Texas Water Savers
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Insidious disaster

On the waterless planet Dune in Frank Herbert's science fiction classic of the same name, native Fremen harvested morning dew from blades of grass. Inhabitants' own body transpiration was captured for drinking water in uncomfortable "stillsuits."

The Dune Fremen vigilantly practiced frugal conservation and reuse. In contrast, our society's water use cycles in reaction to current climatic conditions. We live the "hydro-illogical" cycle: apathy in a time of plentiful water, and progression through awareness, concern, and panic in times of drought.

In contrast to episodic disasters such as hurricanes and floods, droughts are insidious events, but just as devastating.

The current Texas drought may well become the worst ever recorded in the state. It may also become the worst economic disaster this century, with a statewide impact on agriculture and associated industries of more than $6.5 billion, surpassing Hurricane Alicia of 1983. The winter wheat crop is ruined, and corn, sorghum, and cotton may not be far behind. Ranchers are selling herds at less than half the price they would have brought last year. The level of the Edwards Aquifer is down almost 30 feet since last year. San Antonio is under Stage III water conservation restrictions and smaller communities are scrambling to keep their municipal intakes below water level.

The dry landscape serves as a silent testiment to the drought. No rain, but we are inundated with news of the drought. Prudent water use now is just good sense, but in the future, it may mean our survival. According to an article by Paul Ehrlich and others in *Science* (Feb. 9, 1996), humanity uses 54 percent of accessible runoff. Assuming per capita demand and population growth remain constant, by the year 2025, more than 70 percent of accessible runoff will be appropriated by humans. And, historically, per capita use tends to increase.

Like the prudent inhabitants of Dune, inhabitants of Earth must realize that our existence depends on conserving the water supply--drought or not.

Jan Gerston, Editor

New tax law offers relief for water reuse equipment

Proposition 2 means relief in real dollars for Texas industries hardest hit by environmental regulations. This constitutional amendment exempts from property taxes pollution control equipment installed after January 1, 1994 to meet or exceed environmental laws. The Texas constitutional amendment providing for this property tax exemption was passed by Texas voters November 2, 1993.

The intent of the amendment is to ensure that compliance with environmental mandates does not increase a facility's property taxes. Equipment for water reuse and wastewater treatment counts toward this pollution control goal, and is therefore eligible for exemption, according to Ron Hatlett of the Texas Natural Resource Conservation Commission (TNRCC).

Applying for the exemption is a two-step process. First, the facility must receive a use determination from the TNRCC confirming the equipment is used for pollution control purposes. The applicant then uses that positive determination to apply to the local appraisal district for a property tax exemption.

To date, almost 1600 applications have been made to TNRCC for all types of pollution control equipment from industries statewide, primarily chemical companies, utilities, and refineries.

Of these, there were 75 applications for exemptions for wastewater treatment modifications, 47 for stormwater segregation, 23 for groundwater monitoring and recovery wells, and 3 for oil/water separators. In all, 76 types of wastewater pollution control equipment are listed on the TNRCC predetermined equipment list.

"The first year after Proposition 2 was passed, businesses were pleased with TNRCC's handling of the matter. The guidance documents were the best regulatory implementation documents used to date, and they have been used as a model in other TNRCC implementation programs," said Mary Miska, vice-president for governmental affairs for the Texas Association of Business.

Business, of course, analyzes the effect of any capital improvements on the bottom line. In general, industry will implement wastewater reuse systems if they mean an advantageous return on investment. The property tax exemption means a quicker payback for the cost of improvements.

The importance of return on investment to business was underscored in a unique joint working session on industrial water conservation and reuse at the University of Texas last year. There industry, state, and academic counterparts sifted out tax incentives as one of four highest priority actions needed to facilitate industrial water reuse. "

In any new system installed, pollution control equipment can amount to 5 to 10 percent of total cost. By applying Proposition 2, industry can get sizable relief from ad valorem tax,"

said Woody Woodward, an environmental consultant with Dow Chemical in Freeport. "And the benefit grows because the relief continues year after year, project after project."

TNRCC used an innovative approach to come up with Proposition 2 guidelines. It set up two teams of 16 state and industry representatives each, one to set use determination standards and the other to designate three tiers of exemptions. TNRCC figured industrial representatives were uniquely qualified to contribute an operational perspective of pollution control systems. Woodward served on the exemption team.

TNRCC is authorized to recoup its administrative costs in the program. The three-tier fee system thus was adopted.

Tier I, with a $50 application fee, applies to property on a predetermined equipment list. (This list includes equipment both wholly and partially functioning as pollution control equipment.) Tier II, with a $1000 application fee, is for equipment dedicated 100 percent to pollution control but not listed on the predetermined equipment list. Tier III, with a $2500 fee, is property whose function is not 100 percent dedicated to pollution control and not on the predetermined equipment list. All property must have been installed or purchased after January 1, 1994 to meet or exceed federal, state, or local environmental laws.

The predetermined equipment list also includes a section directed at small businesses, such as auto painting shops and dry cleaners.

An application must be filed for each unit or group of integrated units, rather than a single application for a facility of segregated units with no common purpose. Application deadline is January 31.

Property excluded from the exemption are motor vehicles, residential property, recreational or scenic parks, or facilities or services that provide pollution control. Although land with pollution control equipment is eligible, buffer zones are not.

The law governing use determination is formally in the books as Title 30 Texas Administrative Code Chapter 277 (30 TAC 277).

For more information, call the TNRCC Proposition 2 section at (512) 239-6348. To order single copies of use determination guidelines, request TNRCC Publication RG-102 from TNRCC Publications, MC 195, P.O. Box 13087, Austin, TX 78711-3087. Fax orders should be directed to (512) 239-4488; phone orders to (512) 239-0028.

Drought facts

- The High Plains Underground Conservation District is considering augmenting water pumped from the Ogallala Aquifer with water from a deeper water-bearing unit. The High Plains is also considering ground-based cloud seeding.
- In the South Plains, cloud seeding has been routine for more than a quarter century by the Colorado River Municipal Water District. Feasibility studies for for aircraft based

weather modification are ongoing by the West Texas Weather Modification Association. The High Plans Underground Water Conservation District is studying ground-based silver iodide cloud-seeding.

- San Antonio, under Stage III restrictions since May 17, has now tightened the faucet even more. Large residential water users will pay 64 cents per 1000 gallons for use over 17,205 gallons, versus the standard rate of 25 cents per 1000 gallons. Still, the pumpage target of 161 million gallons per day (mgd) has not been achieved. The utility's average demand since Stage III has been about 175 mgd.
- Seven state agencies have joined forces to find the "bad water"line, where salty water might contaminate the Edwards Aquifer.
- The drought is particularly acute in the Lower Rio Grande Valley. Water levels are the lowest since construction of Falcon Reservoir and Amistad Reservoir in the 1970s. Reserves are down to 42.6 percent of Texas' total share in the two reservoirs.
- Yet another problem faces the beleaguered Valley: unauthorized pumping by Mexico, which has been harder hit than Texas by the drought. Last October, Mexico asked the United States for a water loan to ensure sufficient drinking water for border cities. Now Watermaster deputies scan the Mexican river bank for evidence of bootleg pumps, and Texas Secretary of State Tony Garza has met with Mexican officials to encourage adherence to the 1944 U.S.-Mexico Water Treaty, which divides Rio Grande water between Mexico and the United States.
- Canyon Lake, water supply for New Braunfels, outflows 130 feet per second, one-half of last year's flow. New Braunfels is the only city in the Edwards Aquifer with a water treatment plant that relies on surface water, rather than pumping from the Edward Aquifer.

Reuse database on-line

A data base of Texas water reuse projects is now accessible in an readily searchable form from the Texas Water Resources Institute web site (http://twri.tamu.edu/). To access the data base, click the "Research Projects" button on the opening screen.

The data base is a project of the Water Conservation and Reuse Committee of the Texas Section of the American Water Works Assocation. It was compiled by Susan Butler, resources manager with San Antonio Water System, under the direction of Darren Thompson, a planner with SAWS.

Large and small public and private projects for irrigation and commercial consumption are included. For example, the Brazos Transit System bus wash water recycling system is included, as well as the Midland's Airline Mobile Home park, which has been using effluent irrigation since 1975.

An easy-to-use interactive search tool designed by TWRI webmaster Jonathan Jones allows the choice of browsing the entire data base or confining the search by either geographical region or category of reuse, such as irrigation or commericial/industrial projects.

Data included in the AWWA survey questionnaire includes consumption, type of water use, pricing information, potable water rate, and reuse customers. Data were provided by utilities and private industry, which are responsible for the accuracy of information. Whenever possible, a contact for the activity is listed.

To add a reuse project to the data base or to update existing information, responsible individuals should contact Jan Gerston at TWRI, (409) 845-1852 or jan@twri.tamu.edu or Susan Butler at (210) 704-7375 or sbutler@saws.com.

Reclaimed water rules revised

This month, the long-awaited Chapter 310 rule revision of the Texas Administrative Code is scheduled to be published in the *Texas Register* for public comment.

Chapter 310 will be published in the Texas Register for a 30-day public comment period. After the 30-day period, the TNRCC staff will incorporate changes, and the revision is sent to the TNRCC Water Policy Division for approval, then to the commissioners for final signature. At that point, Chapter 310 becomes law.

An *ad hoc* committee of water industry and state agency representatives hammered out the Chapter 310 revision.

The purpose of Chapter 310 is "to establish quality criteria, design and operational requirements for use of reclaimed water which may be substituted for potable water and/or freshwater," according to a TNRCC concept paper. "These criteria are intended to allow the safe utilization of reclaimed water for conservation of surface and ground waters; and to help ensure an adequate supply of water resources for present and future needs."

In 1990, the Texas Water Commission (precursor of TNRCC and Texas Water Development Board) came up with regulations for water reuse and reclamation based upon existing practices in other states. It was understood that the rules would be revisited after the body of knowledge on water reuse grew.

In 1995, the Texas Section of the American Water Works Association and the Water Environment Federation of Texas informally requested that TNRCC revise Chapter 310. A joint committee of these organizations was instrumental in facilitating the rule revision and for hammering out the draft version. Representatives of TNRCC, Lower Colorado River Authority, Texas Water Development Board, water and wastewater planning and management firms, and independent wastewater consultants served on the revision committee.

The Chapter 310 Rule Revision committee identified barriers to the use of reclaimed water and set forth plumbing standards to preserve public health. For example, reclamation ponds would require pond liners only in regions where the aquifer is close to the surface, such as the Edwards Aquifer region. Other environmentally sensitive areas

would be decided on a case-by-case basis. All ponds must be constructed to prevent groundwater contamination.

As for plumbing, standard hose bibs will be in locked, below-ground vaults. Above-ground hose bibs may be operated only with a special tool. Signs in both English and Spanish will post a "Reclaimed Water, Do not Drink" warning. Hose bibs, faucets, and above ground pipes will be purple.

One reason industry organizations requested the rule revision was that existing rules are so rigid as to discourage reclaimed water use. For example, under the existing rule, a permittee may not apply effluent from its wastewater treatment plant on land owned by that permittee without a permit amendment. The time and cost associated with obtaining the amendment has discouraged water reuse.

Crops may be irrigated with reclaimed water, with some restrictions. Direct contact with citrus trees and with edible crops to be skinned, or thermally processed is allowed. Indirect application, such as drip or ridge and furrow irrigation is allowed for crops that will not be processed or skinned.

Access to public landscaped areas, such as golf courses, cemeteries, and roadway rights-of-way using reclaimed water for irrigation must be controlled by legal or physical means.

A related rule, Chapter 309, sets standards for systems that are allowed to discharge only during extreme wet years--when rainfall exceeds a 25-year return period. Where effluent discharge is allowed, discharges from storage ponds are prohibited by Chapter 310, except during rainfall events. Chapter 310 allows reclaimed water to be delivered on a demand basis only where the user may cease delivery to avoid direct discharge. The rules require land be irrigated efficiently so as to prevent runoff or excessive percolation through the root zone. In applying for a permit, a potential user must document typical irrigation demands based upon type of vegetation and land area to be irrigated. The water balance equation must consider average monthly rainfalls, evapotranspiration, and leaching. Storage ponds are expected to operate as no-discharge systems except for discharges caused by rainfall runoff; therefore, they must be of sufficient capacity to hold reclaimed water to be delivered to the user.

SEMATECH reclaims plant wastewater; shows 7-month payback

by Jan Gerston

After Japan gained the upper hand in the semiconductor industry in the 1980s, American electronics powers fought back. In 1988, 14 American manufacturers banded together with the federal government to found SEMATECH with the idea of pooling talent and sharing discoveries about the fabrication of semiconductors. That technology transfer from SEMATECH helped boost the United States into top position as a semiconductor manufacturer.

In 1995, SEMATECH (Semiconductor Manufacturing Technology Consortium) addressed the issue of water reclamation in its Advanced Tool Development Facility (ATDF). The outcome was a retrofit that showed a remarkable seven-month payback on initial equipment and installation costs of $146,000. Annual cost savings are projected to be about $250,000 based on current Austin water and wastewater rates of $2.25/1000 gallons and $3.13/1000 gallons, respectively. In comparison, in the electronics industry, payback periods for retrofit projects vary greatly and are plant- and process-specific, but a payback period of more than 10 years is not uncommon. Located in a former 150,000-square foot Data General plant in south Austin, SEMATECH took advantage of pre-existing distribution piping and sump, according to Rachel Jensen, project manager for water reclamation. A 20,000-gallon storage tank and several pumps were purchased for the project.

For storing reclaimed reverse-osmosis water, this 20,000-gallon storage tank represents the largest expenditure in SEMATECH's water reclamation project.

Despite SEMATECH being a testing, research and prototype facility rather than production plant, it is nonetheless one of Austin's top ten water consumers. The reclamation project reduces city water consumption by 30 percent or 40 million gallons annually. The other half of the cost-saving coin is tied to the reduction of wastewater output. SEMATECH worked with the Austin Environment and Conservation Department to ensure the reduced wastewater component would not force SEMATECH to modify its wastewater permit with the city of Austin. (A reduced discharge can have the effect of concentrating contaminants in wastewater.)

In addition to saving many times its capital costs in water and wastewater fees, the reclaim system ensures a constant, reliable sources of feed water.

Since completion of the project in October 1995, the water reclamation system was awarded a $30,000 rebate from the City of Austin Industrial Water and Wastewater Conservation Incentive Program. This year Sematech was the first recipient of the Industrial, Commercial and Institutional (ICI) water conservation award from the City of Austin Water Conservation Division. The ICI awards recognize customers with water conservation projects which contribute to the city's goal of a 10 percent reduction in peak demand.

About 4 million gallons per month of ultrapure water (UPW) plant wastewater is available for reclamation. Components of that total are 73 percent reverse osmosis reject,

14 percent sample port runoff, and 13 percent vacuum pump discharge. UPW is used for rinsing and cleaning etched silicon wafers.

Wastewater enters the collection sump by gravity feed. A 3-horsepower lift pump fills the 20,000-gallon tank with reclaimed water. Waste water overflows to the sanitary sewer when demand is low.

From the holding tank, wastewater is gravity fed to the cooling towers or pumped to the UPW vacuum pumps and the acid scrubbers. The 10-horsepower distribution pump is oversized and its speed is controlled by a variable frequency drive. The larger pump handles demand variation and also allows for future expansion.

The cooling towers are the major reclaimed water users. In the cooling towers, heated process water from fabrication is pumped through a series of pipes. Reclaimed water cascades over the pipes, absorbing heat, then is recycled through the cooling system five to six times before blowdown (discharge of a portion of circulating water to prevent concentration of solids).

In summer, 100 percent of the reclaimed water goes to the cooling tower for makeup for evaporation. To prevent corrosion in cooling tower pipes, a chemical treatment keeps reclaimed water at a neutral pH. In cooler months, the reclaimed water supplements water used by the UPW vacuum pumps and acid scrubbers.

Vacuum pumps and acid scrubbers use the balance of reclaimed water. The vacuum pumps operate a closed-loop system. Reclaimed water is circulated to the vacuum pumps for pump seal coolant during pump operation. Acid scrubbers remove acid exhaust fumes collected from vented hoods by air-to-water transfer inside the fabrication plant. City water supplements reclaimed water.

The entire reclamation system is automated with off-the-shelf Lookout™ software with manual overrides of valves, pumps, the variable frequency drive, chemical treatment for pH control, and the modulating valve for city water makeup. In case of a problem, mechanisms are in place for a full bypass of the reclamation system.to allow for city water back-up supply.

Using a programmable logic control (PLC) field interface, sensors at primary valves and pumps feed data to the system. The PLC logic remotely operates valves and pump frequencies based upon weather conditions, user demand, and reclaimed water availability. These parameters were formulated using historical trends to determine most effective mode of operation. Real-time information as well as historical trends can be read by the operator.

"The system was designed to allow for future expansion. With that in mind, we are looking for more sources of reclaimable water and more ways to use it," said Jensen. "SEMATECH's mission is technology transfer--several member companies have already modified their plants or are in the process of retrofitting for water reuse." SEMATECH

hopes to expand wastewater reuse to provide site irrigation and process water for the plant itself. To meet demands of end users, other sources of reclaimed water, such as the acid wastewater stream, are under evaluation.

For more information, contact Jensen at (512) 356-7044.

Meetings and Conferences

The **5th International Desert Development Conference** August 12-17 on the Texas Tech University campus in Lubbock. Call [806] 742-2218, fax [806] 742-1954 or e-mail aislw@ttacs.ttu.edu

Texas Water Monitoring Congress, September 9-11, Austin. Technical sessions will include optimizing data collection programs and emerging technologies. Contact Cindy Billington, (713) 718-3655. (WWW site: http://txwww.cr.usgs.gov/txwmc/).

A conference on water issues impacting **Sabine Lake,** September 13-14, 1996 at the Beaumont Hilton. Contact Blackburn & Carter in Houston at (713)524-1012.

Understanding the Gulf of Mexico Ecosystem, sponsored by the U.S. Environmental Protection Agency's Gulf of Mexico Program, September 16-18 at the University of Southern Mississippi. Contact Mack Felton, (601) 688-7121. (WWW site: http://pelican.gmpo.gov.)

Amercian Water Resources Association's conference and symposium on **GIS and Water Resources**, September 22-26, Fort Lauderdale, Fl. Conference sessions will include remote sensing, surface and agricultural hydrology. A special symposium will focus on geographic information systems. AWRA, (703) 904-1225.

Water Environment Federation Annual Meeting, October 5-9, Dallas, with technical program including ecological risk assesment, remediation of contaminated sites, and transboundary issues. Call WEF at (800) 666-0216 or email confinfo@wef.org.

International Symposium on Waterborne Cryptsporidium, March 2-5, 1997, Newport Beach, Calif. Technical sessions include effectiveness of disinfection, risk assessment and treatment. Contact Brian Murphy of AWWA at (303) 347-6194 or bmurphy@awwa.org. More details at http://www.awwa.org.

Blue and green unite for water conservation

Composed of representatives of landscaping-related industries and water management agencies, the Texas WaterWise Council has adopted as its mission "to promote sound water conservation practices in Texas through a public-private partnership that fosters awareness of the value of sound water management." The WaterWise Council was incorporated earlier this year.

Municipalities signing on as partners agree to promote water conservation and more efficient use of water through a public information campaign including bill stuffers,

billboards, and internal newsletters. Partnership letters were sent to eight large cities last month.

Business partners and their employees, after receiving training in efficient use of water in landscaping, will then be able to promote themselves as WaterWise Partners. Business partners may then advertise as WaterWise partners using the council's logo. The council will supply businesses with landscaping brochures. The WaterWise Council envisions an added incentive: businesses could create public relations campaigns around their water-saving expertise to promote business during traditionally slow months.

Overall objective of the council are

- to establish an educational network to disseminate water conservation information
- to provide financial and in-kind support for the development of educational programs for landscaping based on the principles of sound water management
- to aid in the development of water-wise guidelines for the public and private sectors.

Academic and media partnerships are in the planning stages.

For more information, contact Marilyn Good, Texas Association of Nurserymen (512) 280-5182.

AWWA database: info on demand

WATERSTATS--the most comprehensive data base on U.S. water utilities has a new name and updated information.

Formerly known as the Water Industry Data Base, WATERSTATS recently completed a survey of over 3200 utilities nationwide, according to Vern Achtermann, data base manager. Survey data will be compiled and made available in 1997.

WATERSTATS contains information on supply sources, treatment, water quality, distribution, metering, rates and customer service. On the average, the WATERSTATS office responds to 1000 requests per year from utilities, engineering firms, managmenet and marketing consultants, researchers, and financial institutions.

Now in its seventh year, the data base is a project of the American Water Works Association and the AWWA Research Foundation.

Almost all WATERSTATS requests are by telephone, often from parties needing immediate answers. To serve the automated market, however, plans include publishing the data base on CD-ROM and on electronic media. For more information on WATERSTATS, contact Vern Achtermann at (303) 347-6220 or by fax at (303) 795-1440. The AWWA home page URL is http://www.awwa.org/.

WATERSTATS joins its information partner WaterWiser, the Water Efficiency Clearinghouse, a cooperative venture with the U.S. Environmental Protection Agency.

WaterWiser can be reached by telephone at (800) 559-9855, by fax at (303) 795-1440, or at their home page, http://www.waterwiser.org./ WaterWiser is a central clearinghouse for information on succesful utility and commercial conservation programs, wastewater reuse, case histories, and abstracts of journal articles on conservation and reuse.

Water Wiser services include document delivery of hard copy requests of citations, annotated bibliographics, literatures searches, referrals, and information packets.

The WaterWiser home page features an electronic mailing list for on-line discussion forum, bibliography and reference searching, a directory of water efficiency services companies, and web links to water resources-related sites.

CD-ROM a liquid multimedia experience

Water is nature's original multimedia compound--the sound of the ocean, the feeling of a swift stream, the smell of a peat bog, the sight of a rainbow.

EnviroMedia,a Hawaii-based multi-media company developing CD-ROM titles focusing on Earth Sciences, exploits to advantage capabilities of the personal computer to create an almost sensory multi-media learning experience. The company's first product is *The Amazing, Stupendous Project Water*. "Every title attempts to raise the player's sense of concern for general environmental issues in a non-judgmental, apolitical gamelike setting," according to Leni Knight, founder of Environmedia.

Project Water greets the user with original music and an introductory page with three subject icons: geology, chemistry, and mythology. Each topic, in turn, opens with theme music or water sounds and an audio narrative.

Users can choose a topic from the index page, then branch down through informative screens. For example, under the subject of wells is a hierarchy of 16 screen on three major branches. Clicking down along the branch icon, the program progresses to screens explaining aquifers, aquicludes, permeability, recharge zone, percolation, and perched aquifers, all with lucid graphics with optional audio voicing of the script.

The chemistry section suggests 10 hands-on experiments dealing with water, some quite clever, like the aquifer model built with sand, pebbles, and water in a plastic pan, demonstrating how a water well works. After each experiment, the program draws a conclusion from the observed results.

Even mythology has its day, with a survey of fantasy such as Vishnu, Poseidon, and the River Styx and mermaids.

A single-user license is $45.95; a multi-user license including a CD-ROM of chemistry movies is $495.

Other CD-ROM titles include *Hydrous: The Story of Water*, and titles dealing with earth, fire and air. *Hydrous* includes an interactive game targeted to children and adults,

For more information, contact EnviroMedia at (808) 988-3444.

Austin's long-term water efforts awarded

The City of Austin Water Conservation Division joins two other Texas political subdivisions in receiving national recognition from the U.S. Bureau of Reclamation.

The Bureau's Western Region office awarded Austin's Water Conservation Division the Long-term Leader award for the City's innovative programs since 1983. Goals of the programs are a 10 percent peak-day water use reduction and a 5 percent average per capita reduction, water quality preservation and customer education.

Between 1986 and 1990, the city initiated three residential water reduction programs, according to Tony Gregg, Director of the Water Conservation Division. First, as part of an overall residential energy efficiency audit program, about 40,000 low-flow showerheads and 52,000 toilet dams were installed. Later, two retrofit programs--one in which residents picked up water saver kits and the other a door-to-door retrofit program--resulted in a total of 65 percent of single-family residential customers taking advantage of one of the three retrofit programs.

The City of Austin continued its innovative lead with three ultra-low-flush (ULF) toilet exchange programs, rebates for xeriscape landscaping, automatic irrigation system audits, and the Dowser Dan School Assembly Program.

The ULF outreach program offers low-income customers the opportunity to replace, free of charge, their toilets with 1.6 gallons-per-flush models. As a direct result of the program, 6,000 toilets have been replaced in low-income single-family homes since the program's inception in June 1994.

The city's rebate ULF program offers a $40 credit on the utility bill when a resident of a single- or multi-family dwelling replaces a toilet with a ULF model. City residents taking advantage of this program have replaced a total of almost 11,000 units. Still Gregg estimates that only 6 percent of Austin resident use ULF toilets (see *Texas Water Saver*s, Summer 1994). The city also established a ULF commercial rebate program, offering a $1 rebate per gallon of water saved per day by installation of equipment or processes that save water.

Older model toilets use 3.5 gallons per flush (gpf), and some as much as 5 gpf. ULF units use 1.6 gpf, saving the average family of 4 about 50 gallons per day. That amount compounds to savings of 6 million gallons per day city-wide, or about 2.2 billion gallons per year.

Ironically, the Austin City Council considered canceling the ULF program as a cost-savings measure. In the long-term, however, any conservation program that cuts peak

usage can save more than just the cost of supplying water. Municipal water utilities are built to meet peak demand. Conservation is one means of postponing plant expansion and new plant construction.

The Dowser Dan school assembly program, aimed at first through fourth graders, consists of a 45-minute theatrical presentation and a conservation booklet for each child.

Continuing programs are indoor water audits for both residential and commercial customers, xeriscape classes and a one-day xeriscape tour of homes with exemplary water-saving landscaping techniques. The city also publishes the quarterly newsletter *Water Conservation Times*, with a gardening maintenance calendar, residential water saving tips, and a calendar of events.

Joining the City of Austin in the national water conservation limelight were two other Texas entities, who received their awards at a meeting of the Texas Water Development Board in May. The City of Austin joins the Harris-Galveston Subsidence District and the City of Houston in receiving awards at meeting of the Texas Water Development Board in May. Awards are given in five categories: promising products, small demonstration project, educational mentor, innovative partnership and long-term leader.

The Subsidence District took the educational mentor award for its innovative "Learning to be Waterwise and Energy Efficient" Program (see *Texas Water Savers,* Fall 1995), a partnership between the district and public schools which included a home plumbing conservation kit and classroom exercises.

The City of Houston Water Conservation Division won kudos in the innovative partnership category for its interactive gameboard, a joint effort between the City of Houston and the Houston Children's Museum (see *Texas Water Savers,* Winter 1995).

Mayor's coalition coordinates water policy

A coalition of 20 Travis and Williamson County mayors has agreed to coordinate efforts on a peak day management program.

The basis of the regional conservation is a coordinated watering schedule. Residents are asked to water once every five days in the morning or evening hours, when evaporation is lowest.

The plan received approval of the Lower ColoradoRiver Authority and Brazos River Authority. The two river authorities, which recently formed an alliance to address immediate and long-term water and wastewater issues in Central Texas, have offered to provide information on water supplies and other technical support

Central Texas cities are taking creative and sometimes failsafe measures to combat the drought. The City of Austin has also initiated a Water-Wasters' Hotline. Neighbors call in to report wasteful use of water. A city conservationist counsels citizens practicing wasteful habits by telephone. The most common problem is sprinklers left running too

long so that water flows in to the street, accoring to Tony Gregg, chief of Austin's Water Conservation Division.

Williamson County has built a test bed for turfgrass and other landscape products on land adjacent to the county's maintenance facility in Georgetown. Initiated by county extension agent Ron Leps, much of the turfgrass, trees, and parts for the irrigation systems have been donated. Emory Thomas, of Thomas Brothers Grass Company, considers the project a worthwhile investment to assess the performance of their turfgrass products. Thomas Brothers domated several turfgrass varieties to the project.

Leander, which has battled worrisome water supply and pumping problems last year, has tied into Cedar Park's water system.