

divining rod

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Wellhead protection: New Mexico's role in a national program

By Maxine S. Goad and Barbara K. Giesler, New Mexico Environment Department

Wellhead protection objectives

Widespread concern in recent years about the quality of groundwater and of water distributed by public water supply systems has led to a variety of initiatives on the federal, state and local levels, including the Wellhead Protection (WHP) program mandated by the

1986 Federal Safe Drinking Water Act (SDWA) amendments. Although these amendments required each state to develop a program to protect groundwater quality in wellhead areas surrounding public water supply system wells and authorized funding for EPA grants to help states in program development, Congress failed to appropriate money to finance these grants.

New Mexico was one of 26 states to submit WHP programs to the EPA by the June 1989 deadline. After EPA reviewed and commented on New Mexico's WHP submission, the state modified and resubmitted the plan which EPA approved on August 30, 1990. States are to "make every reasonable effort" to implement the WHP

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It's the invasion of the snow geese! Snow geese and other visitors flocked to the Bosque del Apache in 1991. Over 72,000 people visited the Bosque during 1991. During Thanksgiving week when this photo was taken, over 25,000 geese were counted.

More Puerco River information available

In the last issue of the *Divining Rod*, we ran information on a new USGS open-file report, *Historical water-quality data, Puerco River basin, Arizona and New Mexico*. John R. Gray from the USGS office in Reston, VA was kind enough to write to say that there is more information available on the Puerco River basin than we mentioned.

Gray is the former project chief of the USGS study, "Occurrence and Movement of Radionuclides and Other Trace Elements in the Puerco and Lower Little Colorado River Basins, Arizona and New Mexico." Final reports for this project should be published in about a year.

He suggests that those interested in the subject may want to read an interpretative report using pre-1987 data entitled "Radionuclides in the Puerco and Lower Little Colorado River Basins, New Mexico and Arizona, Before 1987", published in USGS Bulletin 1971, *Field Studies of the Radon in Rocks, Soils, and Water* (pages 297-311). He also noted that a paper "Effects of Uranium-Mining Discharges on Water Quality in the Puerco River Basin, Arizona and New Mexico" will likely appear in the *Hydrologic Sciences Journal* this year.

Persons needing additional information on these reports should contact the USGS District Office at 375 S. Euclid, Tucson, Arizona 85719.

**37th Annual
New Mexico
Water Conference
November 5-6, 1992
Taos, NM**

New water course debuted at UNM

One of WRRI's missions is to promote student training. Often classes have resulted from research projects we've helped fund, but it isn't often we are able to provide direct funding for a new class such as Aquatic Ecology/Toxicology offered last fall at the University of New Mexico. A proposal for this class was submitted by Dr. Carleton White of UNM's biology department to receive funding through the Chino Mines Grant Fund administered by WRRI.

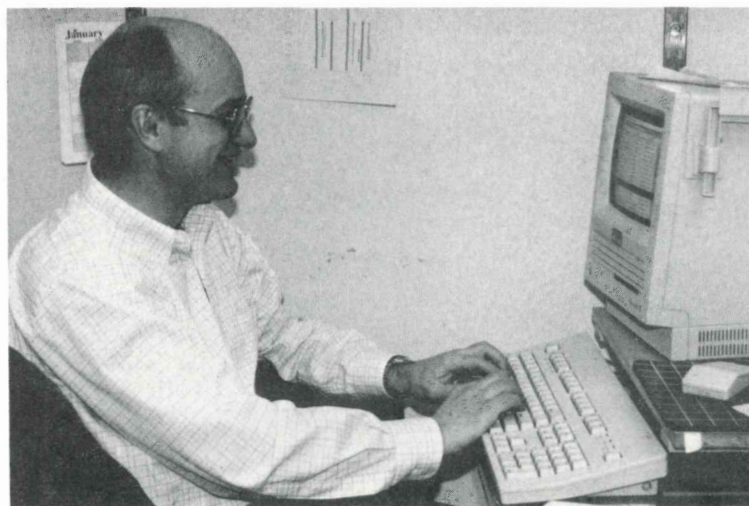
The class was successful according to student evaluations of the course. In fact, one student wrote WRRI a letter regarding the value of the class to her and White's exceptional teaching abilities.

White saw the need for the Aquatic Ecology/Toxicology class in UNM's Master of Water Resources Administration program. Many of the students in the graduate program come from water-related disciplines such as engineering and geology. White recognized a solid foundation in basic biology, ecology, and aquatic systems would give students a more holistic view of systems. He wanted students to

acquire an appreciation for whole systems, not just the technical or geological aspects of a system; to understand, for example, intimate linkages between a stream and the surrounding terrestrial system.

White designed the course to provide non-biology students with the basic biological and ecological concepts and principles that control the fate of inorganic and organic chemicals in the environment. A lab provided hands-on experience in the methods and associated instrumentation used in biological/ecological investigations of water issues. Because communication with lay audiences is an important component in the MWRA program, White also included a communication component in the course which included summarizing readings for a lay audience and a research project to be written as well as delivered orally.

Working with students from various backgrounds is more of a challenge than teaching only biology majors, White admits, but he says he "learned equally if not more from the students."



Dr. Carleton White

Texas AG opinion empowers Water Commission to regulate groundwater

Many Texans have long presumed that the state has no authority to control a landowner's right to use the groundwater underlying his property. On November 4, however, Texas Attorney General Daniel Morales issued an opinion which enables the Texas Water Commission to make and enforce rules and regulations for conserving, protecting, preserving and distributing groundwater.

Section 28.011 of the Texas Water Code provides that the TWC can "make and enforce rules and regulations for conserving, protecting, preserving, and distributing underground, subterranean, and percolating water. . . .", but a 1941 AG opinion held the statute was unconstitutionally vague in that it did not provide adequate standards to guide the water agency. Morales overturned that opinion.

In September, the Texas Water Commission requested an opinion from Morales. Basically, the commission wanted to know whether it could regulate pumpage of the Edwards Aquifer to ensure

water from the aquifer was used beneficially and in a non-wasteful manner. The Edwards Aquifer is the sole source of water for the City of San Antonio, which could be facing a crisis. Commission Chairman John Hall has maintained that TWC would prefer not to regulate ground water at all and that the commission believes "local problems are best solved through local solution."

It will be interesting to see what happens in Central Texas with the Edwards Aquifer. In a state which has basically followed riparian water rights, there is now a lawsuit filed by the Guadalupe-Blanco River Authority in state district court seeking judgement regarding the ownership of the water in the aquifer. GBRA requested the court declare that the aquifer is owned by the State of Texas in trust for the benefit of the public. The TWC and the Texas Parks and Wildlife Department are jointly represented in the suit but have taken no position as to whether the aquifer constitutes state water.

USGS publications look at Socorro County, Bosque del Apache

The following new U.S. Geological Survey publications are available from Books and Open-File Reports, USGS Federal Center, Box 25425, Denver, CO 80225.

Ground-water resources of Socorro County, New Mexico, Water-Resources Investigations Report 89-4083, by F. Eileen Roybal describes the occurrence, availability, and quality of groundwater in Socorro County.

Reconnaissance investigation of water quality, bottom sediment, and biota associated with irrigation drainage in the middle Rio Grande Valley and Bosque del Apache National Wildlife Refuge, New Mexico, 1988-1989, Water-Resources Investigations Report 91-4036, by Kim Ong, Thomas O'Brien and Marc Rucker, indicates that concentrations of most

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Two new groundwater reports hot off the press

WRRI's two newest reports focus on groundwater research completed by New Mexico Tech researchers last year. These are free of charge and may be ordered by calling 505-646-1813.

Report No. 261, *Groundwater quality in pumping wells located near surface water bodies*, is written by John L. Wilson and William R. Linderfelt. Most of this report invokes a two-dimensional conceptualization of aquifer flow, induced infiltration, and capture zones. Questions addressed in the report include: "Under what conditions does induced infiltration take place? What are the contributions of the stream and other sources to the well? How much water is drawn from each source? What are capture zones and related travel times? Where is the water coming from and how long does it take to reach the well? What are the effects of well location and pumping rate, aquifer properties, hydrodynamic dispersion or macrodispersion, time varying pumping rate, parameter uncertainty, etc.?"

Report No. 262, *Field study of multidimensional flow and transport in the vadose zone* by Robert Bowman, Daniel Stephens, Paula Arnet, David Grabka, Rolf I. Schmidt-Peterson, and Ann M. Stark, describes a comprehensive field experiment conducted to determine geologic controls on water flow and solute transport in a heterogeneous vadose zone. The field site was representative of stratified alluvial deposits common throughout the western U.S.

Wellhead protection, continued

program within two years of submitting it to EPA. However, without expanded resources this will be very difficult.

The state has a longstanding program to protect the quality of all groundwater with a total dissolved solids concentration of 10,000 mg/l or less for present or reasonably foreseeable future use. . .

New Mexico's WHP program has two objectives: to protect the state's public water supply systems and to fulfill the SDWA requirement that each state submit to EPA "a State program to protect wellhead areas within their jurisdiction from contaminants which may have any adverse effects on the health of persons." Wellhead protection area (WHPA) is defined to mean "the surface and subsurface area surrounding a water well or wellfield, supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or wellfield."

New Mexico's program to protect public water supply systems from contamination is part of the state's much broader program of aquifer protection. The state has a longstanding program to protect the quality of all groundwater with a total dissolved solids concentration of 10,000 mg/l or less for present or reasonably foreseeable future use, which goes far toward preventing contamination of existing public water systems.

While some aspects of New

Mexico's general aquifer protection program are extremely effective, others are less effective. Therefore, it is wise to have additional precautions in the wellhead areas surrounding public water supply wells. The state has some additional specific provisions for the protection of wellhead areas now in effect. Other provisions and activities are planned, some for the immediate future, depending on the availability of resources.

Required elements of NM WHP program

The New Mexico WHP submission includes each statutorily required program element, summarized below.

Duties of state agencies, local governments and public water supply systems

This section includes a table of existing state and local authorities and the duties of the state and local governmental entities that administer them, and the duties of public water supply systems. Since many entities are involved in the various aquifer and wellhead protection programs, the mechanisms for coordinating these entities are addressed. The principal coordinating mechanism is the Water Quality Control Commission, but there are other active commissions and committees providing coordination.

Delineation of Wellhead Protection Areas (WHPAs)

The first step in delineating WHPAs is to map accurately the locations of public wellheads. The Drinking Water Section of the New Mexico Environment Department's Ground Water Bureau has been working on this for several years and has a database into which information is entered on an ongoing basis. This database now covers

over 2000 water supply sources. After wellheads have been located, the protection area around each should be specified. The site-specific delineation of WHPAs using detailed hydrologic information cannot be done without substantial resources. New Mexico has not yet established such a site-specific program, and to date, simple radii have been used to define WHPAs. For purposes of inventorying potential pollution sources around public wellheads, NMED uses a radius of 1000 feet. Although two sets of statewide regulations specify setback distances from public water supplies (the New Mexico Regulations Governing Water Supplies and the Liquid Waste Disposal Regulations), in many cases it would be desirable to delineate site-specific WHPAs. If resources become available, there are various options that could be pursued by the state and local governments to accomplish this.

Counties and municipalities have extensive authority to institute measures to protect groundwater and wellhead areas, but most have not taken full advantage of this authority.

Identification of potential anthropogenic sources of contaminants within WHPAs

New Mexico is approaching the identification of potential pollution sources within WHPAs in two ways. The first is to look at the WHPAs and inventory sources within them. The second is to take computerized lists of pollution sources and correlate them with wellhead locations. For the first,

NMED has implemented a new form to be used when conducting sanitary surveys of public drinking water supply systems. The form includes a detailed system, suitable for computerization, to inventory all present and potential pollution sources within a radius of 1000 feet from water supply sources. This information should prove very useful to local governments in their application of local management methods, such as zoning, to the protection of their water supplies.

The second approach will correlate specialized lists of pollution sources prepared for various purposes with wellhead locations as resources become available. Nineteen such specialized lists are described in the New Mexico WHP program submission.

Management approaches

The principal management approaches described in New Mexico's WHP program include:

- Implementation of statewide control measures, including programs under the Water Quality Act, the Environmental Improvement Act, and others. Most of these aim to protect the quality of the state's groundwaters, whether within or outside of WHPAs.

- Specific requirements in WHPAs found in the Regulations Governing Water Supplies and the Liquid Waste Disposal Regulations.

- Local government activities, which vary greatly across the state. Counties and municipalities have extensive authority to institute measures to protect groundwater and wellhead areas, but most have not taken full advantage of this authority.

- Education and public outreach is basic to public support for groundwater and wellhead programs. NMED has prepared educational materials which are widely

distributed, and the "Water Fair" program contributes to raising public awareness of groundwater issues.

- Technical assistance to local governments is provided by both NMED and the Oil Conservation Division as resources permit.

- A Geographic Information System (GIS) being developed by the state will enhance the effectiveness of management approaches. The work plan will establish a GIS in skeletal form for groundwater media and related programs. It builds upon experience, software and hardware acquired in a previous pilot project. A GIS workstation will be set up and a core groundwater media staff person assigned. A departmental groundwater quality data working group will be created, and a groundwater media users training program will be developed. At the conclusion of the project in September 1992, the department will be able to assess its groundwater databases. Sophisticated GIS applications should be possible in future proposals.

Contingency plans in the event of well contamination

New Mexico has several short- and long-term approaches to contamination of public water supply wells. These include water delivery in tank trucks by the National Guard, loan and grant money under the New Mexico Rural Infrastructure Act and the New Mexico Community Block Grants, and emergency procedures under the Federal Superfund Act.

New wells

New wells must comply with all provisions of the Regulations Governing Water Supplies and all other applicable requirements.

Public participation

The state has active public participation in the development of its

environmental protection programs, including public notice and public hearings. Notice of the proposed WHP program was published statewide in April 1989, and a public hearing was held in Santa Fe on May 24, 1989. The program submitted to EPA in June 1989 and the modified program submitted in August 1990 incorporated written and verbal comments received pursuant to the public hearing.

At least two cities in New Mexico have established WHP programs or have applied for grants to establish a program. The City of Santa Fe has established a program which consists of two districts. The first encompasses a 1000-foot circle around each of the eight municipal wells. District 2 extends throughout the city and beyond, to extra-territorial limit of municipal jurisdiction (for water wells, five miles). Espanola has applied for grants and has begun a community participation project.

Copies of New Mexico's WHP program can be examined at the NMED Ground Water Protection and Remediation Bureau, Runnels Building, Santa Fe. Questions should be directed to Jerry Lowance at 827-0166 or Barbara Giesler at 827-2732.

USGS reports, continued

chemicals that are potentially harmful to human health or wildlife were within acceptable limits established for drinking water supplies and wildlife use within the study area. This was one of eleven reconnaissance investigations begun in 1988 as part of a Department of Interior program to identify the nature and extent of irrigation-induced water quality problems that might exist in the western U.S.

Conservation pact to help save California water

By the end of 1991, dozens of California cities and several public interest groups had signed a unique agreement called the "Memorandum of Understanding Regarding Urban Water Conservation." The pact commits the signatories to a multi-million dollar effort to reduce water consumption—possibly to the tune of 500,000 acre-feet by the year 2000 and 1 million acre-feet by 2010.

The heart of the conservation program is a series of 16 Best Management Practices including conservation pricing, water audits for the interior and exterior of homes, public information campaigns, school education programs, commercial/industrial conservation programs, and new and retrofit plumbing programs.

Focus, Metropolitan Water District of Southern California

New water game unveiled

In lieu of Nintendo, maybe you can get your kids to play "To the Last Drop," a board-game designed for elementary school students. Each player is given 100,000 "Waterbucks" (gallons) at the start of the game. As players land on water conservation and water trivia spots, "waterbucks" are gained or lost as players answer water-related questions.

Developed by two Indiana elementary school science teachers, the game is available from the Cooperative Extension Service at Purdue University for \$10 (301 S. 2nd St., Lafayette, IN 47905-1092).

Agricultural producers may get help from innovative pesticide technology

By Marsha Duttie, Cooperative Extension Service, NMSU

Many agriculturalists are predicting the downfall of American agriculture with so many pesticides being discontinued, voluntarily withdrawn because of bad press, or simply not re-registered due to the high cost of testing and evaluation. New methods are on the horizon, however, that may help farmers cope with changes in consumer attitudes.

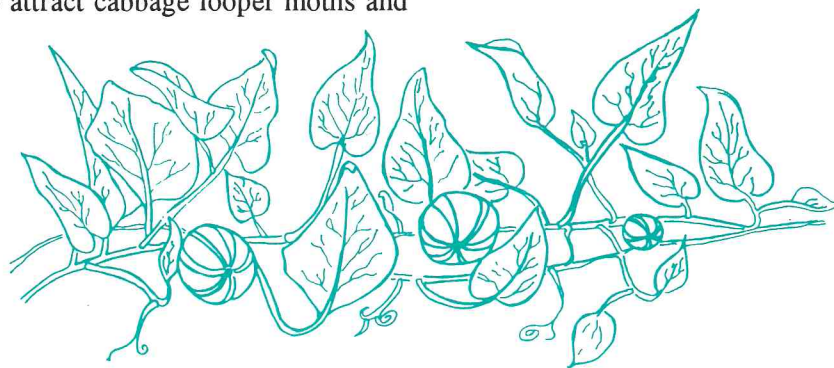
Researchers with the USDA and Texas Agricultural Extension Service are testing an insecticide-laced bait made from the root of the buffalo gourd, which is common in New Mexico and South Texas. The bait stimulates feeding of the adult beetle of corn rootworm and the beetles can get a toxic dose in less than two minutes in some cases. The bait is sticky enough to cling to corn leaves which restricts the movement of the insecticide. But the real benefit to the farmer and to the environment is that the amount of insecticide used is reduced by as much as 98%.

Two other new technologies are more high tech than buffalo gourds. In one study, entomologist Peter Landolt and chemist Robert Heath have developed a system which uses a phony flower with synthetic scent to attract cabbage looper moths and

induce them to feed on a sugar solution laced with insecticide. Because the scent attracts the insects to a confined area, the insecticide doesn't need to be sprayed over an entire field, and the effect on beneficial insects is minimal.


The other high tech development allows controlled release of the active ingredient in a pesticide. The key is a temperature sensitive polymer that, below a predetermined temperature protects the chemical and keeps it inactive. A sufficient rise in temperature triggers the release of the active ingredient. Because the large molecule does not move easily in the environment, time of application is less critical. The large molecule also reduces losses to degradation, so that less chemical may be applied in the long run.


The down side to this promising new technology is that developing the technology for commercial use is time-consuming and expensive. However, if pesticides continue to be an option in a farm management strategy, it will be because agriculturists supported innovative research and adopted the new methods.





The lowly buffalo gourd may be used to help reduce insecticide use.

Conferences, symposia, etc.

 A national meeting on water quality standards on Indian lands will be held March 25-26, 1992 at the Denver Marriot Center. It is intended to help tribes begin the process of setting their own water quality standards. Call Chris Lehnertz at (303) 293-1656 for information.

 **Ground Water: The Problem and Some Solutions** - To be held April 2-3, 1992 in Beaumont, TX, sponsored by the eight-university consortium, The Gulf Coast Hazardous Substance Research Center. Topics include "Factors Influencing the Transport and Fate of Contaminants in the Subsurface;" "In-Situ Bioremediation of Aquifers Containing Polynuclear Aromatic Hydrocarbons;" and "Fundamentals of Subsurface Microbial Ecology." For more information contact R. Warren, (301) 982-9500.

 **Detention/Retention in Urban Surface Water Management** - One-day seminar to be held in Sacramento, CA on April 10, 1992, focusing on flood control ideas, analysis, and planning and design methodologies at a basic to intermediate level. For more information contact American Society of Civil Engineers, (212) 705-7668.

 **Subsurface Restoration Conference: 3rd International Conference on Ground Water Quality Research** - June 21-24, 1992, Dallas, TX. Conference topics include regulatory requirements, subsurface hydrogeology, contaminant immobilization and containment, and technologies for containment and recovery. For more information contact Susan McSpadden, Environmental Science and Engineering Dept., Rice University, P.O. Box 1892, Houston, TX 77251.

Hydrologic modeling and drainage criteria short course offered at UNM

March 26-27 and April 16-17, 1992, a short course in hydrologic modeling and drainage criteria using the AHYMO program will be offered at the University of New Mexico.

Taught by Clifford Anderson, drainage engineer for the Albuquerque Metropolitan Arroyo Flood Control Authority, and Richard Heggen, associate professor of Civil

Engineering at UNM, the course will focus on Southwest hydrology. It includes case studies and hands-on activities. A copy of the AHYMO program will be provided to each participant. The short course costs \$275 per person. For more information or to register, contact Angela Hannan at 277-6061.

GIS lecture slated

The University of New Mexico's School of Architecture and Planning is hosting a lecture, "Geographic Information Systems: Putting the Technology to Work" by Bruce A. Joffe. Joffe is an executive consultant for PlanGraphics, Inc. The lecture will be held Monday, April 13, at 5:30 p.m. in the SUB theater in the Student Union. The lecture is free and open to the public.

Water Pollution Control Federation gets new name

After 64 years, the Board of Control of the Water Pollution Control Federation voted to change the name of the organization to the Water Environment Federation.

"The purpose of the name change is to solve the problem that our previous name had," said Roger Dolan, WPCF president. "To the outside world, our people came to be seen as 'pollution people'. It was an image issue. Also, in today's world the word 'control' just isn't good enough. We don't control pollution anymore, we eliminate it. That's why we changed."

The Water Environment Federation is a non-profit technical and education organization with 38,000 members. Its mission is to preserve and enhance water quality worldwide. For more information on the Water Environment Federation, contact Nancy Blatt, Water Environment Federation, 601 Wythe St., Alexandria, VA 22314.

Happy 25th Darlene!

WRI Project Coordinator Darlene Reeves recently celebrated her 25th anniversary with New Mexico State University and her 18th anniversary with the institute. Always looking for an excuse to have a party and wanting to honor the co-worker we couldn't live without, WRI staff members threw an anniversary bash for Darlene on February 26. Fifty friends from around the university stopped in to say hello during the reception and then we headed over to the NMSU ceremony honoring employees celebrating 10-40 year anniversaries.

We can't thank you enough for all your hard work, Darlene.



Mrs. H. R. Stucky, Dr. Stucky, Darlene Reeves, and Tom Bahr celebrate Darlene's silver anniversary with NMSU. Dr. Stucky served as institute director from 1963-1971.

Tom Bahr, Director, New Mexico Water Resources Research Institute
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