

New Water Publications

A series of water related publications have been added to the TCE Bookstore. These publications address various water quality topics for private water well users or homeowners interested in in-home water treatment. These publications are available in English and Spanish and can be downloaded from the TCE Bookstore website located on the worldwide web at <http://tcebookstore.org/>. The publication numbers and titles are as follows:

- E-225 Do's & Don'ts of Saving Water
E351 Shock Chlorination of Stored Water

Website Spotlight

This quarter's website spotlight is shining on the Texas Water Resources Institute located at <http://twri.tamu.edu/>. The Texas Water Resources Institute serves as a focal point for water-related research at Texas universities, encouraging discussion of statewide issues through meetings and multi-university studies. The Institute links academic expertise with state and federal agencies, strengthening water research and education. Additionally, the Institute provides leadership for water resources programs through grant administration, pre-award services, project management, communications and facilitation of inter-agency collaboration.

Small Water Systems Seminar Set for July 28

The Texas Water Resources Institute, Texas Cooperative Extension, Southeastern Technical Advisory Center and the United States Environmental Protection Agency have partnered to offer a workshop on Homeland Security Issues for Small Water Systems on July 28 at Cedar Creek.

The seminar will take place at the Lower Colorado River Authority's McKinney Roughs Nature Park Center,

1884 U.S. Highway 71, Cedar Creek, Texas.

Registration starts at 8 a.m. The cost is \$20, which includes lunch. The goal is to help small water systems managers learn how to cope with pressing homeland security issues.

Speakers include the director of the Texas A&M University Integrative Center for Homeland Security, and a field agent from the FBI in Houston,

who will outline how water professionals can be alerted to pending homeland security threats. Another session will include information on how small water systems can increase managerial and technical.

For more information or to register for the seminar, call the Texas Water Resources Institute at (979) 845-1851 or go to <http://water-workshop.tamu.edu>.

Quote of the Day

Always do right. This will gratify some people and astonish the rest."

Mark Twain

For additional information, please contact me.

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Factors to Consider for Proper Water Management of Lawns!

Mr. Roger Havlak, Drs. David Chalmers and James McAfee, Texas Cooperative Extension

Are you having problems determining when and how much to water each time you irrigate your lawn? Well, you need to understand that several factors need to be considered to accomplish this task properly. First, determine the type and depth of your soil. Clay soil will certainly be different than sandy soil because of the clays ability to hold water and its inability to allow water into the soil (reduced infiltration rate). Furthermore, having a soil depth greater than 6 inches allows for deep and infrequent irrigation (recommended) and the ability to maintain a reservoir of water for roots to tap into. Research has shown that turfgrasses are able to extract water deep into the soil pro-

file if you maintain an adequate root system. Shallow soils lack this attribute; thus, light and frequent applications will be needed which results in a shallow root system and reduced drought resistance.

Other factors that affect water management in turf include: proper turfgrass selection, proper fertilization, proper mowing, thatch management, aerification practices, pest management, water quality, and many environmental conditions (wind, sun, shade, relative humid-

ity, air temperature, etc.). Keep in mind that we want to maintain a healthy, well-rooted lawn grass. Do not over-saturate your site for long periods of time—roots need oxygen to survive—saturated soils lack oxygen. So, if possible, water deeply and infrequently! Water in the early morning hours! You will be much happier with your lawn and your lawn will be much happier with you!

For more information on “Water Management in Lawns”, go to the Aggie-Turf web site at: <http://aggie-turf.tamu.edu> and click on “Turf Tips”.



Irrigation Audits—A Method to Evaluate Your Irrigation System

Mr. Roger Havlak, Drs. David Chalmers and James McAfee, Texas Cooperative Extension

Have you ever wondered if your irrigation system is placing water evenly throughout your landscape? Do you have areas in your turf that seem to remain rather dry compared to other sites in your lawn? Do you have any idea how many inches of water is applied when you irrigate for an hour? One method used to answer all of these questions is an “irrigation audit”.

An irrigation audit is used to evaluate the performance of your irrigation system. By performing an audit, one can obtain an application rate (inches of water per hour) as well as the distribution uniformity of your system. It is a rather simple task to perform. Just take several catch cans (i.e. tuna fish cans, cat food cans, dog food cans, etc..) and place them in one of your zoned areas. Place a catch can two feet from each irrigation head and one between irrigation heads. Turn on that irrigation zone for 15 or 30 minutes and measure the amount of water (inches) captured in the cans with a measuring tape or ruler. Record the values and obtain an average for all the can measurements. For example, if your average is ¼

inch for 15 minutes, you would then have an application rate of 1 inch per hour for that zone. By drawing a diagram of your zone, you can also record the values for each head and see just how uniform the water is being applied to your lawn. Do this for each zone to evaluate your entire irrigation system. Make the needed adjustments to your system so that you can have an efficient and effective irrigation system.

For more detailed information on “Water Management for Turfgrass” and “Irrigation Audits”, go to the <http://aggie-turf.tamu.edu> and click on “Turf Tips”.



How to Calculate How Much Nitrogen Fertilizer to Apply to Your Lawn

Mr. Roger Havlak, Drs. David Chalmers and James McAfee, Texas Cooperative Extension

Have you ever gone to your local fertilizer outlet store and asked yourself, “how much fertilizer do I need to buy?” If so, don’t feel alone in this category. Unfortunately, many people have purchased and applied either too much or too little nitrogen fertilizer in their lawn, sometimes resulting in damage not only to their turf, but to the environment as well.

Nitrogen is a macronutrient required by plants in amounts greater than any other nutrient. To avoid nitrogen deficiencies, applications will need to be made throughout the growing season. A good rule of thumb is to apply from ½ to 1 pound of actual nitrogen per 1,000 square feet each time you fertilize. Next, you must calculate the surface area (square feet) of your lawn. Then, use the following formula for applying the correct amount of nitrogen (N) for each application:

Determine Your Fertilizer Need	
Step 1 Get a good estimate of the total size (in square feet) of your lawn using tape measures, or number of paces, etc. ... and record that number in the box to the right. (ex. 13000 square feet) Do not use commas!	<input type="text"/>
Step 2 What rate of nitrogen do you want to put down on your lawn? We recommend not going above 1 pound of nitrogen per thousand square feet. Use decimal equivalent - Do not use fractions (/ sign) in the box!	<input type="text"/>
Step 3 What is the first number in the analysis of your bag of fertilizer? (ex. 15 - 5 - 10) This number corresponds to the percentage of nitrogen in the bag. The second number corresponds to the percentage of phosphorous and the third number, potassium.	<input type="text"/>
You need <input type="text"/> pounds of fertilizer for one thousand square feet.	
You need <input type="text"/> pounds of fertilizer for your entire lawn.	
<input type="button" value="Compute"/> <input type="button" value="Reset"/>	

$$\frac{(\text{N RATE} \div \text{N ANALYSIS})}{(\text{SURFACE AREA} \div 1,000)} = \text{units of 1,000 square feet in the lawn}$$

Then, multiply the two answers from above together to obtain the amount of fertilizer you need to buy and apply uniformly to your entire lawn, as shown below:

$$(\text{N Rate} \div \text{N Analysis}) \times (\text{Surface Area} \div 1,000) = \text{Pounds of fertilizer to apply to your lawn}$$

N Rate: One pound of actual nitrogen per 1,000 square feet per application is usually the maximum recommended N RATE. Use ‘1.0’ to represent a one pound nitrogen application.

N Analysis: The first number on the bag represents the percent of nitrogen by weight or the N ANALYSIS
Example: 15-5-10 fertilizer has 15% nitrogen—use ‘0.15’ in the formula (decimal form) as the N ANALYSIS

Surface Area: Use the number of total square feet you have in your lawn as your SURFACE AREA
Example : If you have a 5,000 square foot lawn and are using a 15-5-10 fertilizer, you would use the following formula:

$$(1.0 \div 0.15) = 6.67 \text{ pounds of fertilizer to apply on each 1,000 square feet}$$
$$(5,000 \text{ sq. ft.} \div 1,000) = 5.0 \text{ units of 1,000 square feet}$$

**Multiply 6.67 pounds of fertilizer by 5.0 will equal 33.35 pounds of 15-5-10 fertilizer needed to fertilize the entire 5,000 square feet of lawn with the 1 pound of actual N per 1,000 square feet rate.

**You would need to purchase and apply 33 pounds of 15-5-10 fertilizer to your lawn for the correct measured amount of nitrogen.

An alternative method to the formula is to use a “Fertilizer Calculator”. You can find this ‘calculator’, as well as information on nitrogen requirements for different lawn grass species at the Aggie-Turf web site at <http://aggie-turf.tamu.edu> . Click on “Answers 4 You”, then “Fertilization”.

Drought Watch on the Rio Grande

Ari Michelson, TAES-El Paso and Filiberto Cortez, U.S. Bureau of Reclamation

Elephant Butte Reservoir Level Peaks for 2005, River Runoff Below Earlier Forecast

As we move into the summer season and heat Wayne Treers at the U.S. Bureau of Reclamation, El Paso Field Office is projecting flows into Elephant Butte Reservoir of 132% of average or 757,000 acre feet for this season's runoff. This is down from an earlier mid-spring forecast of 140%. So far this year over 690,000 acre feet of water has entered the reservoir. This above average runoff is very welcome following seven years of river drought and would be the highest runoff since 1995.

The peak storage and elevation at Elephant Butte Reservoir for the season occurred on Saturday, June 25 at 569,920 acre feet. The combined water in storage in Elephant Butte and Caballo Reservoirs on June 28th was 27.6% of capacity or 607,474 acre feet out of a total capacity of over 2.2 million acre feet. Based on water demand projections and "normal" summer rains, the end of season low point in reservoir storage is projected to be 429,000 acre feet or almost one-fifth of capacity. This would be 340,000 acre feet more than the 2004 low of water in storage.

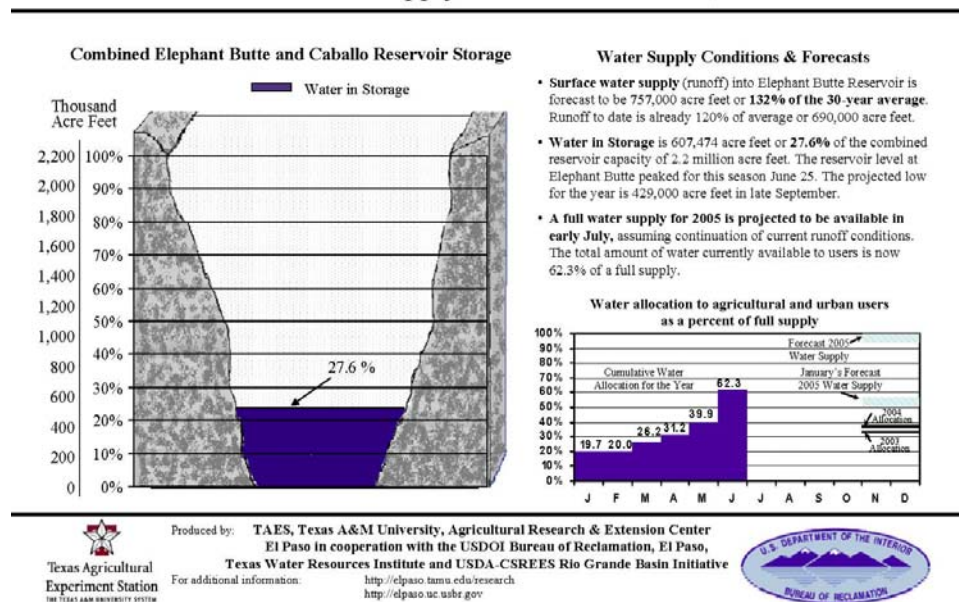
Even with above average inflows projected for the year, the current amount of water available to users is 62.28% of a full supply. The allocation or availability of water to users is made only after water actually enters the reservoir, not on projections of supply. It is anticipated that a full water supply allocation will be made available to users in early July.

Caballo Reservoir is currently releasing 2,326 cubic feet per second or approximately 4,614 acre feet of water per day for agricultural production in the Elephant Butte Irrigation District, NM (EBID), El Paso County Water Improvement District #1, TX (EPCWID#1), Mexico's Irrigation District #009, and to El Paso Water Utilities for urban use. Reservoir releases are expected to stay near this level through mid-July and then decrease as irrigation and urban demands begin to fall. With a full river water supply the El Paso Water Utilities could provide about half of it's urban water demand from the Rio Grande saving ground water resources for drought and future needs. Scheduled end of season reservoir release dates are

September 18th for Mexico, October 7th for EBID and October 14th for EPCWID#1 at which point the reservoir gates will be closed until next year. These end of season closing dates are subject to change depending on available water supplies and late season demand.

"Drought Watch on the Rio Grande" is provided by the Texas Agricultural Experiment Station, Texas A&M University, El Paso Agricultural Research and Extension Center in collaboration with the United States Bureau of Reclamation El Paso Field Office and USDA-CSREES Rio Grande Basin Initiative. Updates of Drought Watch are issued as conditions change.

Drought Watch on the Rio Grande Surface Water Supply Conditions June 29, 2005



Panel Told of San Antonio Seeking Water Sources

David Bowser, Globe-News Correspondent (March 2005)

DENTON - The head of the Edwards Aquifer Authority said San Antonio should be interested in water from the Texas Panhandle. Robert Potts, general manager of the Edwards Aquifer Authority from which the Alamo City draws most of its water, told about 200 people at a water conference Tuesday night at the University of North Texas that San Antonio needs other sources of water.

"It's great to have options," said Potts, who was on a panel with Boone Pickens, Dallas businessman and Roberts County rancher.

Potts, who said the water authority only manages the water, not supplies it, said the people of San Antonio were considering buying water from Pickens, president and CEO of Mesa Water Inc.

Pickens has proposed pumping and selling groundwater in the top four counties in the northeastern Texas Panhandle to Dallas, San Antonio or El Paso.

"I've been at it for six years," Pickens said.

He said he had 200 landowners associated with Mesa Water who were willing to sell their water for export from the Texas Panhandle to thirsty cities.

"They have an asset for sale," Pickens said, although he admitted that he as yet has no buyer.

Pickens said the water in the Ogallala Aquifer beneath Ochiltree, Lipscomb, Roberts and Hemphill counties in the northeastern corner of the Panhandle was surplus water, and selling it to metropolitan areas downstate would not harm the agriculture industry in those counties.

The four counties cover about 2.5 million acres, and less than 10 percent of the counties are irrigated. The rest, he said, can't be farmed with irrigation because of the rolling topography.

"The water is surplus water," Pickens said. "It's not used."

If the landowners are able to sell their water, he said, they could increase the value of their \$200-an-acre rangeland to as much as \$700 per acre.

"We have a permit to sell it," Pickens said. "We're trying very hard to sell it."

He said the pumping permit would require that Mesa Water leave 50 percent of the water in the aquifer as a conservation measure, a measure he said he agrees with.

Even then, Pickens said, he could deliver 200 acre-feet of water via pipeline for 200 years or longer. If the water was mixed with existing water supplies from local reservoirs, he said, the water supply



Water Issues

Boone Pickens called the water he wants to sell "surplus water" because "it's not used."

could last indefinitely.

Pickens said he thinks the key to selling the water is being able to deliver it at a competitive price. He also indicated that the conservation of water in the future will likely depend upon the cost of the precious liquid.

Potts said there is not enough surface water in the state to meet future needs. Groundwater, he said, is part of the solution to potential water shortages in the state.

"We don't have an offer," Pickens said, "but I think eventually we'll sell it."

Anti-Bacterial Additive Widespread in U.S. Waterways

Rolf Halden, Assistant Professor & Certified Professional Engineer, John Hopkins University

Many rivers and streams in the United States are believed to contain a toxic antimicrobial chemical whose environmental fate was never thoroughly scrutinized despite large-scale production and usage for almost half a century, according to an analysis conducted by researchers at the Johns Hopkins Bloomberg School of Public Health. The chemical, triclocarban, has been widely used for decades in hand soaps and other cleaning products, but rarely was monitored for or detected in the environment. The new findings suggest that triclocarban contamination is greatly underreported. The study is published in the current online edition of *Environmental Science & Technology*, a peer-reviewed journal of the American Chemical Society.

“We’ve been using triclocarban for almost half a century at rates approaching 1 million pounds per year, but we have essentially no idea of what exactly happens to the compound after we flush it down the drain,” said the study’s lead author, Rolf U. Halden, PhD, PE, assistant professor in the School’s Department of Environmental Health Sciences and founding member of its Center for Water and Health.

The nationwide assessment of triclocarban contamination is based in part on an analysis of water samples collected from rivers in and around Baltimore, Md., as well as from local water filtration and wastewater treatment plants. From the samples, Dr. Halden and his summer research intern, Daniel H. Paull, now a graduate student in the

Chemistry department at Johns Hopkins University, observed the occurrence of triclocarban in the environment correlated strongly with that of triclosan, another commonly used antimicrobial chemical that has been studied in much greater detail because it is more easily detectable. Using an empirical model and published data on the environmental occurrence of triclosan, the researchers predicted triclocarban concentrations for 85 U.S. streams. The study results suggest that the antimicrobial contaminant is present in 60 percent of the U.S. water resources investigated, thereby making it the fifth most frequent contaminant among 96 pharmaceuticals, personal care products and organic wastewater contaminants evaluated.

To determine the validity of the analysis, the researchers compared their predicted nationwide levels of contamination to experimentally measured concentrations in the Greater Baltimore region, and found no statistically significant differences. The results also show that the levels of triclocarban in water resources nationwide are much higher than previously thought.

In surface water from the Baltimore region, the researchers detected triclocarban at concentrations of up to 6.75 micrograms per liter (parts-per-billion). This maximum concentration was 28-fold higher than previously reported levels, which are currently used by the U.S. Environmental Protection Agency for evaluation of the ecological and human health risks of triclocarban.

“Along with its chemical cousin triclosan, the antimicrobial compound triclocarban should be added to the list of polychlorinated organic compounds that deserve our attention due to unfavorable environmental characteristics, which include long-term persistence and potential bioaccumulation. Triclocarban, for example, has an estimated half-life of 1.5 years in aquatic sediments. Do the potential benefits of antimicrobial products outweigh their known environmental and human health risks? This is a scientifically complex question consumers, knowingly or unknowingly, answer to everyday in the checkout line of the grocery store,” said Dr. Halden.

“Co-Occurrence of Triclocarban and Triclosan in U.S. Water Resources” was written by Rolf U. Halden and Daniel H. Paull.



Rolf Halden, PhD, PE

Antibiotic Resistant Genes Traced from Farms to Groundwater

University of Illinois at Urbana-Champaign

Genes resistant to tetracycline have been found in groundwater as far as a sixth of a mile downstream from two swine facilities that use antibiotics as growth promoters. The finding is significant in part because it shows the potential for spreading resistance back into the food chain of animals and people, researchers say.

For more than 50 years, US farmers have used tetracycline and other antibiotics to enhance the growth of livestock. In humans, an overuse of antibiotics is blamed for a growing resistance to many antibiotics, and agricultural use has been suspected in the spread of resistance genes. The European Union is phasing out such agricultural use; Sweden banned it in the 1980s.

Researchers from the University of Illinois and Illinois State Geological Survey used a DNA-amplification technique (polymerase chain reaction or PCR) to analyze samples from lagoons, wells and groundwater on and near two Illinois facili-

ties, said Rustam I. Aminov, a visiting professor of animal sciences at the UI. Their research appeared in the April issue of *Applied and Environmental Microbiology*. Aminov had reported his creation of primers for use with PCR to detect resistance genes in the environment earlier this year in the same journal. In the earlier paper, he also reported the detection of resistance genes in livestock intestines and feces and in commercial feed.

“The use of tetracycline on farms is pushing the evolution of these genes,” he said. “We found tetracycline resistance genes in soil and groundwater bacteria. The genes are transferred to this type of bacteria, where they can survive and travel long distances in the environment. It has been suggested that there is horizontal transfer of antibiotic resistance genes, but we had only seen it in laboratory experiments, not in in-situ studies. Here, we see such a transfer is occurring in the environment.”

The researchers were able to identify the trail taken by the resistance genes. The DNA fingerprints in the samples matched the resistance genes previously identified in livestock and feed.

“These genes were found to be predominant in the gastrointestinal tracts of pigs and steers,” the authors wrote. “The elevated frequencies of these genes in the environment surrounding the farms were consistent with the hypothesis that this occurrence was the result of gene flow from the animals.”

Once resistance genes make their way into drinking water, they will find their way into the guts of the people, animals and wildlife that drink it, Aminov said. “We are potentially passing on resistance in a continuous gene cycle in the environment,” he said.

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