over the three months of its performance period, the Clinton Library used 99 percent green-certified chemicals.

Courtesy of William J. Clinton Presidential Library

The Building was designed with energy efficiency and water efficiency in mind. A water-efficient sprinkler system complements drought tolerant, low maintenance on-site vegetation with irrigation that uses a computer system to determine how much water is necessary based on moisture in the soil.

"The system cut by 20 percent the amount of water used before," Jensen says. The building also boasts a famously green rooftop, where trees and plants replace standard stone and rubber membranes. In addition to its aesthetic upgrades, the rooftop also helps in reducing energy costs by providing better insulation and captures rainwater for irrigation.

Like ECHO, the Clinton Library was designed with an alternative transportation plan that includes bike racks and showers for bike commuters. A preferred parking plan encourages carpooling, but as a further innovation, the preferred parking is offered to employees that carpool with employees from a neighboring building. "It's exciting because they're reaching beyond their building envelope," Jensen says.

Where East Meets West

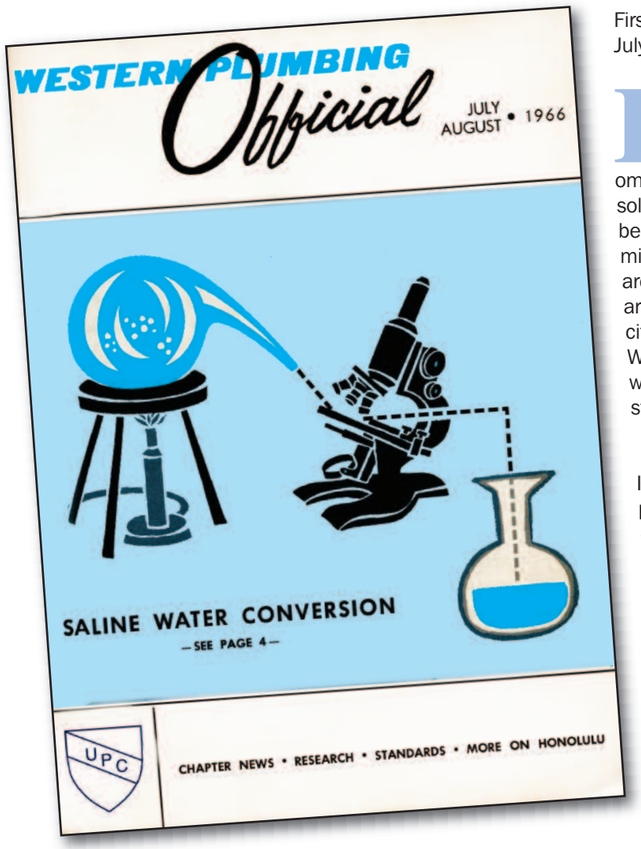
"This isn't about China or the United States," Marcotte says, "or about conflict, tension or competition. It's about collaborating to develop innovative green technologies and design solutions." The vast rate of urbanization in China is the impetus for green design. The Central Government is finding pressure on existing large cities to accommodate the influx of new urban workers and, as a result, are finding the need to dedicate new towns, essentially suburbs, but with all the amenities of a fully functioning city.

Water is a huge issue in China, not just diminishing supply, but also because much of the water supply is tainted due to heavily polluted waterways from industry and agriculture. However, because some segments of the Chinese population are unaccustomed to technology that Americans take for granted, such as potable water in flush toilets, there is an opportunity to innovate with technology such as harvesting rainwater and grey water for waste plumbing.

As perhaps a definitive sign that this new collaborative development is working toward more peaceful goals, a stated goal of the Sustainable Village Design project is, "to provide a higher quality of life for the villagers and to exemplify a more hopeful future for the children."

SALINE WATER CONVERSION

By Stewart Mulford
U.S. DEPARTMENT OF INTERIOR



First published in Western Plumbing Official, July-August 1966

First, what is "Saline Water?" We can define it arbitrarily as being any water that is too salty to drink. The U.S. Public Health Service, at the present time, recommends a maximum of 500 parts per million total dissolved solids, with limitations on certain specific ions, and it could be argued that any water that has more than 500 parts per million is saline water. By that standard of reference, there are a good many communities in this country today which are consuming, on a daily basis, saline water, including such cities as San Diego and parts of Los Angeles. By "Saline Water Conversion" we mean the processing of a saline water supply to make it potable: that is, to meet USPHS standards.

Why is saline water conversion becoming important? It is because there are places in this country and in other parts of the world where the demand for water has exceeded the supply, or will probably exceed the supply in the near future. Now, the terms of supply and demand are obviously economic terms as well as physical terms, and no discussion on the subject of water supply and water demand is complete without some reference to the problems of cost. I will make a few remarks about it at the end of this discussion. However, from a strictly technical standpoint, if you have a situation where the demand for water looks like it is going to exceed the supply, then your water supply engineers, if they are alert and on their feet, have a lot of careful thinking to do. They have to find some way of bringing the supply and demand into balance, if they are to do their job thoroughly.

There are four general things that can be done. From an engineering standpoint, the first thing we should do is to look at our demand curve and see if we really need all the water we think we do. Years ago, the people who compose what is now the American Water Works Association adopted as a sort of standard the notion that their job is to provide all the water people want whenever they want it. And, as long as there was plenty of water around, no one could take any serious issue with this objective. As our population has burgeoned, and particularly as people seem to want to move into the desert, we may have to re-examine this philosophy a little bit, and perhaps do a little modification on it.

Two Water Wasters

I have two pet windmills that I tilt with a la Don Quixote, which I will simply throw in for your consideration, and these are particularly in reference to the situation in Southern California. One of these is the ornamental grass lawn. I am told it takes something like eight feet of water a year to grow a good grass lawn in Los Angeles or San Diego. One writer has described this as California's most senseless crop. You grade it, and you bring in top soil, and you plant it, and you fertilize it, and you roll it, water it, water it, and water is some more, and when it comes up, what do you do? You cut it off and throw it away!

There must be other ground covers we can use, which are more ornamental and less work, and take less water. The other little windmill I tilt with is the domestic toilet. We haul water for perhaps three hundred miles or more from the Colorado River down to San Diego. We trip the toilet valve, anywhere from three to five gallons goes down the sewer, and that's the last we see of it. Now surely, with all the inventive geniuses available, we should be able to find a way to do the job with maybe one gallon or even less. In another paper presented at these meetings, there is a description of a mechanical toilet that may be just exactly the answer to what I am talking about.

New Water Sources

If we can't do anything about the demand, for it seems to increase no matter what we do about it, we can certainly try to increase the supply of water. The traditional method of doing that is to go find another place where we can dig a well or, alternatively, build a dam, put in some pumps, and build some pipes or ditches to convey the water from where it is to where you want it, and certainly nobody can take any serious issue with this technique. It has been used for thousands of years, and it will probably go on being used as long as there are people around. If that is the cheapest thing to do, then by all means, that is the thing that should be done.

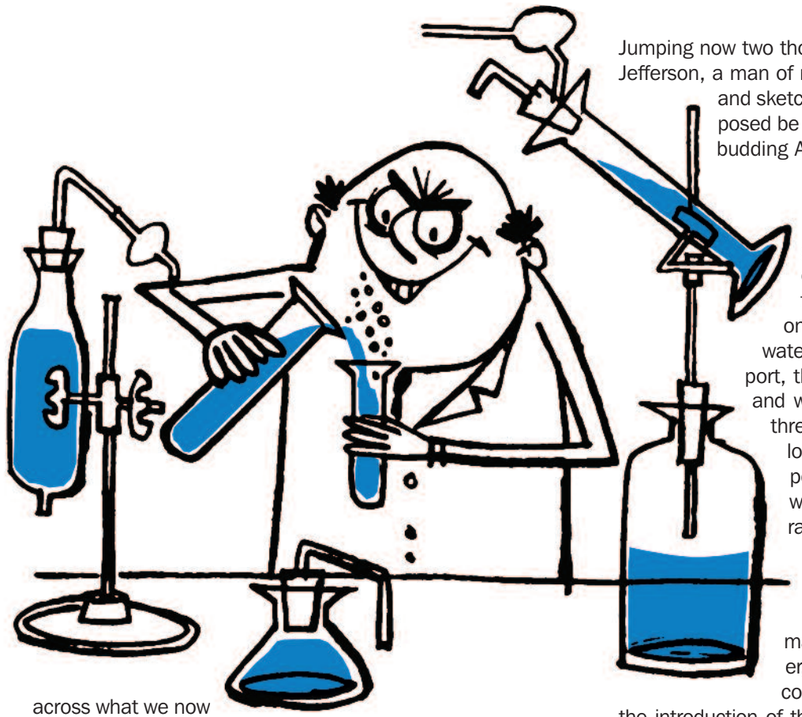
However, transporting water is like transporting any other commodity. The farther we haul it, the more mountains we carry it over, the more we will have to pay for it. The question we have to ask, then, is: Does this cost have to increase

without limit as we need more and more water? The answer is no, it doesn't. There are at least two other approaches we can take. One of these is reclaiming and reusing wastewaters. Even though we don't have efficient toilets or devices, at least we can take the water that has only been used once, treat it properly, and reuse it at least for some purposes. In another paper presented at these meetings is a description of a very significant project at Santee, a suburb of San Diego, which, although a small project, is probably the most advanced in the country in studying this type of operation. It is a real pioneering venture, and we are going to be hearing a lot more about it.

The final thing that we may do is try to remove some of the salts from the saline waters. We have a lot of water that is a little too salty to use. That is to say, it is more salty than the Public Health Service suggested maximum of 500 parts per million (total dissolved solids). There may be things we can do to improve the quality of that water to a point where we can use it. Much attention has been leveled at sea water for the reason that something like 97 percent of the earth's water is in the form of sea water, and it is therefore an essentially inexhaustible reservoir for water, if we can find some way to use it. There are, however, vast supplies of saline or salty waters in inland areas. Some of these are surface waters: salt lakes and even some streams that flow are too salty. Many of our underground aquifers (water bearing strata) contain brines that are too salty to use. If we can find some way economically to treat these waters, we may be able to develop a substantial increment to our water supply.

An Old Principle

I would like to give you a very brief history of saltwater conversion. The idea is not new. The oldest reference that I know anything about appears in the look of Exodus in the Bible. There, according to the account, we find that Moses and the children of Israel, having left Egypt, were traveling



across what we now call the Sinai Desert. At one particular point they had been without fresh supplies of water for several days, and ere in truly desperate straits. They finally came to some pools of water only to discover that the water was not drinkable; in the English translation that I have, it is described as "bitter." According to the account, the Lord showed Moses a tree or a shrub, which when plucked from the ground and cast into the waters, then caused the waters to become sweet and drinkable. Well, I have spent some 13 years in this business trying to find a way to do the same thing, and I would give a lot to know something more about that tree. But, all kidding aside, this story illuminates many things. Certainly one of them is the importance of fresh water supplies, and the possibilities of water conversion of bad waters in desert areas.

Jumping a few hundred years, we find the Greek philosopher, Aristotle, describing in one of his many books the observed fact that when salty water is boiled and the vapors collected and allowed to re-condense in a separate chamber, this condensed vapor will be sweet drinkable water. Today, we call that process distillation. And as will be seen in what follows, the most promising process right now today is still that same process that Aristotle described some 2,400 years ago. The thing that we have that he didn't have is technology to exploit the process.

We are told that Julius Caesar, at the siege of Alexandria, had some crude distillation apparatus available to provide his troops with fresh water. Again, it is interesting to speculate on the possible course that history might have taken had this conversion of bad water not been available.

Jumping now two thousand years or so, we find that Thomas Jefferson, a man of many parts, left among his effects notes and sketches on distillation apparatus that he proposed be applied to the ships of the then new and budding American Navy.

There is a story that some of you may have heard about the log of the good ship Constellation (the original one). When she started on her cruise, the list of all the different stores she had on board included some 10,000 gallons of water. She made the rounds, and at every port, the supply of rum had to be replenished, and when she got back to the starting point, three years later, the original 10,000 gallons of water were still on board. I suppose this is the reason it was decided it was unnecessary to put distillation apparatus on board.

Today's Navy Different

The modern navy and merchant marines are quite a different thing, however, and the first large scale use of salt water conversion equipment came about through the introduction of the steamship. The steamship, first of all, required substantial quantities of fairly good water to operate the boilers. On top of that, if they could make the water as they went along, instead of having to carry it, they could increase the operating range of the ship, and also increase the payload, as they didn't have to use so much of the ship's capacity for water tankage. So, there was considerable economic and technical pressure to develop distillation apparatus.

This equipment was developed beginning somewhere around the time of World War I, although some ships carried it even before then. The real impetus came just prior to and during World War II, when distillation equipment of great reliability and longevity was developed. Today, no major ship from any country goes to sea without distillation apparatus on board. To show you how far this goes, the big carriers of the Forrestal class, including the modern Constellation, each carry four distilling plants, with individual capability of better than 60,000 gallons per day. That is, each of these ships can generate ¼ million gallons per day.

Land Plants Set Up

Somewhere around the time of World War II, or a little after that, it began to be evident that there are some places in the world where it might be feasible to use salt water conversion on land as well as for ships, and some companies began to develop appropriate equipment. As might be expected, people who had been building shipboard plants were among the first ones to go into the development of land-based distilling plants. This kind of commercial development has been going on till the present day.

There are today some 18 to 20 installations with individual plant capacities of 100,000 gallons per day or greater scattered pretty well around the world. There are communities that are depending either in part or in some cases almost solely on converted seawater for their water supply. For the most part, these are communities which have both a lack of water, being desert regions, and also a relatively cheap fuel source. Such places were the logical places for first development of salt water conversion equipment.

Producing Plants

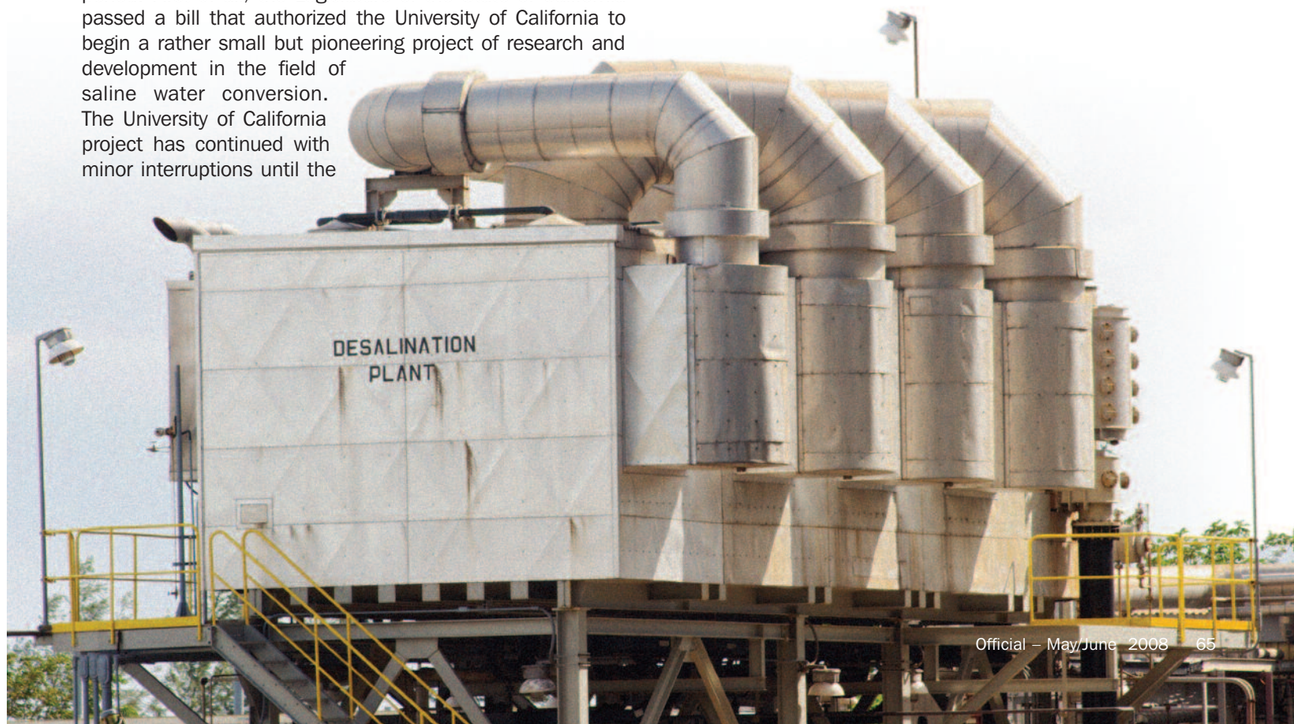
The Sheikdom of Kuwait, on the Persian Gulf, has, at the present time, something more than six million gallons per day distillation capacity, and is in the process of adding another six million. Virtually their entire supply comes from this source.

Closer to home, the little city of Coalinga, which is right across the Valley from Fresno, has a fair supply of salty ground water, which apparently is suitable for growing crab grass and flushing toilets, but the people don't like to drink it. For years, they imported fresh water from Hanford (about 40 miles away) by tank cars, at the cost of about $7 per thousand gallons, and distributed it through a separate distribution system throughout the city. Some four or five years ago, they put in a membrane type conversion plant of 28,000 gallons per day capacity, not to process their total supply, but to process only enough for their "good water" pipes. This brought the cost of "good water" down to about $1.40 per thousand gallons, and reportedly everyone is happy.

In 1952, a couple of rather significant things happened. First of all, the Legislature of the State of California passed a bill that authorized the University of California to begin a rather small but pioneering project of research and development in the field of saline water conversion. The University of California project has continued with minor interruptions until the present time, and has produced some extremely significant results. Later that same year, the Congress of the United States passed an act that authorized a Federal program in the same general field. The Office of Saline Water, which I represent, was established to carry out the provisions of this act. This office has now been in existence some 13 years. It started out very small; I believe we had four technical people, and supporting staff of about three clerks. After 13 years of growth, we now number something under a hundred employees.

With the recently enacted bill, the program is to be expanded further. A good share of this money will go into experimental hardware, which turns out to be fairly expensive. There is also a very substantial basic research program. We don't know whether that is going "pay off" or not, but then one never does in research; we don't ever find out unless we try.

In 1958, Congress passed another act which directed the Office of Saline Water to choose the five processes which at the particular moment in history looked like the most promising and to embody each of these processes in what we called a "demonstration plant." These plants were to be built in five different parts of the country; three of them were to be seawater plants, and the other two were to be working on inland brackish waters. Number One is in Freeport, Texas; Number Two was in San Diego; Number Three was a membrane process and was installed in Webster, South Dakota, working on well water of about 2,000 ppm; Number Four is in Roswell, New Mexico, working on what amount to oil field brines with total dissolved solids of about 24,000 ppm, which is about 2/3 as much as sea water; Number Five was built at Wrightsville Beach, North Carolina, and embodied a freezing process.



Four Out of Five

The first four of these have been built and operated, with varying degrees of success. Each one of them had a "debugging" period, which took about two years, and in each case most of the problems were worked out; the plants now all show real capability and also are generating significant information which can be used in the development of more advanced plants. The fifth plant wasn't so successful and we won't dwell on that particular one; let's just say that four out of five is a pretty good record for an experimental program.

The Number Two plant, the one that was in San Diego, went to war a year and a half ago, at the time Castro cut off the water supply at Guantanamo Naval Base, Cuba. The Department of Interior offered the Navy the use of the San Diego plant, the offer was accepted, the plant was shut down, picked up by the roots, moved to Guantanamo, and set up again, all in less than five months. It is now running there, and two new plants were purchased to supplement it. The three plants are now furnishing a total of about 2 ¼ million gallons a day, supplying virtually the entire water supply for the base.

At the present time, there are two processes that have been developed to the point of being really usable on a productive basis, and there is a third one that is rapidly approaching that status. The first one of these is distillation, which Aristotle described 2,400 years ago. A distillation apparatus can take several different forms, but basically, they all amount to the same thing. You take your salty water and boil it, the salt stays behind in the boiling liquid, and the vapor (if you do it right) is essentially clear water. Carry it over someplace, cool it off so it condenses, and you have pure water.

You can do this at home on your kitchen stove with a teakettle and a teacup if you want to fool around with it. Have a teacup in front of the spout of the kettle, and you can collect a few drops of water in it; taste it, and you will find that you have pure water even though you have salt water in the kettle. That would be a "single effect submerged distillation plant," a rather inefficient one. The trick is to find ways of making it more efficient, and there is a great deal of work being done in the industry to do just that.

At this point, it should be stated that the role of the Office of Saline Water is to stimulate the industry. We keep our own staff as small as we can, and virtually all of our development and research work is done under contract to people who come to us with ideas. After these ideas have been screened to eliminate those that are technically unsound or economically unfeasible, the office supports those that have real technical and economic merit, through research, development, and pilot plant stages.

All of the seawater conversion plants today embody one variety or another of distillation. It is characteristic of the distillation process that it produces extremely pure water. A distillation plant that is operating properly will produce water with less than 5 ppm total dissolved solids. This is as good

as, of better than rain water. The paper that follows this one is devoted to a discussion of what happens when this distilled water is delivered into a city water system; properly handled, this high grade water can be used to upgrade an existing water supply. In other words, in adding to a given quantity of water, a distillation plant gives a bonus of higher quality.

Membrane Method

The second currently usable process we call "electrodialysis." This process utilizes two types of synthetic membranes, one of which will permit positive ions to pass through, and the other of which will permit negative ions to pass through. These are stacked in alternating order, with spaces between each two membranes. Saline water is introduced from one side, and a direct current potential placed across the entire stack. As the ions migrate, alternate spaces become more and less saline, respectively. Like streams are collected; the depleted stream is the product, and the enriched stream is sent to waste.

This process characteristically does not produce pure water. The cost of the product depends both on the salinity of the feed and on the salinity of the product. In other words, the more saline the feed, the more it is going to cost; and the more pure the product, the more it is going to cost. With that kind of process, it is not economic to produce pure water, so you just bring the dissolved solids down to 350 or 400 ppm, and not try to carry it any farther. There are quite a number of small plants embodying this process in service today; the one at Coalinga, already mentioned, and one or two fairly large ones. Buckeye, Ariz., has the largest in this country; they have a 650,000-gallon day installation that was put in by the City on a straight commercial and utility basis about two years ago.

Reverse Osmosis

The third process, which is now on the verge of becoming commercial, is reverse osmosis. It is also a membrane process, but here the motive force is straight mechanical pressure rather than an electromotive force. There is an experimental reverse osmosis plant at Coalinga in addition to electrodialysis and there is quite a little work being done in various other paces on the process. You should look for great things from that process in the next ten years. It, like electrodialysis, will not economically produce extremely pure water.

What is ahead in saline water conversion? The most immediate large-scale project is one jointly sponsored by the Office of Saline Water, the Atomic Energy Commission and the Metropolitan Water District of Southern California. This project consists of a feasibility study for a combined power and distillation plant, which is proposed for the Metropolitan Water District system in Southern California. This plant would have 150 million gallons a day capacity.

This is roughly twice the average daily demand for a city the size of San Diego. It is in the order of 10 percent increment for Metropolitan Water District's total supply. If the Board of Directors of Metropolitan Water District ultimately decides to go ahead and if they can raise the money, it is proposed that this plant be put on the line around 1971. Their reasons are: (1) They want it for the additional quantity, because they foresee a shortage between the time the demand and supply curves will cross (1970) and the time they get additional water from the north (1972); (2) they want the high-quality to mix with and upgrade the low-quality water obtained from the Colorado River; and (3) they feel that there may be a long-range potential in desalting and they want to get actual operating experience on a big plant before having to decide (somewhere around 1975) whether to build new and stronger aqueducts or to go the salt water conversion route. Those of you who live in the Metropolitan Water District service area may very well, within seven years, be getting large quantities of distilled water mixed into your water supply.

What's the Price?

Finally, a word about the cost. People say, quite properly, that salt-water conversion is a fine thing technically, but what is the total cost? In terms of what people are accustomed to paying for water in communities such as ours, salt-water conversion still looks a little expensive. But I will try to give you the best engineering predictions available on the costs of converted water, and I will speak primarily of distillation at this point. Please understand that when we in the Office of Saline Water quote costs, we are calculating total costs, including interest at 4 percent amortization for 20 years, labor, land, land development, engineering, and everything else which legitimately belongs in the cost picture. (As you well know, there are different ways of reporting water cost; I will not attempt to argue with anybody else's method of reporting cost!) We do not include cost of conveying water from the conversion plant to the delivery point, since that will vary with the location.

Water from a one million gallon per day single purpose distilling plant will at the present time cost in the order of $1.10 to $1.20 per thousand gallons, delivered at the site. Water from the same type of plant in sizes around 15 million gallons per day would run somewhere in the neighborhood of 70 cents per thousand gallons. The same type of plant, in sizes around 150 million gallons per day, and combined with a nuclear-fueled electric power plant, is estimated to produce water for less than 25 cents per thousand gallons (based on the Metropolitan Water District study).

This is getting pretty close to the cost of hauling Northern California water to Southern California through aqueducts! So, for municipal water in Southern California, the cost of saline water conversion in large quantities is becoming competitive with aqueduct water; or, as we prefer to think of it, is setting a ceiling on the cost of water that is very near to what the aqueduct people can do right now.

To place the matter of costs further in context, I would like to point out some prices that people are already perfectly willing to pay. I will shift here from cents per thousand gallons to dollars per acre-foot. Farmers these days are used to paying around $5 an acre-foot, or less, and rarely as high as $15 for certain crops. Cities will pay from $50 to $75 an acre-foot for the same water, sometimes out of the same pipe. Converted seawater will cost from $75 to $350 per acre-foot, depending on plant size and other factors, as indicated earlier. You can buy bottled water in five gallon jugs for about $65,000 an acre-foot. The grocery stores will sell you "steam iron water" for around $165,000 per acre-foot. Or, you can go to a "Surplus Store" and purchase a six ounce can labeled "emergency water rations" for 10 cents; that works out to $400,000 an acre-foot. Finally, someone has made a calculation that a certain class of popular beverage consisting of water contaminated by alcohol and other substances costs around $7 million per acre-foot; in which case, I don't think the cost of converted water looks too bad!

Catch a Rising Star

UA Apprentice Contest Returns for Second Consecutive Year After Long Layoff

By Geoff Bilau

Last year, following a 34-year hiatus, the UA Apprentice Contest made what was by all accounts a triumphant return. So triumphant, in fact, members won't have to wait another 34 years for the next — it's back again this year.

Again to be held in conjunction with the UA's annual Instructor Training Program on the campus of Washtenaw Community College in Ann Arbor Michigan, Aug. 10-14, the competition will pit the winners of local, state/provincial and regional contests against each other in five crafts: plumbing, pipefitting, sprinklerfitting, welding and HVAC. Contestants may be in any year of their apprenticeship, but must have worked at least 1,500 hours for a contributing contractor in the previous year. And contestants who represented their region in last year's competition are not eligible this year.

During the four-day competition, in addition to a 200-question exam, a full day (eight hours) will be devoted to a trade specific project. All methods of piping, including, but not limited to threading, soldering, brazing, bending, grooving and welding may be required as part of any of the projects. All tools, safety equipment and materials will be supplied during the competition.

Candidates can only compete within one of the five craft categories.

Local unions formed committees to support the first round of the competition. These committees conduct local contests in each craft. Winners advance to compete at the state/provincial level, then onto the regional level. Regional winners will compete in Ann Arbor.

For information, contest rules and/or an application, direct your Web browser to uanet.org.

IAPMO Hosts SCSA, CBSC

By Geoff Bilau

The International Association of Plumbing and Mechanical Officials (IAPMO) on Friday, April 11, welcomed Rosario Marin, secretary of California's State and Consumer Services Agency (SCSA), and Dave Walls, executive director of the California Building Standards Commission (CBSC), for a tour of The IAPMO Group's world headquarters and product testing facilities.

It was the first visit for each of the state officials, who were guided around the facility by Gaby Davis, IAPMO senior director of Worldwide Operations, and Dwight Perkins, IAPMO Western regional manager. The SCSA and CBSC, under Marin's supervision, are responsible for administering California's building codes, including adopting, approving, publishing and implementing codes and standards.

After Executive Director Russ Chaney provided a brief welcome and overview of IAPMO's operations, Director of Code Development Lynne Simnick spoke about the Uniform Codes and described the process through which they are created and amended. Ken Wijaya, senior director of IAPMO R&T Lab, and Phil Cheng of IAPMO R&T described their testing operations.

From left: Gaby Davis, IAPMO senior director of Worldwide Operations; Dwight Perkins, IAPMO western regional manager; Rosario Marin, secretary of the SCSA; and Dave Walls, executive director of the CBSC, at The IAPMO Group World Headquarters.

Standing from left: Perkins, Marin and Walls observe a meeting of IAPMO's Uniform Plumbing Code *Workshop Committee.*

Following the introductory remarks, Marin and Walls were given a tour of IAPMO's headquarters, including the code development department, the laboratory and on-site certified child care center.

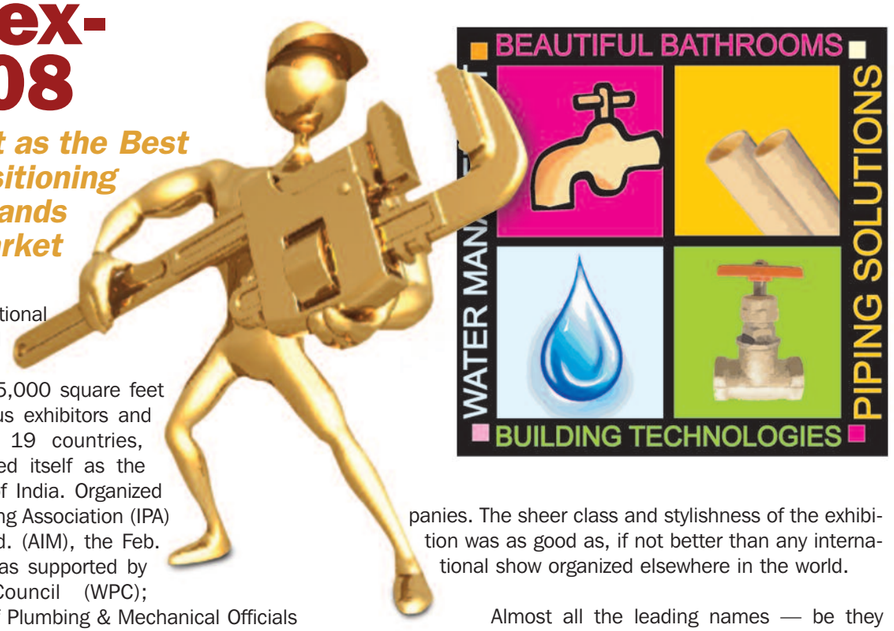
"I was delighted to see first hand the work being done at IAPMO and look forward to working together as the state moves forward adopting and implementing the nation's first-ever green building standards," Marin said. "Together we can make the small changes that will equal big impacts on our carbon footprint."

Said Perkins: "It allowed them to see for themselves how codes are developed and products are tested and certified. Both the secretary and Mr. Walls were given a better understanding of the operation and the role IAPMO plays in code development worldwide."

IAPMO recently participated in the unveiling of the Uniform Plumbing Code – India, developed in a joint effort with the Indian Plumbing Association, and will soon partner with the Emirate of Abu Dhabi on its own plumbing code.

Plumbex-India '08

Event Firmly Set as the Best Platform for Positioning International Brands in the Indian Market



The first ever international plumbing expo held in India took place this past February. With 65,000 square feet of exhibition space, 80-plus exhibitors and products displayed from 19 countries, PlumbexIndia'08 established itself as the definitive plumbing show of India. Organized jointly by the Indian Plumbing Association (IPA) and Akar InfoMedia Pvt Ltd. (AIM), the Feb. 11-13 show in Mumbai was supported by the World Plumbing Council (WPC); International Association of Plumbing & Mechanical Officials (IAPMO); Institute of Indian Interior Designers (IIID) and Brihan Mumbai Licensed Plumbers' Association (BMLPA).

Geberit of Switzerland was the Principal Sponsor, whereas Viega of Germany was Associate Sponsor to PlumbexIndia'08. The very fact that these two international majors supported this show in such a big way amply displays their confidence in the platform.

The exhibition, divided into four broad product categories — Beautiful Bathrooms, Piping Solutions, Building Technologies and Water Management — featured nicely designed stalls put-up by Indian as well as international companies. The sheer class and stylishness of the exhibition was as good as, if not better than any international show organized elsewhere in the world.

Almost all the leading names — be they Jacquar, Hindware, Roca, Geberit, Astral, Georg Fischer, Grundfos, Kirloskar, Vectus, ACO, Willo, SAS, Lubrizol, A.O. Smith, Viega, Thermax, Prince SWR Pipes, Supreme, Sloan, Alfa UV, Bonomi, Prince Pipes, Kisan Pipes, etc. — were present at this show. In fact, anybody who is somebody in the field of plumbing was there with a sizeable presence, which obviously helped to make the show a grand success.

On this occasion, Sudhakaran Nair, President of IPA said: "PlumbexIndia'08 is part of IPA's ongoing endeavor to upgrade standards of the Indian Plumbing Industry to a level comparable to the best in developed Western countries. IPA hopes that the participation of overseas manufactures will facilitate exposure to modern, high-tech plumbing products for members of our ever-burgeoning domestic industry."

"Here (PlumbexIndia'08) there's a clear focus on plumbing, and so people who come here, they are all interested in plumbing. We really think it's a perfect platform for Geberit, that's why we are the Principal Sponsors. We are very satisfied with the interest that we see and we are pleased that there is such good focus in this exhibition" **– Christian Ernst, Head of International Sales, Geberit International Sales AG, Switzerland**

"We see the first international PlumbexIndia as a successful start. It is not only our duty, but our pleasure to support this event. We have confirmed our presence for another two years. We have noted a good quality of visitors, who also came from all parts of India. We are confident that the number of visitors will increase next year and PlumbexIndia absolutely deserves it." **– Stefan Rinscheid, Sr. Project Coordinator Asia/Pacific Export Sales Dept Viega GmbH & Co. KG, Germany**

This being a B2B show, the footfalls — almost 4,000 of them — were of quality visitors and serious buyers. This, obviously, has given "value for money" to the exhibitors, so, exhibitors were in high spirits during and after their participation at PlumbexIndia'08. At the same time, visitors were also happy, as this show provided them an opportunity to see so many products/technologies from the world over assembled under one roof. In short, PlumbexIndia'08 created a win-win situation for both exhibitors and visitors.

"PlumbexIndia'08 has truly developed to a world-class event. On behalf of the IAPMO group, we look forward to continuing our participation in this truly global event, which is really without parallel."

- Russ Chaney, Executive Director IAPMO, USA

The co-organizer to the show, Kamal Khokhani, director of AIM, observed with great satisfaction, "This is the first time that in India a trade show of such magnitude has been focused only on plumbing and allied products. The show is superlative in respect to targeted national market exposure and all efforts have been made to attract committed and quality business visitors."

The organizers succeeded in receiving extremely positive industry response for the next show, PlumbexIndia'09, to be organized in Mumbai between Jan. 30 and Feb. 1, 2009. Geberit of Switzerland has confirmed its participation as Principal Sponsor and Viega of Germany has maintained its slot as Associate Sponsor to the show. On top of that, most of the exhibitors, too, have confirmed their larger participation at PlumbexIndia'09, especially keeping in mind the thumping success of the first-ever international exhibition of plumbing and allied products that was PlumbexIndia'08.

Construction Trades Testing Services: Why look to IAPMO?

By Stephen Webb

IAPMO Director of Career Services Kathleen Mihelich says IAPMO has an advantage over testing service companies for one major reason: "We're not a testing service company," she explains. "This is what makes IAPMO uniquely positioned to understand the testing needs of its members and customers. As a result, our primary focus is on the technical aspects of the tests as they relate to protecting the health, welfare and safety of the public."

As a non-profit membership organization, Mihelich says IAPMO is better able to understand the responsibility of governmental jurisdictions to assure the public's safety.

"We appreciate the expansive resources required of the jurisdictions," she says. "This is why we are committed to providing cost-effective resources. Unlike for-profit testing service companies, we are more attentive to meeting the needs of the industry than we are to generating revenue."

Real World Testing

IAPMO North Central Regional Manager Bill Schweitzer sees IAPMO's emphasis on test content as one of its greatest testing assets, as well.

"We use industry experts to help develop our tests and make sure they require more than just reading a book in order to pass them," he says. "For example, answering questions like 'If you have a leak on a Delta type faucet, do you replace the O-rings, cups or cartridges?' requires actual trade experience, which helps eliminate those people who think they can bid on a particular type of work they're really not qualified to do."

Mihelich points out this same base of trade-specific knowledge gives IAPMO the ability to develop a virtually unlimited number of tests for any subject as needed.

"Typically, our approach involves working with committees appointed by the government licensing body," she says. "Then we bring an IAPMO content expert on board who actually works in that subject area — a practitioner — to make sure questions are valid, reliable and technically accurate with regard to adopted codes."

As part of a code development body, IAPMO is also disciplined to make sure test contents are kept current. Sean Cleary, field manager for Region Five, reports that a number of jurisdictions in his region have their own journeyman licensing tests that they have been using since 1992 — even though codes are updated there every three years. IAPMO places a priority on keeping its tests up to date with the new code editions.

More Than Lip Service

At its core, IAPMO is a service organization, and testing is a significant component of what IAPMO provides to facilitate the uniform adoption and administration of its codes. Providing testing services is a priority that has a growing demand. Mihelich says government jurisdictions and agencies are contacting IAPMO because they are looking for alternatives to national testing organizations. This is due to the fact that many jurisdictions don't have enough candidates to qualify as clients with profit testing organizations, or they are receiving minimal service due to their low number of test candidates.

In smaller jurisdictions, where Mid-Western Regional Manager Ron Lord represents IAPMO, the minimum service may not even be an option.

"The problem," he says, "is there aren't many people being tested in some states — maybe 100, 200 guys. There's not that much interest from large testing companies. IAPMO's program offers the opportunity for individuals who have no other testing resource to demonstrate their knowledge to jurisdictions for the purpose of securing a license or permit."

Tests That Pass the Test

While technical content is IAPMO's primary concern, Mihelich is quick to point out this doesn't suggest that attention paid to the development of the tests is secondary or that it's second-rate.

"We've partnered with two highly respected third-party testing organizations to assure us that we have professional tests," she says. "Both organizations — National Inspection, Testing and Certification Corporation (NITC) and Kryterion — have PhD psychometricians on their staffs who provide oversight of our test development activity."

According to NITC Executive Vice President Mike Massey, having these resources assures clients that IAPMO's tests are legally defensible, fair, valid and reliable.

"If you have three or four versions of a test, you have to confirm that each has the same degree of difficulty," Massey says. "You also have to verify a test can accomplish the intended goals. Let's say you have a journeyman plumber exam, for example, that is 100 questions and has a pass/fail rate of 70 percent. How do you know that asking 100 questions can sufficiently test a person's knowledge or that a failure rate of 30 percent will adequately protect the public? That's what psychometricians can determine and why their services are so important."

> ***"How do you know that asking 100 questions can sufficiently test a person's knowledge or that a failure rate of 30 percent will adequately protect the public?"***
>
> – Mike Massey, NITC executive vice president.

Together, NITC and Kryterion provide a total of nearly 500 testing sites conveniently located throughout all 50 states and U.S. territories, as well as at several international locations. As IAPMO's test administrators, they're in charge of registration, collecting fees, administering tests and issuing score reports. Mihelich, however, maintains that IAPMO will always provide a single point of contact for those taking the tests — either through a region's field manager or Kathy Maka, IAPMO's Certification and Testing coordinator. That way, Mihelich says, "a jurisdiction or a candidate can contact us anytime with a problem or an issue. This is a reliable means of assuring their needs are met in a timely manner."

Massey asserts IAPMO is a natural choice, not just because it's non-profit, but due to its service reputation. Based on his association with IAPMO, he's found it to be highly regarded within the construction trades, extremely user-friendly and quite possibly "one of the most professional organizations of its kind in the world."

Best Practices are Followed

While setting its own standards for quality, IAPMO strives to adhere to nationally recognized standards for testing and measurement, which Schweitzer says is "a big thing" for establishing IAPMO's credibility with clients. The standards and organizations from which IAPMO takes its lead include the following:

- Standards for educational and psychological testing developed by the American Educational Research Association (AERA), American Psychological Association (APA) and National Council on Measurement and Education (NCME).

- Standards for the Accreditation of Certification Programs of the National Organization for Competency Assurance by the National Commission for Certifying Agencies which apply to the approval of certification tests.