

divining rod

Vol. XIII No. 3

New Mexico Water Resources Research Institute

Fall 1990

35th Annual New Mexico Water Conference

Toward a common goal: Forging water-quality partnerships

A vast library of laws and regulations governing water quality has evolved over many decades. Laws continually change, presenting challenges and creating conflicts between regulators and those who are regulated. Many conflicts could be avoided if each party had a better understanding of the other party's constraints and unique problems.

Each party has a responsibility to other parties involved, too. Those who translate federal or state law into rules and regulations must be ever mindful of the lawmakers' original wishes. Regulators must also be fully aware of the practical

consequences of their actions. Those regulated not only have a legal obligation to abide by the rules of the game, but they also should make regulators aware of particular problems they encounter that might not have been anticipated. Open and positive dialogue among all parties is essential to achieve our common goal of a clean and healthy environment.

This year's water conference brings together the regulators and those who are regulated for the purpose of fostering this dialogue in an informal setting free from judges, court reporters and strict rules.

Recognized experts who are neither regulators nor representing an entity being regulated will present impartial overviews of selected water quality issues and moderate what should be lively panel discussions. The general public will have ample opportunity to ask questions and participate in open discussion. All will leave the conference with a much better understanding of the issues, and, hopefully, better armed to solve problems.

The 35th Annual Water Conference will be held November 15-16 at the Holiday Inn Pyramid in Albuquerque (exit 232 off of I-25). A small block of rooms has been reserved at conference rates of \$53.50 for singles; \$60 for doubles and double/doubles. Those needing rooms should call the hotel at 505-821-3333 by **October 14**.

The conference registration fee will be \$60 before November 5; \$75 after that date. It includes coffee breaks, Thursday's lunch, and a copy of the proceedings to be mailed next spring. Student registration is \$20 before November 5; \$35 after that date.

See page 11 for a tentative schedule of presentations and registration form.

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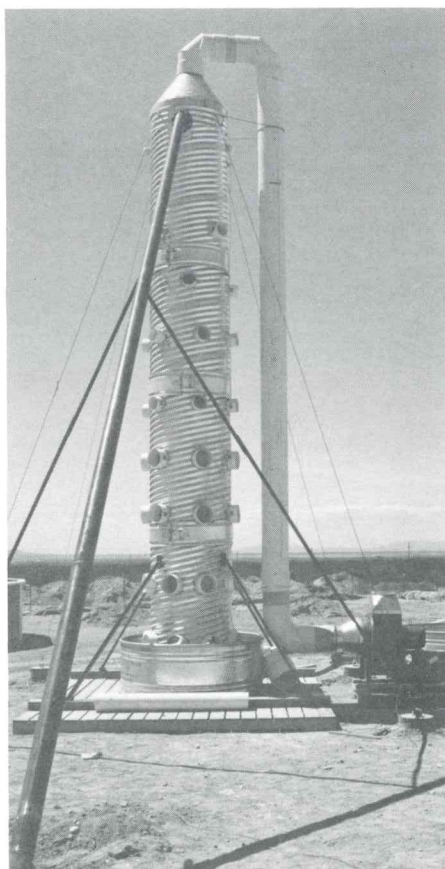
Cascade air stripping: an economical alternative for removing organic contaminants from water

Air stripping has been used in the chemical industry for over fifty years for a variety of applications. During the past decade the method has been adapted by environmental engineers to clean up ground water contaminated with organic pollutants. Now a New Mexico State University researcher from the Civil, Agricultural and Geological Engineering Department, Nirmala Khandan, is field testing a new, more efficient type of air stripping which he developed—cascade air stripping. Not only will Khandan's method remove a wider range of chemicals from water than conventional air stripping, but it is also cheaper.

Conventional air stripping consists of a cylindrical-shaped tower, three to ten feet in diameter and twenty to forty feet tall. Air is pumped into the tower from the bottom, while the contaminated water is sprayed from the top of the tower. As the air flows upward, it collects the contaminant from the water, and is blown out of the top of the tower into the atmosphere. At the same time, the water flows down through the tower over the packing material that fills the tower, and eventually is reinjected into the ground or collected for reuse. The packing material is usually plastic hollow spheres or cylinders which help the contaminant volatilize by providing a surface for the water to flow over. The packing material changes the concentrations between the air and water and continuously exposes fresh water to the air. If the volatile contaminant is in excess of the water's equilibrium level, the contaminant will be transferred from

the water to air until equilibrium is reached.

Khandan's method uses the traditional tower, but in cascade air stripping, air is admitted into the tower at graduated elevations. In this way, it is possible to pump more air into the system, using less energy. The more air flowing through the system, the more chemicals can be removed. Because the cascade system can accommodate larger water loading rates, the tower does not need to be as large as that used with the traditional air stripping, and cleanup time may be



Above is a cascade air stripping system built by NMSU graduate students.

shortened. With the cascade method, the tower may be 20 to 30 percent smaller in diameter and 40 to 50 percent shorter than the conventional system. The shorter cleanup time could also be a big advantage—air stripping systems are usually left in place ten to twenty years.

Khandan's process also offers an attractive way to clean up low-volatile hazardous compounds such as naphthalene and PCBs or semi-volatile compounds like bromoform, which cannot be removed by conventional air stripping. Because of the power requirements and high air flow required to clean up these compounds, conventional air stripping becomes too expensive. Usually other more expensive methods such as those using granular activated carbon or stream stripping are employed.

Khandan began working with air stripping four years ago while at Drexel University in Philadelphia. There he looked at optimizing the air stripping process. He developed the cascade concept based on theoretical concepts and computer simulation models. At Drexel, he successfully tested cascade air stripping in the laboratory through a project funded by the American Water Works Research Foundation.

The field-scale testing of Khandan's method is supported by the New Mexico Water Resources Research Institute, NASA, and Geoscience Consultants Limited. The tower used in the field testing was constructed in the engineering shop at NMSU by graduate students. It cost between \$8,000 and \$10,000 to build. Khandan reports

Continued on page 8

Tatum finds solution to its waste-water woes

What does Tatum, New Mexico have in common with San Diego, California? Not much you might think. But last January, Tatum like San Diego, began using an artificial wetland to treat waste water. Cities as diverse as Collins, Mississippi, Monterey, Virginia, and Haughton, Louisiana do the same.

Faced with a condemned waste-water treatment system and a small budget, Tatum officials worked with Hobbs engineer F. L. "Roy" Miller and the Environmental Improvement Division to get the innovative system up and running. It was EID District IV Manager Garrison McCaslin who first suggested Miller consider the wetland approach for Tatum.

Tatum Mayor Betty Rickman speaks enthusiastically about the new treatment plant. Not only did the town stay within its \$330,000 budget--which wouldn't have been possible had they built a traditional waste-water treatment plant--but she says, "there are lots of extra benefits that we've been enjoying here in Tatum." Some of these benefits include a park-like, odor-free area where the town's citizens have started walking. The treatment plant was designed to use cattails in the cleansing process, but Miller has added other plants suitable to Tatum's climate which are also aesthetically pleasing, such as arrowheads and ice plants. He says there are about a dozen species of plants now growing. The wetland has become a haven for birds, and some citizens have put park benches in the area so they can sit and birdwatch. There is talk of stocking fish and building a golf course, too.

The waste water at the plant is first pumped to two aerated lagoons,

Tatum residents were faced with a condemned waste-water treatment plant and a small budget

and then flows into a subsurface aquatic filter which is 1 1/2 feet deep, 200 feet long and 400 feet wide. It is filled with 2 inches of crushed rock. The cattails are planted on top of the rock. After flowing through the filter, the treated water is applied to a rapid infiltration area where it percolates back into the ground.

Microorganisms established on the roots of the cattails and other aquatic plants help remove the nitrates and other contaminants in the waste water. The microorganisms have a symbiotic relationship with the plants--they use each other's waste which permits a reaction conducive to the rapid removal of nitrates from the waste water. During the degradation of the contaminants, metabolites are produced which the plants absorb and use as a food source. In turn, the microorganisms use the metabolites released through the plant roots as a food source.

Although the artificial wetlands systems are much less expensive than traditional waste-water treatment systems, more land is required for the systems. The filter at the Tatum plant covers three-quarters of an acre and handles about 54,000 gallons of effluent daily. The infiltration area is 5 to 6 acres in size, but could be expanded to 10 acres. The Tatum plant was designed to

make use of gravity flow, and as a result some additional land with the correct slope had to be purchased.

Not only are the wetlands systems less costly to install than traditional treatment plants, but operation and maintenance costs are lower. Non-technical personnel can operate and maintain the system, and less energy is needed for operation, especially when gravity flow is used. For weed control in the area, Tatum is using 20 goats, which Miller says "don't foul the water as other livestock would." This "back to nature" approach is perfect for the wetlands, Miller reports. It is difficult to get mowing equipment on some of the banks, and much of the area is too wet for the equipment.

Other New Mexico communities planning wetlands projects are San Jon and Capitan. Miller designed a small wetlands project at the correctional facility in Roswell and is now looking at putting one in a densely populated area for a nursing home in Hobbs. He says the wetlands are ideal for communities with populations under 3,000. "They are very cost effective," he adds.

When asked why they haven't been utilized more by larger cities, Miller says it is because they are so land intensive. Cities like Albuquerque and Santa Fe don't have the low-value land needed for the projects. But Miller is most enthusiastic about the future of artificial wetlands. He observes, "I think we're on to something."

For more information on artificial wetlands, write the National Small Flows Clearinghouse, West Virginia University, P.O. Box 6064, Morgantown, WV 26506-6064.

Interdisciplinary program prepares students for water resources management career

What began as a "brown bag" series of lunch seminars has grown into an interdisciplinary Master of

The program's goal "is to help students acquire the generalist's appreciation for the big picture."

Water Resources Administration (MWRA) program at The University of New Mexico. The new program, which is housed in the Division of Public Administration was officially opened last January. Student admissions and program policies are handled by a steering committee composed of five faculty members, each of whom specializes in one of the disciplines represented in the curriculum. Eight students have been accepted, and seven prospective students have applications in process, says Michele Minnis, the MWRA program's acting academic director.

The MWRA curriculum is designed to prepare students for the diverse and increasingly complex demands of a career in water management. "Today, no less than in the past, water administrators must have in-depth knowledge and technical proficiency in a discipline closely related to their work," notes Minnis. "But that kind of background—the skills of a specialist, the ability to thoroughly explore a subject within a disciplinary framework—is something we expect students to bring with them to the MWRA program. The program itself has a different purpose," she says. "Its goal is to help students acquire the generalist's appreciation for the big picture."

"Among current water issues, some of the toughest issues—water reallocation, conservation and quality, for example—cut across the boundaries of several disciplines," observes Minnis, "and revolve around competing, deeply held values. Approaching these issues, engineers, hydrologists, and water scientists need a working knowledge of water law, policy, and economics. Similarly, water lawyers and resource policy analysts need a working knowledge of the natural science and engineering foundations of the positions they advocate."

The MWRA program was developed by a 25-member ad hoc committee appointed in 1987 by Chris

ciplinary courses, each containing a communications laboratory, comprises the foundation of the MWRA curriculum.

The interdisciplinary courses are team taught by four instructors. The first course in the series, *River Basin Survey*, is offered in fall semesters. It offers a panoramic view of water use in the geographic area defined by a major watershed. The second interdisciplinary course, offered in spring semesters, concentrates on interpreting data produced by mathematical models of hydrologic and economic systems. The third course, which serves as the culmination of the entire program, is a field course in which students

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Garcia, then UNM vice president for academic affairs. Biology Professor Jim Gosz and Economics and Public Administration Professor Lee Brown co-chaired the committee, which included faculty from nine academic units.

The planning committee sought input from New Mexico water resources professionals in both the public and private sectors. Many of the suggestions offered by these professionals were incorporated into the program design.

The late State Engineer Steve Reynolds and several other professionals strongly endorsed the program's emphasis on communication skills. A series of three interdis-

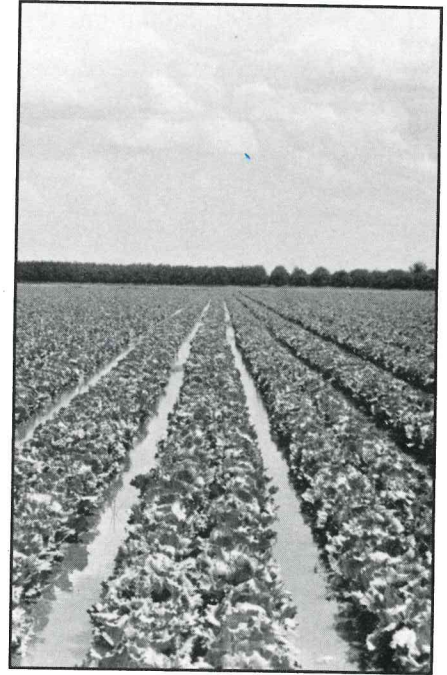
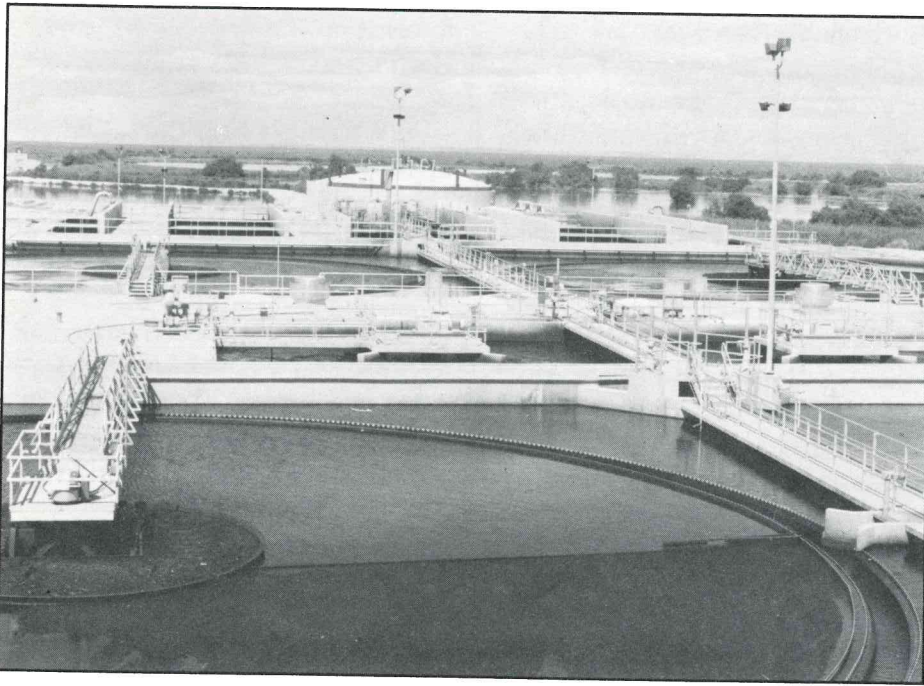
work on site with an actual water management problem and the people it affects.

In addition to the interdisciplinary courses, required courses include: hydrology, hydrogeology, water law, administrative behavior, public budgeting, and public personnel. Electives come from areas such as aquatic ecology and toxicology, resource economics, public policy, community and regional planning, and environmental health. Applicants to the program are expected to have taken a year of calculus, a year of chemistry, a semester of probability and statistics, and a semester of intermediate microeconomics.

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Whose water is it anyway?

New publication reviews El Paso water suit



The Fred Hervey Water Reclamation Plant (above left) takes sewage effluent and restores it to near-drinking-water quality. The treated water is injected into the Hueco Bolson where it eventually becomes part of El Paso's drinking water supply. High-value irrigated crops such as lettuce (above right), chile, and pecans help make Dona Ana County the most profitable agricultural county in New Mexico.

Photos by Linda G. Harris

After two years of letting it sit, Linda Harris recently picked up a manuscript she and three others wrote about the El Paso water suit. The result is *Whose Water Is It Anyway? An account of El Paso v. New Mexico*, soon to be released by Arroyo Press.

Harris, who served as the Water Resources Research Institute's information coordinator for seven years, worked for one year with Robert C. Czerniak from New Mexico State University's Earth Sciences Department, Richard A. Earl, now a faculty member at Bowling Green University in Ohio, and William J. Gribb of the Geography Department, University of Wyoming, writing about the suit for a general audience. They set out to tell both

sides of the water suit. "We wanted someone in El Paso to have an understanding of what goes on in New Mexico and vice-versa," Harris says.

Harris can identify with El Pasoans and New Mexicans. She grew up in El Paso, but has lived in Las Cruces for the past twelve years. She thinks the dual perspective was an asset in writing the book. "I don't think Texans are terrible, but I do think they have a poor understanding of the way New Mexicans regard water resources. Texans put water in the same category as oil. That's definitely not the case in New Mexico," she emphasizes.

Harris says she, Czerniak, Earl and Gribb joked that they were writing the book for the mayor of

Alamogordo—someone who would have a vested interest in the suit, but perhaps not technical expertise.

"I'd like to emphasize that I'm not an expert," Harris says. "I have approached this as an observer." However, the manuscript has been reviewed by a number of experts on both sides.

What made Harris go back to the manuscript after it was filed away for two years? "To me El Paso was unfinished business," she explains. "So much had been written about specific aspects of the suit, but nothing had been written to pull all these together. That's what we set out to do. We also wanted to profile the issues and the players involved in the suit."

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Proposal deadlines approach

October 23, 1990, 5:00 p.m., is the deadline for pre-proposals for WRRI's 1991 Water Resources Research Allotment Program and for proposals to be submitted through WRRI for the U.S. Geological Survey Section 105 matching grant program.

WRRI's allotment program includes research projects to be supported with state appropriations as well as with federal funds from the USGS. Generally, WRRI funding is limited to \$25,000 per project.

WRRI Project Coordinator Darlene Reeves says "pre-proposals with larger budgets will be considered if the project is interdisciplinary or if additional funds are to be provided by other sources." She stresses that WRRI funds projects for only one year at a time. Continued funding for projects with a two- or three-year time frame will be awarded on a year-by-year basis.

WRRI's Program Development and Review Board will complete the pre-proposal evaluations by early December. Researchers will then be invited to submit full proposals on which final funding decisions will be made by April 1, 1991.

Those needing information regarding project eligibility or a copy of the pre-proposal guidelines, may contact Reeves at 646-1194.

The USGS Request for Proposals for the nationally competitive Section 105 program also may be obtained from WRRI. Reeves advises researchers not to use an old announcement for guidance as this year's RFP contains much new information.

Continued on page 7

El Paso water suit (continued)

During Harris's tenure at WRRI, the El Paso water suit was the "big issue." She attended almost every single day of the hearings. Then she devoted a year to distilling information from the hearings and writings. During the two-year lapse she did some historical research for other projects that changed her perspective.

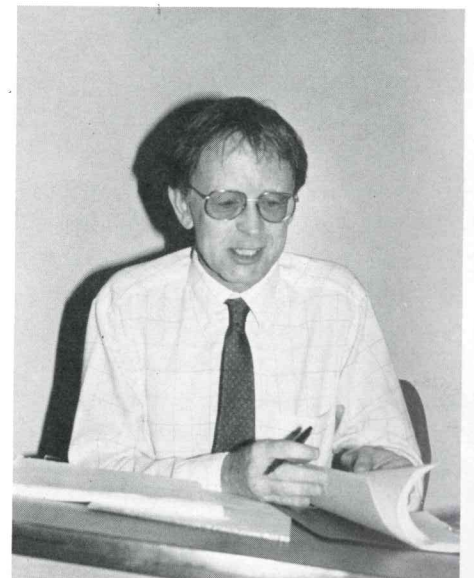
"One of the things I've noticed is that Las Cruces and El Paso have a very common history as cities, but very different histories as states," she reports. Harris says she has gathered the impression that El Paso feels pained over the suit. "But," she says, "the water laws of Texas and New Mexico are very, very different and that's the crux of this suit."

The title, *Whose Water Is It Anyway?* reflects the dilemma of those involved in the long dispute. "After I finished writing the book, I

still don't know how they are going to come up with a decision," says Harris, although she realizes there are others who disagree.

"We always have the same amount of water, just more people," Harris reflects, noting the tremendous development of El Paso in recent years and Las Cruces's equally rapid growth with its 27 percent population increase since 1980. She says a recent article in *Time* magazine on water scarcity pointed out that there is no alternative to water. "That's the problem here," Harris laments. "A recent report says eventually El Paso will come back here for water. The situation between Las Cruces and El Paso hasn't really changed."

Whose Water Is It Anyway? will be available in October from Arroyo Press, P.O. Box 4333, Las Cruces, NM 88003. It will also be for sale in local bookstores.



El Paso redux: Above left, late State Engineer Steve Reynolds, who served as a hearing officer in the case, makes a point during one of the hearings. Above right is El Paso's engineering consultant, Lee Wilson, looking up figures to document his testimony.

Photos by Linda G. Harris

New USGS reports

National Water Summary now available

New Mexico residents have withdrawn about 3.3 billion gallons of fresh water per day from aquifers and water courses in recent years, according to the New Mexico section of the latest *National Water Summary* published by the U.S. Geological Survey.

The *National Water Summary, 1987—Hydrologic Events and Water Supply and Use* (USGS Water Supply Paper 2350) is now available for \$31 from the U.S. Geological Survey, Books and Open-File Reports, Federal Center, Box 25425, Denver, CO 80225-0425. It presents information on water withdrawals by river basin, aquifer, and county. It also provides a comprehensive interpretation of the source, use, and disposition of fresh water in the U.S. for five major use categories:

- public supply
- domestic and commercial
- industrial and mining
- thermoelectric power
- agricultural

Single copies of the New Mexico section of the report are available from the District Chief, USGS, 4501 Indian School Rd., N.E., Suite 200, Albuquerque, NM 87110-3929.

Also available from the USGS Denver office are three new reports pertaining to New Mexico:

Lithology of basin-fill deposits in the Albuquerque-Belen Basin, New Mexico (Water-Resources Investigations Report 89-4162) by C. A. Kaehler describes and categorizes the lithology of basin-fill deposits in the Albuquerque-Belen Basin using drillers' logs of sediment samples from 128 holes and borehole-geophysical logs of 61 wells. Cost — \$13.25, paper; \$6.25, microfiche.

Geohydrology and simulation of ground-water flow in the Mesilla Basin, Dona Ana County, New Mexico, and El Paso County, Texas (Open File Report 88-305) by Peter Frenzel and C. A. Kaehler, with a section on water quality and geochemistry authored by Scott Anderholm, was part of a study of the intermountain basins in the southwest which relates river and drain flows, irrigation, and mountain-front recharge to ground-water storage and pumpage. This computer model study concluded about 80 percent of ground water withdrawn for municipal and industrial use in the Mesilla Basin during the 1970s may have come from the Rio Grande.

Base-flow investigation on the Sacramento River, September 25, 1985, near Sunspot, Otero County, New Mexico (Open-File Report 89-239) by Clint Nagel was conducted by the USGS in cooperation with the City of Alamogordo on the Sacramento River drainage basin. The base-flow investigation consisted of a series of discharge measurements and observations during low-flow conditions on all flow of the Sacramento River and its tributaries. Specific conductance and water temperature were measured concurrently at the discharge measurement sites.

No prices were available yet for the last two reports as the *Divining Rod* went to press.

**Register for the 35th
Annual New Mexico Water
Conference on page 11.**

El Paso company seeks saline

America's love for jeans with that "lived-in" look has created a garment-finishing industry consuming six million gallons of water a day in the desert city of El Paso. One of El Paso's largest garment finishers, Economy Laundry, is looking to brackish water in the Hueco Bolson east of El Paso to help fill its 320,000-gallon-a-day water bill. Economy is building a new plant to make use of the saline water located about 200 feet below the ground's surface.

After drilling the wells, the water which is unusable except for industrial uses, will be free except for the electricity needed to pump it and chemicals necessary to soften the water. Although the brackish water may save the laundry money (its current water bills are approximately \$18,000 a month), according to the local office of the Texas Water Commission, Economy Laundry President Cesar Viramontes is very concerned about conserving El Paso's limited water resources.

The plant will be the first to tap the Hueco Bolson's saline supply.

Deadlines (continued)

The 105 program requires at least one dollar of non-federal support for each federal dollar provided. The federal share of the grant may range from \$25,000 to \$175,000, with a total project budget not exceeding \$350,000.

To inquire about possible non-federal matching funds from WRRI, researchers may contact Reeves at 646-1194 or Assistant Director Bob Creel at 646-4337.

McStress—not just another catchy name

McStress isn't what McDonald's employees feel after an especially busy day. It is a simulation model developed by Keith McCree, professor emeritus of the Soil and Crop Sciences Department at Texas A&M University.

The program allows users to simulate plant growth as it is affected by water availability and drought stress. Processes including water stress, the soil/water balance, air temperature, solar irradiance, evaporation, transpiration, energy balances, photosynthesis, carbon balances, biomass growth, rates of new leaf production, and others can be calculated. McCree also developed a hypercard application, **Exploring Crop Physics**, that separates the individual components of the McStress model.

For more information, contact McCree at the Soil and Crop Sciences Department, Texas A&M University, College Station, TX 77843-2474, (409) 845-3041.

-New Waves, Texas Water Resources Institute

It's not cheap being green

Peter Grogan, a columnist for the waste recycling journal, *Biocycle*, reported in the July issue that during the recent drought, some Californians were dyeing their shriveling lawns green. The dye jobs reportedly cost about \$45 and last three weeks.

Grogan also observed that "our nation's lawns receive on average, more pesticide and herbicide per acre than just about any crop grown in this country."

Cascade air stripping (continued)

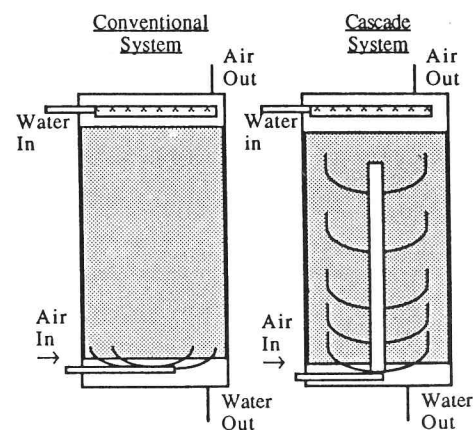
that built commercially, the tower would cost three times as much. For the field test, the cascade process was operated continuously for three weeks. Khandan says it was very successful cleaning up contaminated water. He had designed it to process 300 gallons of water per minute. However during field tests, it processed 400 gallons per minute, reducing levels of trichlorethylene (TCE) from about 500 ppb down to 10 ppb, satisfying the limits enforced by the Environmental Improvement Division.

With the successful field test, the future looks good for cascade air stripping. In New Mexico, there may be many opportunities to use the process since there have been 200 underground storage tanks reported leaking in the state. In Bernalillo County, for example, 41 leaks have been identified; 28 of these have contaminated the underlying aquifer. These underground tanks leak the same organic chemicals that air stripping can remove. In Tatum, NM, several wells were taken out of service recently, following contamination by low-volatile petrochemicals. A cascade system is being designed for cleaning this drinking water source.

Khandan says that several features of the cascade system are highly significant due to current standards and regulations controlling treatment levels and tower heights for conventional air stripping systems. As a case study he tells of a water utility in New York which lost about a third of its 380 wells due to contamination by a common volatile organic chemical. Conventional air-stripping was considered as the treatment method, but was ruled out because the excessive

tower height of ten meters violated the county's zoning code. Also, the air stripping process could not consistently reduce the concentration of the chemical to the acceptable limit. An activated carbon adsorption system was selected as the next best option for cleanup at a cost of \$250,000 per well plus operational costs for carbon replacement. A preliminary cascade system design showed that it could have met the zoning codes and the treatment goals, with a 50 percent savings in costs.

As with conventional air stripping, there is a potential problem with the gases released once the contaminant has volatilized. Currently most states do not require that these "off-gases" be cleaned of the chemicals, but such cleaning could be mandated in the future. However, a granular activated carbon system could be used to adsorb the chemicals before this gas is released. The adsorption process is faster in the gas phase than in the liquid phase, so a cascade air stripper plus off-gas treatment is still expected to be more economical than a carbon adsorption system.



Conventional v. cascade air-stripping systems

Upcoming conferences . . .

There is a call for papers and exhibitors for an *International Seminar on Efficient Water Use* to be held in Mexico City October 21-25, 1991. For more information, contact the International Water Resources, University of Illinois, 205 North Mathews Avenue, Urbana, IL 61801; phone (217) 333-0536; fax (217) 333-8046. The seminar is being organized by Mexico's National Water Commission, the Mexican Institute of Water Technology and the International Water Resources Association.

The Texas Water Resources Institute at Texas A&M University, Texas Tech University's Water Resources Center, and the High Plains Underground Water Conservation District No. 1, will host the *23rd Water for Texas Conference* in Lubbock, December 5-6. Sessions will deal with non-point source pollution, pesticides in urban environments, agricultural nutrient management, and pesticide management. For details, call the Water Resources Center at (806) 742-3597.

On October 29-31, 1990, the Watershed Management Council and the University of California Water Resources Center are sponsoring *California Watersheds at the Urban Interface* in Ontario, CA. For more information call the Water Resources Center at (714) 787-4327.

The 1991 *Colorado Water Engineering and Management Conference* is tentatively scheduled for February 27-28, 1991. Conference topics include water management by exchanges, banking, and conjunctive use; flood and stormwater management; urban water supply; drought planning; groundwater management; climatic issues; and agricultural

water management. For details, contact the Water Resources Research Institute, Colorado State University, Fort Collins, CO 80523; phone (303) 491-6308; fax (303) 491-2293.

The Irrigation Association and the American Society of Agricultural Engineers are sponsoring *Visions of the Future* October 28-November 1, 1990 at the Civic Plaza, Phoenix, AZ. It will include an exposition symposium. The USDA's Agricultural Research Service will present its B.Y. Morrison Lecturer for 1990 at the keynote session October 29. For more information, call the IA at (703) 524-1200.

The *Fifth Annual Water Marketing Conference: Moving From Theory to Practice* will be held November 15-16, 1990 in Denver, CO. Contact the University of Denver College of Law, 7039 E. 18th Avenue, Denver, CO 80220; (303) 871-6118 for particulars.

Drought could mean we'll owe Texas water

If the drought continues through 1991, New Mexico could owe Texas a water repayment under the Pecos River Compact, a State Engineer Office representative told the legislature's interim Committee on Energy, Natural Resources, and Extractive Industries in July. The committee was told New Mexico should develop plans for short-fall years and to assure the Pecos's flows will meet the state's annual obligation to Texas. These plans could include significantly reducing water use in the basin or importing large quantities of water from another basin.

MWRA (continued)

The MWRA planning committee also sought input from faculty and administrators at New Mexico Tech and New Mexico State University. Tech and NMSU personnel expressed interest in using instructional television to offer some of the program's courses to their students and to offer some of their courses to MWRA students at UNM.

There was also some interest in offering the MWRA degree cooperatively, an idea which will be explored further this coming year. "We'd like to share this program, extend its reach," says Minnis. "We think it's timely, innovative, and potentially, through its graduates, of importance to the water future of our state."

For more information, contact Minnis at 277-1001 or Robin Morgan at 277-1965.

Law Review highlights solid waste management

The first issue of the *New Mexico Law Review* for the 1990 academic year (Vol. 21, No. 1) will be dedicated to solid waste management, presented in symposium style. Some of the topics to be addressed include long-range municipal solid waste planning; Indian Nation/state relations; waste reduction, solid waste and public policy; privately owned solid waste landfills in New Mexico; and liability issues.

A one-year subscription to the *Law Review* is \$21; Vol. 21, No. 1 only is \$12. Send check or money order to: New Mexico Law Review, UNM School of Law, 1117 Stanford N.E., Albuquerque, NM 87131.

Used motor oil dwarfs Valdez spill

Recycling used motor oil could greatly reduce water pollution in the U.S. By one estimate there are times when 40 percent of the pollution in our nation's water is old motor oil, containing lead and trace amounts of other toxic metals plus a variety of hydrocarbons, many of which are toxic to aquatic life, even at low concentrations. Pouring oil into the gutter or storm sewer, or letting it leak from your car, is just like dumping it directly into the lake. Recycling used oil does not mean to use it as a fence line weed killer or on dirt driveways because it can soak through the soil, even at landfills. Used oil is not trash, it's toxic waste.

To put the problem into perspective, a single pint of oil can create a glistening slick the size of a football field. A single quart is enough to pollute 250,000 gallons of water. One part oil to one million parts water is detectable to taste and smell. Average estimates indicate 240 million gallons of used crankcase oil find their way into the nation's lakes, rivers and streams each year, 22 times more oil than the Exxon Valdez spilled in Alaska. The nation was outraged at one oil tanker spill, yet lamely accepts the willful disposal of 22 times that much each year.

—Texas Water Commission



Inventory shows improved range conditions in New Mexico

According to Soil Conservation Service State Range Conservationist Lendon Parker, the ecological range condition in New Mexico is better than it has been since the late 1800s. Ecological range condition is a measure of how closely a site's present plant community resembles the potential, or 'climax', plant community of the site. These climax plant communities are relatively stable and in balance with environmental factors, including soils, topography, and climate.

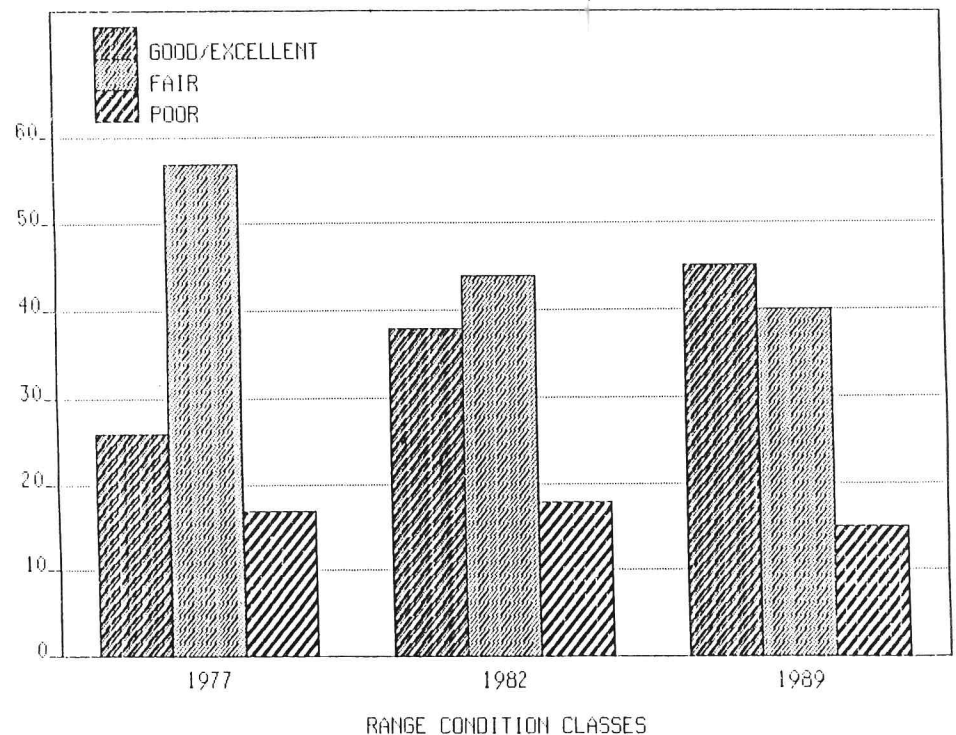
The SCS has inventoried the condition of New Mexico's nonfederal rangelands for several years. According to Parker's data, inventories reveal a trend of rangeland improvement across the state. From 1977 to 1989, the rangeland in excellent and good ecological condition has increased

from 26 percent to 45 percent. Also since 1977, an additional eight million acres of the state's nonfederal rangelands have been managed so well that the plant communities are approaching stable, or climax, condition.

Parker reports, "Improved condition of 45 percent, or nearly 20 million acres, of the state's nonfederal rangeland results in reduced sediment in our streams, rivers, and lakes; improved wildlife habitat; improved and more stable agricultural income; and even extended as well as increased stream flows."

The SCS primarily works with private landowners, providing technical assistance in all phases of conservation.

NEW MEXICO RANGE CONDITION TRENDS



Toward a common goal: Forging water quality partnerships

The finalized conference program will be sent in mid-October to those who have attended recent water conferences. If you have not attended the water conference the past few years and wish to receive a finalized program, write us or call (505) 646-1813.

November 15 - Morning Session 1: Surface Water Quality

- Overview of Federal Water Quality Laws and Regulations
- State Water Quality Laws and Regulations
- The Law as it Relates to Indian Tribes
- Introduction to Surface Water Issues and Conflicts
- Panel Discussion: Clean Rivers and Streams—What does it take? Participants from the All Indian Pueblo Council, the EPA, the Environmental Improvement Division, municipalities, Elephant Butte Irrigation District, the Tontazin Institute, and Los Alamos National Laboratory have

been invited.

November 15 - Afternoon Session 2: Ground Water Quality

- Federal and State Overview of Laws
- What Really is Ground Water and How Does it Behave?
- Where has New Mexico Ground Water Contamination Occurred? What Can Be Done About it?
- Drinking Water Standards
- New Mexico Ground Water Issues and Conflicts
- Panel Discussion: Ground Water Protection and Cleanup for the 90s - Participants from the New Mexico legislature, the Environ-

mental Improvement Division, the EPA, Indian tribes, local governments, and interest groups have been invited.

November 16 - Morning Session 3: The Human Element

- Risk Assessment: How Safe is Safe?
- Stakeholders and Dispute Resolution: Does Anyone Win?
- Costs and Benefits: What is Sensible and Reasonable?
- Panel Discussion: How to Build a Workable Consensus - New Mexico Congressional delegates and Colorado Congressman Ben Nighthorse Campbell have been invited to participate.

35th Annual New Mexico Water Conference Registration Form

Name _____ Affiliation _____

Address _____ Daytime phone number _____

City _____ State _____ Zip _____

Registration fees: Registration including lunch on Thursday and a copy of the proceedings, \$60 before November 5. After that date, please add a late charge of \$15. Student registration is \$20 before November 5; add a \$15 late charge after that date. **Make checks payable to NMWRRI-Water Conference.** Please return form to: NMWRRI Water Conference, Box 30001 - Dept. 3167, Las Cruces, NM 88003.

Registration fee enclosed \$ _____
Late charge enclosed (if applicable) \$ _____
Total \$ _____

Conference participants must make their own hotel reservations by calling the Holiday Inn Pyramid (505) 821-3333. They are holding a block of rooms until October 14.

Organics study completed by Tech team

Laboratory Investigation of Residual Liquid Organics from Spills, Leaks, and the Disposal of Hazardous Wastes in Groundwater (EPA/600/6-90/004) was recently completed by John L. Wilson, Stephen H. Conrad, William R. Mason, William Peplinski, and Edward Hagan of New Mexico Tech. The project was sponsored by the Environmental Protection Agency and the Water Resources Research Institute.

Laboratory Investigation of Residual Liquid Organics describes the migration of organic liquids, essentially immiscible with water, through the subsurface under the influence of capillary, viscous and buoyancy forces. It focuses on the organic liquid that is trapped by capillary forces in the soil matrix.

The researchers found that the spatial distribution and saturation of organic liquid depended upon a variety of factors including:

- fluid properties of interfacial tension, viscosity, and density;
- soil structure and heterogeneity;
- number of fluid phases present; and
- fluid flow rates.

Photomicrographs on a pore scale (many which are included in the report) show the residual organic

liquid appears as blobs, films, rings and wedges of microscopic size depending on these factors. The size, shape, and distribution of the blobs, films, rings, and wedges affect processes which are important when predicting pollution migration and designing aquifer remediation projects including:

- the dissolution of organic liquid in the water phase;
- volatilization into the air phase; and
- adsorption and biodegradation of organic components.

The completion report must be ordered from Publications, U.S. EPA, RSKERL, P.O. Box 1198, Ada, OK 74820.

Corrales project continues

Construction of the second phase of the Corrales flood control project is expected to begin by October 1, 1990. The nearly 6,000-foot-long concrete-lined channel will carry runoff water from the Lomitas Negras Arroyo north of Corrales into the Harvey C. Jones Channel and ultimately to the Rio Grande. The Soil Conservation Service will pay the \$3.10 million construction costs for the project.

Program head sought

The Master of Water Resources Administration program at The University of New Mexico is seeking an academic director.

Qualifications: knowledge of the water resources management field; doctorate in related discipline; experience in graduate teaching, administration, and program development; demonstrated ability to work effectively with faculty, students, university administrators, and professionals in diverse specialty areas.

Responsibilities: coordinate program implementation; teach one or more courses; develop program advertisement, student recruitment and job placement efforts. Tenure track position in appropriate department; rank negotiable.

Submit application and resume to Robin Morgan, Natural Resources Center, Economics Building, The University of New Mexico, Albuquerque, NM 87131. Application deadline: December 31, 1990. Starting date: August 19, 1991.

Deadline for research proposals is near — see page 6 for details.

Tom Bahr, director, New Mexico Water Resources Research Institute
Leslie Blair, editor

the divining rod
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