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Water Current Newsletter

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# Water Current

## UNL Remediation Research Gets NSF/EPSCoR Funding Boost

LINCOLN — Five University of Nebraska-Lincoln (UNL) scientists have been awarded a \$430,000 grant for researching safe methods of cleaning-up munitions contaminated soil and groundwater.

The recent National Science Foundation (NSF) grant is through Nebraska's Experimental Program to Stimulate Competitive Research, or EPSCoR.

The grant helps sustain research that for the past few years has focused on TNT and RDX contamination at the former Nebraska Ordnance Plant near Mead. The plant once made bombs for the Army, but is now on the U.S. Environmental Protection Agency's "Superfund National Priorities List" for cleanup.

Contamination at the site and efforts to counter it, have generated considerable public interest since the problem was first discovered.

The research cluster's proposal, "Environmental Processes for Accelerated Bioremediation of Xenobiotics in Soil and Water," was awarded a two-year, \$430,000 grant from NSF

with \$220,000 in matching funds from EPSCoR.

UNL residue chemist Patrick J. Shea is lead principal investigator for the project. He said their group was "One of only two new research clusters funded in the program" this year.

Shea and colleague Steve Comfort, a soil environmental chemist, are working with a team of researchers to remediate soil and groundwater at the Mead site. They are "Interested in developing innovative, integrated approaches" to restore contaminated sites, Shea said.

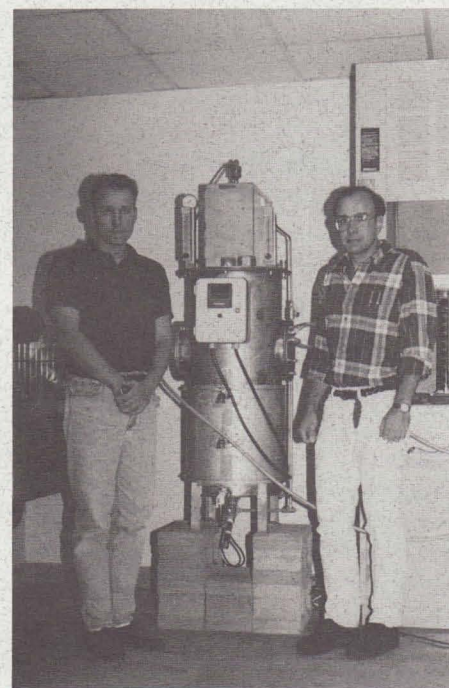
Principal investigators (PIs) in addition to Shea and Comfort are crop physiologist Garald Horst, environmental engineer Tian Zhang and soil microbiologist Rhae Drijber.

Together, their work covers the areas of soil chemistry, microbiology, plant physiology physics, biotechnology, toxicology and engineering.

For several years, Shea and Comfort have collaborated on research focused on remediating soil highly contaminated with munitions compounds such as

TNT and RDX, at the former Nebraska Ordnance Plant near Mead.

The University of Nebraska acquired the 26-



Steve Comfort (left) and Pat Shea display a 60-liter pilot-scale reactor used to suspend soil-water mixtures. The "Very elaborate mixer" is used in remediation research Shea's cluster group recently got an NSF/EPSCoR grant to continue. Photo - Steve Ress.

square-mile site from the Army in 1960. During World War II and the Korean War, more than three million bombs and other munitions-related products were produced there.

See Remediation, Page 3.

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# Implementation Plans Continue for "School of Natural Resources;" New Staff Joins Water Center

## from the DIRECTOR



**Bob G. Volk**

Implementation plans are being developed for a proposed "School of Natural Resources" (SNR) that will be formed from departments and core units within the University of Nebraska's Institute of Agriculture and Natural Resources (IANR). Proposals call for establishing the SNR on July 1, 1997.

Though that doesn't seem far off, the committee meetings now being held are in many ways an extension of informal concept discussions

which began about 30 years ago.

Initially, the SNR is expected to include only the Department of Agricultural Meteorology, the Conservation and Survey Division, Department of Forestry, Fisheries and Wildlife, Nebraska Forest Service, Nebraska Statewide Arboretum and the Water Center/Environmental Programs unit.

Other units or faculty from throughout the university system may later choose to affiliate with the SNR.

Water Center Assistant to the Director Bob Kuzelka is a member of the faculty planning committee that is drafting plans for a proposed vision, mission, organizational structure, program plan, bylaws, policies and other forms of guidance necessary for the school to operate successfully.

Environmental Programs Coordinator Ed Vitzthum is serving on the outreach subcommittee and Extension Assistant Clyde Ogg is on the support/facilities subcommittee.

Darrell Nelson, IANR Interim Associate Vice Chancellor recently said, "The proposed School of Natural Resources will provide a focus for natural resources at UNL and deliver integrated programs that will better meet Nebraska's needs for research information, educational programs and outreach efforts related to the state's natural resources."

SNR proposals include efforts to find funding to build a Natural Resources Complex that would serve as an administrative home for the school and provide additional needed space for some school programs and for personnel from interested federal agencies.

In late October, as the last edition of the "Water Current" was going to press, the Water Center/Environmental Programs unit welcomed Steve Ress as our new Communications Associate. The position had been vacant for a couple of months following Bettina Heinz-Hurst's resignation. She is presently devoting her full attentions to work on a Ph.D in Interpersonal Communications. We are very happy to have Steve aboard and getting up-to-speed on the many activities and projects of the unit.

His background is in community journalism, where he spent 14 years as an award-winning reporter and editor for two weekly newspapers in the Lincoln area. He is also a UNL alumnus and fourth generation Nebraskan.

Steve tells me he always welcomes suggestions, constructive criticism and most of all, your story ideas, so don't hesitate to give him a call at (402) 472-9549.

## Water Current

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## Remediation From Page 1

When it was in operation "It was very common to wash out buildings where the bombs were produced and assembled and that water just drained out of the buildings and into nearby drainage ditches," said Comfort.

The wash water contained residues from explosives and cleaning solvents which ultimately found their way into soil and groundwater beneath the plant.

Cleaning it up is now the responsibility of the EPA and the Army's Corps of Engineers, who have investigated several means of dealing with the problem. One of those calls for incinerating some 8,400 cubic yards of top soil where contamination is the most severe, mostly near the buildings where the bombs were made.

The Army earlier looked at composting the munitions contaminated soil, but have since abandoned the idea, Shea said.

"Right now they're leaning towards incineration as a means of remediation, but that's a process that has some very negative economic, environmental and political stigmas associated with it," he continued.

## Investigative Focus

The research cluster's investigative focus has been away from such potentially harsh and expensive treatment measures. Instead, they've focused on integrated chemical and biological treatment of the soil.

"Our goal is to degrade the toxic compounds to carbon dioxide and water by enhancing the natural degradation process. If we can't do that, then altering the structure of the toxic compounds may help microorganisms present in the soil degrade them more easily," said Comfort.

With the recent NSF/EPSCoR grant, researchers in the cluster will continue efforts to find biological means to detoxify soil and groundwater at the site.

These biological clean-up methods are known as bioremediation.

"Our goal is to increase the understanding of processes governing environmental fate and toxicity of these contaminants and to provide information that can be used to develop cost-effective and environmentally sound remediation strategies for contaminated soil and water," said Shea.

But biological treatments tend to work well only in areas where contamination is relatively low. That has led Comfort and Shea to believe a combination of chemical and biological methods may work best where the soil is the most highly contaminated.

## Research Evaluation

Their research will evaluate the possibilities for using plants and microbial systems to remediate only marginally contaminated soil.

"One of our hopes is that our research will result in relatively simple, easily taught and cost-effective technologies that will transfer to industry to remediate contaminated sites across the country," said Shea.

The group began their research

with a small grant from the U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, NH and got its first significant funding from the Great Plains-Rocky Mountain Hazardous Substance Research Center (HSRC) two years ago.

Individual researchers on the team also have received grants from the National Water Research Institute (NWRI), the NRI competitive grants program and from industry.

Funding of "Simultaneous Transformation of Atrazine and Nitrate in Contaminated Water, Sediment and Soil by Zero-Valent Iron-Promoted Processes" (Zang, Shea and Comforts) was this year's number-two ranked HSRC proposal and will complement the NSF project.

Individual researchers in the cluster also have received recent grants from the National Water Research Institute (NWRI) and NRI and industry grants to continue their work.


Shea and Comfort emphasized that the Water Center/Environmental Programs unit at UNL, with NRI funding support, has been instrumental in advancing this new interdisciplinary research and education program.

# Free!

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# Drought, Climate Change Effects on Aquifer Are Topics for 26th Water Conference

## 1997 Nebraska Water Conference presents

The Great Plains Symposium 1997:  
The Ogallala Aquifer  
"Managing for Drought and Climate  
Change"

March 10-12, 1997  
Burnham Yates Convention Center  
and Cornhusker Hotel  
Lincoln, NE

LINCOLN — It's a resource beneath Nebraska containing nearly five times the water volume of Lake Erie.

The Ogallala Aquifer holds nearly 688 trillion gallons of high quality, easily-accessible groundwater. This makes it one of the United States' single largest sources of groundwater. Managing the effects of drought and climate change upon that resource will be the focus of the 26th Annual Nebraska Water Conference, March 10-12, 1997 at Lincoln's Burnham Yates Convention Center and Cornhusker Hotel.

During the two-day symposium, speakers will address the aquifer itself, as well as how drought and changing climate affect it, as well as those dependent upon it.

The conference will look at drought from the perspective of it being a normal part of Great Plains climate, along with its consequences to agriculture, the economy and society. During the conference's opening session on Tuesday, March 11, hydrogeologist Jim Goeke of UNL's Conservation and Survey Division analyzes more than a thousand years of climate change in the High Plains region. He'll also explain why increasing irrigation from the aquifer doesn't appear to be depleting it.

Don Wilhite, director of UNL's International Drought Information

Center and National Drought Mitigation Center (NDMC) will continue with a historical perspective of weather patterns in the Great Plains region over the past hundred years. Wilhite will pay particular attention to the environmental and economic impacts of that pattern.

"Oftentimes we focus on the droughts of the 1930s and 1950s and fail to look at those events as part of an overall pattern," he said.

Wilhite's address will look at what future patterns may bring and whether society is becoming more vulnerable to the effects of drought.

Two follow-on presentations will build on Wilhite's examination of Great Plains drought and climate.

Bill Easterling, director of the Great Plains Regional Center for Global Environmental Change, will give conference attendees a feel for what climatic changes he thinks we may see in the future, as well as what we've learned from the past.

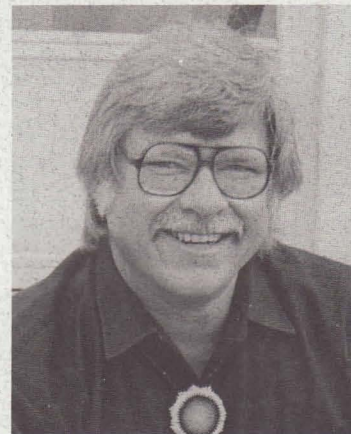
He'll examine how agriculture may adapt to those changes and what effects a decline in the aquifer's water level may have.

Dennis Fisher will then address what drought and possible changes in weather patterns, water levels and climate could mean to the economy and society in general. Fisher is an economist for the Texas Agricultural Extension Service at Texas A&M University.

Norm Rosenberg, Batelle, Pacific Northwest Labs will deliver the conference challenge. This initial session of the conference will be moderated by Susan Seacrest, President of the Groundwater Foundation.

Sessions two and three of the conference, on the afternoon of Tuesday, March 11, will address management responses and sustainable management of the aquifer in a series of concurrent groups.

A highlight of the conference is Tuesday night's presentation of the



Roger Welsch

annual pioneer and progress awards by the Nebraska Water Conference Council, and the Groundwater Foundation's awarding of the Maurice Kremer Groundwater Achievement award.

The awards banquet speaker will be none other than author and folk humorist Roger Welsch. Welsch is probably best known to the nation as the overalled humorist and Nebraska's chief promoter on CBS television's "Sunday Morning."

Nebraska Governor E. Benjamin Nelson has been invited to speak at Wednesday's breakfast.

Group session perspectives by state representatives will follow. Other presentors will look at the aquifer's management challenges from the ag producer, manufacturer, food processor and governmental sectors.

For more information on the conference, contact: Bob Kuzelka, Water Center/Environmental Programs, 103 Natural Resources Hall, University of Nebraska, Lincoln, NE 68583-0844 or phone (402) 472-3305.

The conference is sponsored by the Nebraska Water Conference Council, the Water Center/Environmental Programs unit and Conservation and Survey Division, UNL, and the Nebraska Department of Water Resources.



## JANUARY

**Jan. 14-16:** First Annual Conference on Natural Resources of the Missouri River Basin, Columbia, MO. General registration continues after Dec. 15, 1996. Pam Haverland, Missouri River Conference, P.O. Box 10267, Columbia, MO. 65205-4005 or phone (573) 876-1841.

**Jan. 15:** Water Resources Seminar Series. "The Climate of Nebraska," Ken Dewey, UNL Department of Geography.

**Jan. 22:** Water Resources Seminar Series. "Drought: A normal Part of Nebraska's Climate?", Don Wilhite and Mike Hayes, National Drought Mitigation Center and UNL Department of Agricultural Meteorology.

**Jan. 29:** Water Resources Seminar Series. "Monitoring and Detecting Drought: The HPCC's Automated Weather Data Network," Ken Hubbard, High Plains Climate Center and UNL Department of Agricultural Meteorology.

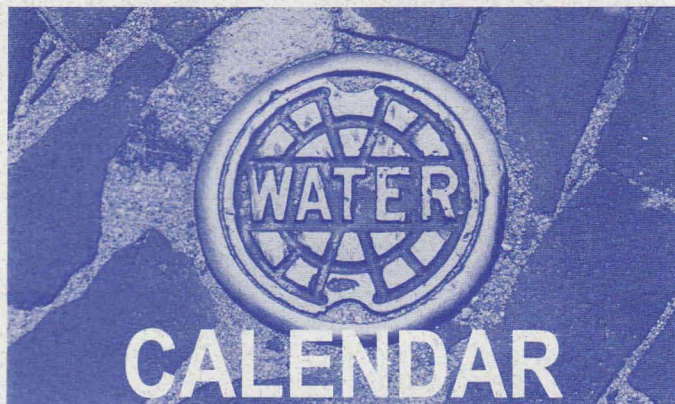
## FEBRUARY

**Feb. 5:** Water Resources Seminar Series. "Monitoring Drought From Space: The Role of Satellites," Don Rundquist, CALMIT, UNL.

**Feb. 12:** Water Resources Seminar Series. "Drought, Water and Agricultural Development: The Expansion of Irrigation in Nebraska," Dean Eisenhauer, Biological Systems Engineering.

**Feb. 12:** North Platte River Basin Water Policy Conference.

**Feb. 19:** Water Resources Seminar Series. "Factors Influencing Future Demand for Water. Ray Supalla, Department of Agricultural Economics.



**Feb. 18-19:** 1997 Platte River Basin Ecosystem Symposium. Holiday Inn, Kearney. Phone (402) 472-1638.

**Feb. 26:** Water Resources Seminar Series. "Crop Management: Challenges of Nebraska's Variable Climate."

**Feb. 25-27:** "Working with Wetlands and Wildlife." Atlanta, GA. Phone (301) 588-8994.

## MARCH

**Mar. 5:** Water Resources Seminar Series. "Drought Management on Range and Pastureland." Pat Reece, NU Panhandle Research and Extension Center.

**Mar. 10-12:** Annual Nebraska Water Conference and the Great Plains Symposium: The Ogallala Aquifer. "Managing for Drought and Climate Change," Lincoln. Phone (402) 472-3305.

**Mar. 19:** Water Resources Seminar Series. "The Effects of Drought on the Management of Natural Resources." John Turnbull, Upper Big Blue Natural Resources District; and Dayle Williamson, Nebraska Natural Resources Commission.

**Mar. 25:** Children's Groundwater Festival, Grand Island. Sponsored by The Groundwater Foundation, Lincoln. Phone 1-800-858-4844.

**Mar. 25-26:** Annual Mississippi Water Resources Conference. Ramada Inn Southwest, Jackson, MS. Phone (601) 325-7356.

**Mar. 27:** Earth Wellness Festival. Southeast Community College, Lincoln. Phone Arlene Hanna or Soni Erickson, (402) 441-7180.

## APRIL

**April 2:** Water Resources Seminar Series: Drought Management in the Missouri River Basin: "Resolving Conflicts Between Upstream and Downstream Users." Panel: John Ferrell, Corps of Engineers, Omaha and John Guhin, South Dakota attorney

general's office.

**April 9:** Water Resources Seminar Series: Can We Mitigate the Effects of Drought? Don Wilhite, director of the National Drought Mitigation Center, UNL.

**April 16:** Water Resources Seminar Series: The Science of Climate Change: "Certainties and Uncertainties." Bill Easterling, director of the Great Plains Center for Global Environmental Change and Department of Agricultural Meteorology, UNL.

**April 23:** Water Resources Seminar Series: The Effects of Weather Cycles and Climate Change on Prairie Wetlandscapes. Carter Johnson, Department of Horticulture, Forestry, Landscape and Parks, South Dakota State University, Brookings.

**April 30:** Water Resources Seminar Series: Planning for an Uncertain Climate: "Policy Implications." Rosina Bierbaum, Directorate for Environment, White House Office of Science and Technology Policy, Washington, D.C.

### "WHEN THE RAINS DON'T COME" 1997 WATER RESOURCES SEMINAR

Weekly lectures Jan. 15-April 30  
(except March 26)

on Wednesdays at 3 p.m., L.W. Chase Hall  
UNL East Campus, Lincoln  
Phone (402) 472-3305 for more information.

For satellite downlink locations and  
college credit information  
Phone 1-800-755-7765





# Water News Briefs

## NWRI Meets in Lincoln; New Projects Recommended for Funding by Board

Forty-six members of the National Water Research Institute (NWRI) Research Advisory Board met in Lincoln for their annual fall meeting Oct. 18-20. Members spent most of the weekend evaluating projects already in progress and recommending to NWRI's Board of Directors new projects for funding during the coming cycle.

New projects funded by the NWRI at the University of Nebraska-Lincoln (UNL) were "Remediation of Atrazine-Contaminated Water: Column Tests of Enhanced Degradation by Using Zero-Valent Iron," by Zongwei Cai, Water Center/Environmental Programs; "Applications of Abiotic Treatments for Remediating Munitions-Contaminated Soil: Pilot-Scale Demonstrations," Steve Comfort, Agronomy; "Remediation of Nitrate-Contaminated Water by Sulfur-Limestone Autotrophic Denitrification," Tian Zhang, Civil Engineering (University of Nebraska-Omaha); "Activated Carbon Treatment of s-Triazines and their Metabolites Effect of NOM Fouling," Bruce Dvorak, Civil Engineering and David Hage, Chemistry; and "Half-Life Determinations of Trichloroethylene Intermediates during Intrinsic Remediation, Mary Exner, Conservation and Survey and Daniel Snow, Water Center/Environmental Programs.

Each of the projects was funded for two-years. Funding of the five projects combined was \$200,000. Most grants are contingent on funding sources capable of providing a

match and the combined amount was available for competitive water research throughout the University of Nebraska system.

UNL professors recently completing NWRI-funded projects also presented their research results. Presentations were made by Vitaly Zlotnik (Geology, "A Dipole Method of Field Measurement of Transport Parameters in Contaminated Aquifers"), Steve Comfort (Agronomy, "Remediating RDX and HMX Contaminated Soil and Water Using Chemical Pretreatments"), David Baltensperger (Panhandle Research and Extension Center-Scottsbluff, "Evaluation of New Techniques for Managing Anitrogen in Crops that follow Sugarbeets"), Kyle Hoagland (Forestry, Fisheries and Wildlife, "Effects of Atrazine Metabolites on Freshwater Algae"), Norman Klocke (West Central Research and Extension Center - North Platte, "Irrigation Management Strategies to Reduce Chemical Leaching Potential and Sustain Economic Return") and Richard Ferguson (South Central Research and Extension - Clay Center, "Conservation Tillage Effects on Denitrification from Irrigated Corn").

The NWRI is based in Fountain Valley, CA. The Lincoln Research Advisory Board meetings were hosted by Dr. Roy F. Spalding, associate director of the Water Center/Environmental Programs and director of the Water Sciences Laboratory at UNL.

A featured speaker at the event was Ron Bishop, manager of the Central Platte Natural Resources District.

Bishop discussed evaluations of groundwater nitrate problems from relatively low levels in the early 1960's to average levels by the late 1980's and measures the NRD has taken to counter the problem in the last 10 years.

Bishop said that better nutrient management, including budgeting

fertilizer applications to crops, has reversed the upward trend in nitrate contamination of groundwater in the district.

He also discussed the NRD's charge in surface water quality and quantity issues.

## Slide Sets Available

Reference notebooks entitled "Understanding Pesticides and Water Quality in Nebraska" are available at cooperative extension centers within the University of Nebraska system.

The notebook, according to Dr. Thomas G. Franti, provides reference material on the physical and chemical relationships between pesticide use and groundwater and surface water quality, and best management practices that can be used to protect water resources.

Included in the notebook are two new publications: "Pesticide Runoff and Water Quality in Nebraska" (EC96-143) and "Agricultural Management Practices to Reduce Atrazine in Surface Water" (G96-1299).

The slide set contains a narrative explaining each slide so they can be used by educators to reach diverse audiences, Franti said.

For additional information and availability of the materials, contact Franti at (402) 472-9872 or Dr. Steve Comfort at (402) 472-1502 at the University of Nebraska-Lincoln, or Dr. Fred W. Roeth at the South Central Research and Extension Center in Clay Center at (402) 762-4438.

## National Drinking Water Video Conference

The League of Women Voters Education Fund plans a national video conference on Mar. 19, 1997 entitled "Tools for Drinking Water Protection."

The conference is designed to be a



catalyst for assembling community leaders, planners, business leaders, water officials and the public to develop workable drinking water protection plans for their area.

Organizers need your help to arrange local downlink sites and in facilitating local meeting sites, however.

Information on arranging for a downlink and planning a local workshop is available from the Water Resources Education Network Project (WREN) Resource Center in Harrisburg, PA by phoning 1-800-692-7281. A conference homepage on the Internet can be found at <http://www.drinkingwater.org>. That address can be used to address questions to presenters before, during and after the conference, organizers said.

If you plan a downlink site, contact the WREN Resource Center as soon as possible.

Source: "Water Policy News," a newsletter of the League of Women Voters PA.

## Conference Dedicated to Longest River

The First Annual Conference on Natural Resources of the Missouri River Basin will be held January 14-16, 1997 in Columbia, MO.

The conference is an opportunity for researchers, resource managers, groups interested in the river and members of the public at-large to come together and address issues concerning our nation's longest river. There will be information exchanges on the stewardship, ecology and management of the Missouri River mainstream, floodplain and tributaries and the conference will be the place to be to hear about the latest research and management activities, learn the perspectives of river interest groups and discuss the future of this very unique river system.

The conference is a project of the Lower Missouri River Ecosystem Initiative of 1994 and is being sponsored by the Missouri River Natural

Resources Committee, Missouri River Basin Association, Midwest Science Center U.S. Geological Survey - Biological Resources Division and the Missouri Department of Conservation.

Registration fees are: General \$90, Student with socials \$65, Student without socials \$40, Spouse (includes socials) \$55.

For more information on the conference, contact Pam Haverland at (573) 876-1841 or fax (573) 876-1896.

## Three Lecture at Kearney Well Conference

Three staff members of the University of Nebraska's Water Center/Environmental Programs' Water Sciences Laboratory (WSL) staff spoke at the Nebraska Well Driller's "Conference on Environmental Water Well Sampling and Construction" in Kearney, Oct. 22 and 23.

WSL data manager Patrick Larsen's presentation emphasized the importance of good data management, along with outlining some of the fundamental concepts and methods of data management used at the new pesticide and nitrate data clearinghouse at the WSL.

Larsen's presentation specifically addressed data formats and conversion, database design and ways to

improve the quality of a database.

Mark E. Burbach, WSL field manager and sample coordinator, presented the results of recent WSL research entitled "Case Studies: Irrigation Well Sampling."

Burbach's research focused on the applicability of sampling irrigation wells for determining exposure to nonpoint source agrichemicals. In his presentation, Burbach told those attending that irrigation wells can easily be incorporated into a monitoring program at low cost.

Burbach also demonstrated that in most nonpoint source areas, both nitrate and pesticide concentrations are rapidly stabilized.

Some of his research results have been published in "Water Science and Technology," and the "Journal of Soil and Water Conservation."

Daniel Snow, WSL manager, discussed laboratory methods, including how to choose a method, the consequence of analytical error and different types of commonly-used qualitative and quantitative techniques. He discussed both standard laboratory techniques and hybrid methods.

For more information on the WSL, contact Dr. Roy Spalding, director of the WSL and Associate Director of the Water Center/Environmental Programs at (402) 472-7558 or Steve Ress at (402) 472-9549 (e-mail [sress@unlinfo.unl.edu](mailto:sress@unlinfo.unl.edu)).

## Mailing List Update

We are updating our mailing list. If you have a change of title, name and/or address, or would like to have your name added or removed from the Water Current mailing list, please complete this form. If you know of individuals who might be interested in receiving our publications, please submit their names.

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# Spaldings Speak at Korea's Cheju University

LINCOLN — While most of us were sitting down to Thanksgiving dinners with family and friends, two University of Nebraska-Lincoln (UNL) faculty were sharing their knowledge of groundwater quality issues with students and faculty at South Korea's Cheju National University.

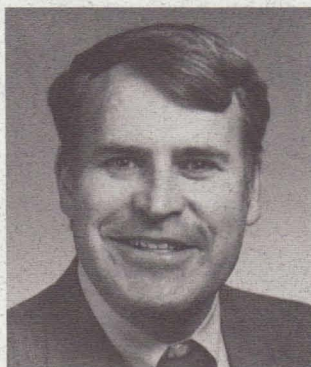
Dr. Roy F. Spalding and wife Mary Exner Spalding accepted invitations to speak at Cheju University from Professor Zang-Kual U, director of that institution's subtropical horticulture research center.

The South Korean national university is located on the subtropical island of Cheju, just southwest of the Korean peninsula.

Dr. U was a visiting professor at UNL's Water Sciences Laboratory, which is under Dr. Spalding's direction, for a total of about two months in 1995 and 1996.

"From his visits during that period, Dr. U learned procedures involved in analyzing nitrate contamination and developed a rapport with the Water Sciences Laboratory.

"So part of what we wanted to accomplish with the trip to Cheju University was to build even closer relations between his research center



Roy Spalding

and UNL's Water Sciences Laboratory," said Spalding.

Dr. Spalding's UNL laboratory has since analyzed several samples of Korean groundwater for nitrate contamination. The samples of Cheju island groundwater were provided by Dr. U.

While at Cheju University, both Spaldings delivered talks relating to nitrate contamination in U.S. groundwater supplies and measures being taken to decrease agrochemical leachate problems beneath agricultural land.

The talks had particular merit since very similar contamination is beginning to occur in Korean crop

production, particularly in groundwater that supplies the subtropical fruit groves and vegetable fields on Cheju island.

In an adjunct visit to South Korea's Doosan National Brewery, Dr. Spalding spoke on applied groundwater research being done by UNL's Water Sciences Laboratory.

The visit to South Korea's largest brewery was arranged by Eui Sik Kim, a researcher at the Doosan Technical Center and former student of Spalding's.

Kim received his MS in Agronomy while attending UNL and volunteered to help host the Spaldings during their visit to South Korea.

Of the trip to Cheju University and meetings with Dr. U, Dr. Spalding said "This was a great opportunity to share information and develop closer relations between our two centers."

In addition to directing UNL's Water Sciences Laboratory, Dr. Spalding is associate director of the IANR's Water Center/Environmental Programs unit.

Mary Exner Spalding is a professor and research chemist for the IANR's Conservation and Survey Division.

**WATER CENTER/ENVIRONMENTAL PROGRAMS**  
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