

NEWS

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"RALLYING BEHIND POLLUTION PREVENTION"

a guest editorial by Joel Hirshhorn, senior associate, Congressional Office of Technology Assessment, reprinted from Environmental Science and Technology

All the recent talk about apparently new global environmental problems—such as acid rain, global warming, garbage disposal, and infectious waste—has not focused national interest on pollution prevention instead of control. America's emphasis on using more and better technology to control pollutants after they have been produced has weakened taboos against producing pollutants. Negotiating safe or acceptable levels of pollution institutionalizes its production and implies approval of it. This pollution control strategy has resulted in environmental policy gridlock rather than a major policy debate on prevention versus control. The upcoming 20th anniversary of Earth Day in 1990 offers an opportunity to put the policy spotlight on pollution prevention.

Calls for more recycling of garbage and toxic waste miss the point that any handling and management of waste is never as safe or beneficial as avoiding the generation of the waste in the first

"The upcoming 20th anniversary of Earth Day in 1990 offers an opportunity to put the policy spotlight on pollution prevention."

place. Discussions of finding substitutes for chlorofluorocarbons (CFCs) to combat stratospheric ozone depletion fail to articulate that that solution is a preventive measure and that control measures used after CFCs are

produced are far less effective. In the debate on how to reduce coal power plant emissions to fight acid rain, the choice between burning dirty coal and controlling air emissions versus using a cleaner raw material or energy source to eliminate them—another pollution prevention tactic—is not fully described. The comparative analyses ignore the fact that the options are different qualitatively.

The most effective, expeditious reductions in pollution have always come from practicing prevention—notably by banning chemicals and products such as DDT, PCBs, and leaded gasoline. Despite concern about severe economic dislocations, there is little evidence that they have occurred. Even now, the replacement of CFCs seems to be moving rapidly. A threat to health or environment does not

have to be predicted for pollution prevention to be practiced. Pollution

"Fearing that technology may not be harnessed fast enough to avert catastrophe and lacking confidence in current environmental programs, Americans are ready for pollution prevention."

prevention can be used successfully after a cause of an environmental threat is identified if preventive measures can be conceived and differentiated from control measures. An emphasis on prevention favors monitoring and analysis to detect problems early, before they become acute.

If pollution prevention became the environmental protection paradigm, then it would be used routinely to respond to environmental threats. Pollution control measures would be seen as inferior and used only in those cases where preventive measures had not yet been identified. Commitment to pollution prevention does not imply a belief that all pollution can be eliminated.

If using pollution prevention were easy, we would have been using it already. Because prevention is not easy to use, we need to make it an issue of public policy debate, to make room for it on crowded agendas, and to acknowledge that we need a better, more cost-effective strategy and paradigm to achieve comprehensive environmental protection. Pollution prevention needs to evolve from a theoretical, philosophical concept sometimes practiced in an atmosphere of crisis to an explicit, commonly valued and applied tool used for all environmental problems.

Two recent actions at the Environmental Protection Agency, following several reports on waste reduction and pollution prevention, signal that this evolution is beginning.

A recent report by EPA's Science Advisory Board concluded: "In addition to the current emphasis on federally mandated controls that are put in place to clean up pollutants after they have been generated, the Agency must develop a strategy that emphasizes the reduction of pollution before it is generated. A strategic shift in emphasis from control and clean-up to anticipation and prevention is absolutely essential to our future physical, environmental, and economic health."

Even before the report was issued, EPA had formed an Office of Pollution Prevention. Several bills introduced in Congress proposed high status for such an office; however, funding for the office is low.

Now, the challenge is to build nationwide support for these initial

steps. If public and private resources shift from pollution control to prevention, then we will have more tangible evidence that the prevention paradigm is taking hold. In the coming months there is an historic opportunity for leaders in government, industry, and public interest groups to select pollution prevention as the theme for the 20th anniversary of Earth Day in 1990. Doing so could rekindle the spiritual and moral lift Earth Day gave the nation, firmly plant pollution prevention in the national consciousness, and overcome mere lip service in key institutions. Fearing that technology may not be harnessed fast enough to avert catastrophe and lacking confidence in current environmental programs, Americans are ready for pollution prevention.

PUBLIC HEARINGS ARE SET FOR PROPOSED WATER QUALITY STANDARDS

Committee Recommends Delaying Adoption of Some Standards

An ad hoc committee set up by the Environmental Management Commission (EMC) to review proposed state water quality standards has recommended that the Division of Environmental Management proceed with adoption of most of the new standards. Holding public hearings and considering public comment is the next and last step before regulations are finalized, and public hearings have been scheduled for May.

However, the Ad-hoc Triennial Review Committee also recommended that adoption of new standards for lead, arsenic, chromium, and trihalomethanes be delayed until a careful study of the economic and environmental effects of the standards can be completed. Such an assessment should be presented to the EMC by Dec. 31, 1990, the committee said.

Adoption of new state in-stream water quality standards is mandated by the Federal Clean Water Act. Once North Carolina has adopted the new standards by following the established procedure for writing them into the state's Administrative Code, the standards will be applied to industrial and municipal wastewater treatment plants (WWTP) as the plants' National Pollutant Discharge Elimination System (NPDES) permits come due for renewal. NPDES permits must be renewed every five years. Each WWTP's permit conditions specify the concentrations of regulated pollutants allowable in the plant's discharge.

Those concentrations must be low enough that in-stream standards are not violated when the WWTP effluent is diluted in stream water. Both the size of the stream (in terms of streamflow) and background quality of

the water influence plant permit conditions. (The committee noted that nonpoint source pollution of streams could be significantly affecting their assimilative capacity and should also be considered in the recommended study.)

Municipalities and industries had attacked the proposed state in-stream toxics standards as being unrealistically stringent. A study by a municipalities group had estimated that meeting the standards would require municipal capital investment in more sophisticated wastewater treatment plants on the order of \$800 million to \$2 billion.

The ad hoc committee—composed of two representatives each from business and industry, environmental groups, the Division of Environmental Management (DEM), local governments, and the scientific community—was established to answer a number of technical questions but primarily to determine how many dischargers might have to provide additional treatment to comply with the proposed water quality standards and how much it might cost dischargers to provide that additional treatment.

In its report, the committee said monitoring data indicates that WWTPs treating only domestic wastewater should not have any problem complying with proposed standards, except for lead and chlorinated by-products. This means that of the 2,500 permitted dischargers in the state, roughly 400 (those with "complex" wastewater, which has significant industrial waste components) might be impacted by the proposed toxics standards. However, of that number about half discharge to streams with high enough mean annual flow to provide a dilution ratio of three or greater, and current ambient monitoring data indicates that plants with a dilution ratio of three or greater should have no problem meeting standards. This leaves only 200 dischargers that the committee concluded would probably be impacted by the standards.

After reviewing several estimates of how much it would cost impacted facilities to comply with the proposed standards, the committee concluded that treatment assumptions which inflated cost had been made in some instances and that evaluation of some

**The N.C. Division of
Environmental Management
has scheduled
public hearings
on the proposed
water quality standards
as follows:**

**Asheville
May 8, 7 pm
Buncombe Tech**

**Raleigh
May 10, 7 pm
Archdale Bldg.**

**Pine Knoll Shores
May 11, 7 pm
N.C. Aquarium**

estimates was impossible because of the limited information about cost bases. The committee report stated, "...toxicity reduction programs could very well result in substantially less costly actions than intensive 'end-of-the-pipe' treatment;" however, the committee agreed that "even though the available numbers are surrounded by considerable uncertainty, they are probably large enough to justify further examination."

The committee, therefore, recommended that the EMC delay adoption of standards for a few substances which clearly will pose problems for dischargers (and which may not be entirely within the dischargers' control) until a thorough study can be conducted to provide more reliable estimates of the cost of meeting the standards. The committee

report stated that one reason for the study is to provide a better public understanding of the economic impact of proposed changes.

However, the committee did not agree on what role the study of economic and environmental impacts of standards should have in setting water quality standards. The report noted that EPA will not approve water quality standards based upon economic considerations.



ALTERNATIVE AGRICULTURE VIEWED AS SOLUTION TO MANY WATER QUALITY PROBLEMS

Determining Extent of Pesticide and Fertilizer Contamination Could Be a Key to Economic Viability

U.S. agriculture has come under increasing criticism in recent years because of its contributions to soil erosion, pollution of surface and groundwater by pesticides and fertilizers, exposure of farmworkers to pesticides, and cultivation of environmentally sensitive and marginally productive land. Some see alternative agriculture as the solution to these problems.

Under pressure from groups as diverse as the League of Women Voters and the Soil and Water Conservation Society, Congress authorized research and education programs in "alternative agriculture systems" through the 1985 Agriculture Productivity Act. Two years later a \$4.9 million appropriation launched a federal research program into alternatives to the conventional U.S. agricultural approach of planting the same crop, in the same soil year after year, and maximizing the crop yield with heavy applications of chemical fertilizers and pesticides.

The simplest description of alternative agriculture is that it involves substituting knowledge and management skills for chemical inputs. It is often referred to as low-input agriculture. The degree to which the substitution of knowledge for chemicals takes place varies, so that there is a range of alternative agricultures. At one end of the range, there are probably a good many farmers who already practice alternative agriculture in its broadest definition by simply incorporating methods such as crop rotation and winter cover crop planting into a conventional but reduced-input program of fertilizer and pesticide application. At the other end of the range, there are a few small farmers—largely the adherents of the Rodale organization organic farming philosophy—who eschew the use of all artificial inputs and aim to enhance a farm's regenerative capacity strictly through management practices.

As late as 1980, the Council on Agricultural Science and Technology characterized such alternatives as archaic. Today, growing environmental problems and increasing political pressures are softening that attitude. But, while there may be more acceptance in the agricultural community of alternative approaches to farming than just a few years ago, even agricultural scientists in the vanguard of the movement agree that before farmers adopt alternative methods, they will have to be shown alternative methods that produce a profit. Finding those methods is the objective of the USDA research program now funding alternative agriculture research projects at land grant universities across the country.

Range of Alternative Methods Exists

Among the low-input methods that can be found in the range of alternative agricultures are these established cultivation and fertilization practices:

- * setting realistic goals for crop yields rather than overestimating

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possible yields and applying excessive fertilizer to reach theoretical yields

- * soil testing to eliminate overestimating the amount of fertilizer that crops need

- * timing fertilizer applications to correspond with crop needs and to minimize leaching

- * using crop rotation to restore soil fertility and tilth and to reduce or alter insect, disease, and nematode pressures

- * planting winter cover crops to discourage weeds, control erosion, and increase soil fertility

- * removing marginal land from production

- * using Integrated Pest Management, an insect and disease control program in which the first-line of defense includes crop rotation, tillage, resistant variety selection, and use of natural enemies, and which resorts only to carefully timed applications of specifically targeted pesticides to control infestations that would cause economically significant losses

A step beyond these practices are the more restrictive low-input approaches:

- * controlling weeds, insects, and diseases strictly through crop rotation, cultivation, and biological controls, such as bacteria, viruses, mycoinsecticides, predatory insects, weed pathogens, or microbial soil inoculants

- * providing nutrients strictly by rotation of main crops with legumes, by return to the soil of crop residues, animal wastes, and other forms of organic waste

As research goes forward, the following could become integral elements of a science-based, advanced low-input agricultural system:

- * exploitation of synergistic relationships among plants and between plants and other organisms to accomplish insect and disease control and to aid nutrition

- * use of bioengineered insect- and disease-resistant varieties

USDA-funded research programs are examining a variety of low-input methods in an effort to find those that will let the farmer reduce dependence on purchased inputs and at the same time increase profits, reduce environmental hazards, and ensure a more sustainable agriculture.

NCSU Research Project is Multidisciplinary

Among the low-input, sustainable agriculture research projects currently being funded by USDA throughout the country is one at North Carolina State University coordinated by Dr. Larry King of the Department of Soil Science. According to King, the multidisciplinary project, which started in 1985 and is now being funded by a four-year \$255,000 USDA grant, is among the largest in the Southeast. It involves faculty in several departments studying allelopathy (the detrimental effect of one plant on the growth of another), soil moisture relations, soil insects, nematodes, weed management, and soil microbiology as well as

economists examining the relative profitability of alternative systems and extension specialists looking for ways of introducing the concepts and practices to farmers.

The site for the study is a 15-acre field at NCSU's Research Unit 9 off Holly Springs Road in Raleigh. There, King and his colleagues have established forty treatments by which continuous versus rotated cropping systems and conventional versus various low-input methods of growing corn, soybeans, wheat, and sorghum are being compared.

Results from the 1986 and 1987 growing seasons have been analyzed and show that under some circumstances low-input management can be more profitable than conventional management. For instance, in 1986, the total cost of growing soybeans by conventional management was \$412 per hectare and the total return produced a loss of \$64 per hectare. On the other hand, the cost of growing soybeans by low-input management was \$183 per hectare, and the total return produced a profit of \$116 per hectare. Low-input management also produced a more profitable crop of soybeans in 1987.

In 1986, low-input managed wheat showed a higher return than conventionally managed wheat, but the next year an application of nitrogen fertilizer, which had not been effective in 1986, significantly increased yield from the conventionally managed wheat and turned the picture around.

Dry weather affected both low-input and conventionally managed corn crops in both 1986 and 1987, and neither showed a profit. But, as King said, the loss was less with low-input corn.

According to King, profitable alternative agriculture methods may need to be quite site-specific because of differences in soils and climates. It may be more difficult to practice alternative agriculture in the Southeast, for instance, because the climate is more conducive to insects and certain other pests. For this reason, intensive research programs would be needed

throughout all the growing zones of the United States to support widespread adoption of alternative agriculture.

According to some proponents, if the prices that farmers pay for pesticides and fertilizers reflected the costs of monitoring for these substances in groundwater and surface water and rectifying the problems they cause, then alternative agriculture would not have so far to go to be competitive economically.

**Proponents Say
Environmental/Social Costs
of Agrichemicals
Should Be Part of
Profitability Calculations**

In constructing budgets to identify management practices that will make alternative agriculture profitable for farmers, neither King nor other researchers take into account what some call the environmental and social costs of agrichemicals. According to some proponents, if the prices that farmers pay for pesticides and fertilizers reflected the costs of monitoring for these substances in groundwater and surface water and rectifying the problems they cause, then alternative agriculture would not have so far to go to be competitive economically.

Writing in the American Journal of Alternative Agriculture (Vol. II, Number 3), Malcolm Fleming, a student in public policy at Harvard University, asserts that various surveys and assessments indicate that as many as 50 million people obtain their drinking water from groundwater that is considered vulnerable to contamination by pesticides and fertilizers. Fleming says that just monitoring where contamination is

suspected could cost \$1 billion to \$2 billion. He asserts that if the cost of monitoring for agrichemical contamination is added to the costs of rectifying the contamination, digging new wells, or otherwise providing safe drinking water, and the cost of the resource lost due to contamination, the total bill to taxpayers and consumers for contamination of groundwater by agrichemicals would be very significant.

However, in an article in the summer 1988 issue of Resources, Pierre Crosson and Janet Ostrov of Resources for the Future say that while the potential for pesticide contamination of groundwater seems to be high, there is very little hard data upon which to base assessments of the extent of contamination. They say that the one word that can be used to describe that current state of knowledge about pesticides and water quality is "uncertain," and they suggest that phosphorus-induced eutrophication of lakes and streams may be the greatest environmental/social cost of agricultural chemicals. Phosphorus and nitrogen loading of water bodies is known to contribute to nuisance algae blooms and fish kills and is suspected of contributing to other problems, particularly in coastal waters. In addition, phosphorus in agricultural runoff reduces the capacity of streams to assimilate point-source discharges and could influence the need for phosphorus removal by municipal wastewater treatment plants--a requirement which drives up the cost of providing waste treatment services to consumers.

Crosson and Ostrov point out that the other important advantages of alternative agriculture are that it would eliminate the human costs of handling pesticides, which they say amounted to thousands of illnesses and several hundred deaths each year in the 1970s, and it would provide a safer habitat for wildlife. They suggest that both of these advantages have economic value and that there should be some way of factoring them into budgets that reveal the costs and returns of various agricultural systems.

Research Could Boost Competitiveness of Alternative Methods

A number of schemes have been suggested for allocating to conventional agriculture its environmental and social costs and for making alternative agriculture more competitive. Fleming suggests (1) restructuring farm support programs to eliminate the incentives for farmers to use more and more agrichemicals and to remove the barriers to low-input production methods, (2) imposing taxes on fertilizers and pesticides, and (3) devoting more federal funds to developing productive low-input methods.

Crosson and Ostrov also recommend increased research to overcome the economic disadvantages of alternative agriculture. They suggest a key objective of research should be to find techniques that control weeds without the use of herbicides. They also assert that research which would make clear the consequences of pesticide use could be an important factor in determining the relative costs and benefits of alternative and conventional agriculture.

No one expects a sudden and radical shift from conventional to alternative agriculture. Farmers will be understandably slow to give up proven methods, and even college-age agriculture students don't seem greatly interested in weaving environmental and social objectives into the agricultural agenda. Larry King has offered a course in alternative agricultural systems at NCSU since 1980 but has attracted enough students to teach the course just three times. Further, he says, enrollment in the university's Integrated Pest Management curriculum has declined in recent years.

King believes that the way to educate students about the benefits of alternative agriculture methods is to integrate the subject matter into regular course work—to teach all

students about a range of approaches together with their benefits and costs.

He also believes that the way to make alternative methods an accepted part of American farming is to continue studies to identify methods that are economically viable and to present this knowledge to farmers along with conventional approaches so that they, too, have a range of choices.

Dr. Larry King of the NCSU Department of Soil Science will offer his course in alternative agriculture systems, SSC (PM) 370 next spring semester.

HOW DEGRADABLE ARE DEGRADABLE PLASTICS?

Just what do consumers get when they buy plastic products--such as garbage bags--that are labeled "degradable"? According to an article in the February/March issue of *Technology Review*, they probably get products that have been optimistically labeled. Most plastic products labeled degradable are probably only disintegratable and leave residues the safety of which is open to serious question.

A great deal of current research is focused on creating products which have the strength and flexibility of plastics but degrade into harmless components in landfills. However, the technology has been slow to evolve. Scientists have focused on three categories of plastics that break down: biodegradable, chemically degradable, and photodegradable.

Biodegradable plastics typically incorporate natural polymers, such as cornstarch, or polyesters into the chains of synthetic polymers to provide an entry for microorganisms that can digest hydrocarbon chains.

Biodegradable plastics are very expensive to produce (\$15/pound as compared to \$0.65/pound for conventional plastic), and to date have been marketed largely for specialty medical and agricultural products.

Chemically degradable plastics do not break down completely. They simply crumble, leaving behind a residue which may remain in the environment for several years.

Photodegradable plastics become brittle and crumble when they are exposed to sunlight. They may take years to break down, and they, too, leave behind a residue. Six-pack yokes and most other degradable plastics now on the market are photodegradable.

According to *Technology Review*, another problem with degradable plastics is that they need the right conditions to break down, and landfills may not provide the right conditions.

Photodegradable plastics disintegrate only if they are exposed to sunlight, which will not reach them in landfills.

Chemically degradable plastics must be buried in dirt or submerged in water.

Biodegradable plastics need oxygen and moisture to break down.

However, today's landfills are managed to keep water out to prevent leaching, and even newspapers, which ordinarily degrade quickly, may remain well preserved for 10 years or more.

CALIFORNIA'S PROPOSITION 65 COULD FORESHADOW NATIONAL APPROACH TO TOXICS REGULATION

Last October signs warning about the health effects of alcohol went up in stores, bars, and restaurants in California, and warning labels began appearing on noncigarette tobacco products on the state's store shelves. According to supporters of Proposition 65, which California voters passed by a two-to-one margin in 1986 after widely publicized efforts by Hollywood celebrities, the measure is reaching where federal laws don't reach to protect the public health. By contrast, it took an act of Congress (passed after the California legislation took effect) to require warning labels on bottles of alcoholic beverages nationwide, and roll-your-own and pipe tobacco and cigars continue to escape federal warning requirements.

However, Prop 65 targets much more than alcohol and tobacco. According to an article in the January 20 issue of *Science* magazine, the initiative says that a business must warn the public if it knowingly exposes them to a substance that poses a significant risk of cancer or birth defects, and it prohibits discharge of any chemical on the state's list of regulated substances into an actual or potential source of drinking water at a level that would pose a significant risk.

In defining "significant risk," California settled on 10^{-5} , or one excess cancer per 100,000 people with a reasonable lifetime exposure. To use a substance listed by the state as a carcinogen or reproductive toxin, a company must determine at what level the substance poses such a risk and must be ready to defend its scientific judgment in court against citizen suits. (Prop 65 allows citizens to keep 25% of the fines awarded in successful suits.)

Therefore, in addition to requiring warning labels on alcoholic beverages and tobacco products and in bars and stores that sell these products, Prop 65 may also require warnings on a host of consumer products from toothpaste to mobile homes and may require that warnings be posted in workplaces or anywhere ambient exposures exceed the state-set limit. Since enactment of the initiative, California has listed 250 chemicals to be regulated and has set standards for 50, including many found in common products like plastic, gasoline, and cured meats. The warning provision went into effect for the first 29 chemicals on the list in February 1988.

The question of whether Prop 65 will actually produce health benefits is being hotly debated in California, and, according to the *Science* article, may be a harbinger of what's to come nationwide if other states follow California's lead—as is often the case—and adopt similar approaches to regulation of toxics.

According to University of California Biochemist Bruce Ames, who serves on the governor's scientific advisory panel, because of extrapolation uncertainties, "de minimis" levels should be set, below which one does not worry about a chemical. According to Ames, and the panel, that level is 1:10,000—ten times the significant risk level adopted by the state. Ames characterizes as "wildly exaggerated" the belief that 3 to 4% of all cancers in the United States are caused by environmental exposures, according to the *Science* article, and says that pollution is probably not responsible for any cancers. Ames is quoted as saying that Prop 65 is "...a thoroughly silly law, with an enormous cost and no gain in public health."

The pesticide DDT, which has been banned in the United States for decades, continues to rain down on the Great Lakes from sites as far away as Mexico. DDT is still produced in the U.S. and sold worldwide.

NEW WRRRI REPORT AVAILABLE

The UNC Water Resources Research Institute has recently published a report on a research project for which it provided funding. Free single copies of this report are available to federal water resource agencies, state water resources research institutes, and other water research institutions with which reciprocal exchange agreements have been made.

Single copies of the report are free to public agencies, institutions, industries, and private citizens of North Carolina as long as it is in print. Copies of any out-of-print publication are available for a \$5 reproduction charge (\$10 if billed). Nonresidents of North Carolina will be charged a prepaid amount of \$8 per copy and \$10 if billed.

The report may be obtained from:

The Water Resources Research Institute
of the University of North Carolina
Box 7912
North Carolina State University
Raleigh, NC 27695-7912
(919/737-2815)

Report Number 237 Effects of Agricultural Water Table Management on Drainage Water Quality

by Wayne Skaggs and Robert Evans,
Department of Biological and
Agricultural Engineering; and J.W.
Gilliam, Department of Soil Science,
North Carolina State University

The primary objective of this study was to determine the magnitude of the water quality benefits provided by controlled drainage practices used to manage water tables at different sites and under different soil conditions.

Artificial drainage of poorly drained soils for agricultural pro-

duction is believed to represent a significant contribution of freshwater inflow to estuaries and nutrients to nutrient-sensitive rivers. Controlled drainage practices can be utilized to manage the water table, which in turn influences drainage water quality. Controlled drainage management alternatives are eligible for cost-share funds through the North Carolina Agricultural Cost Share Program.

Five sites, originally established by the Soil Conservation Service to demonstrate to farmers the water-conserving potential of water table management, were selected for this study to encompass a wide range of soil and site properties representative of the poorly drained soils of the Tidewater region of North Carolina. Drainage control was accomplished by placing flash-board riser type control structures in the drainage outlets.

Drainage control was very effective in reducing drainage outflow and the potential transport of nutrients to receiving surface waters. The control structures reduced drainage outflow by approximately 40 percent as compared to conventional drainage practices. The dominant factor influencing total nutrient transport was the amount of drainage outflow which was reduced by controlled drainage practices. The reduction in nutrient transport was nearly proportional to the reduction in drainage outflow.

Controlled drainage reduced the annual transport of total nitrogen (NO₃ and TKN) by 7 kg/ha and total phosphorus by 0.19 kg/ha. Considering that nearly 1 million hectares of cropland in North Carolina are artificially drained, this represents a potential reduction at the field's edge of nearly 7,000 metric tons of nitrogen and 190 metric tons of phosphorus annually.

Subcommittees of the Buncombe County Environmental Affairs Board are examining water quality and solid & hazardous waste issues. For information contact board chairman Laura Temple Haney at (704) 298-3325.

GROUNDWATER PROTECTION EXAMINED IN VIRGINIA PUBLICATION

A 44-page illustrated book, **Threats to Virginia's Groundwater**, recently published by the Virginia Water Resources Research Center emphasizes pollution prevention and provides detailed tips on the role citizens can play in groundwater protection. It also includes a general overview of hydrogeology, information about well water testing, a glossary, summaries of federal and state laws affecting groundwater protection, and a list of telephone numbers for gaining additional information. An eight-page booklet, **Virginia's Groundwater: You Can Help Protect It**, summarizes the book, briefly describing each threat to groundwater and protection strategies. Both publications are available from: Publications Services, Virginia Water Resources Research Center, 617 N. Main St., Blacksburg, VA 24060-3397; telephone (703) 961-5624. The book is available to those outside Virginia at a charge of \$8. The booklet is free.

CONSERVATION '89 SCHEDULED FOR APRIL 8

The Conservation Council of North Carolina will present Conservation '89, an afternoon of conservation discussions, beginning at 1:00 pm on Saturday, April 8, 1989, at the Old State Capitol Building in downtown Raleigh.

Representative Joe Mavretic, Speaker of the N.C. House, will lead off the afternoon with a keynote address at 1 pm. Following Mavretic's address, a panel of N.C. legislators will discuss environmental issues that are expected to be addressed in the General Assembly this year. Following the panel discussion, workshops will be

presented on (1) coastal issues, (2), groundwater, (3) solid waste, (4) growth management.

There is a \$5.00 registration fee for Conservation '89. For additional information call Scott Breidenbach at (919) 942-7935.

FRENCH BROAD RIVER CHARETTE SLATED

As part of its efforts to revitalize the urban portion of the French Broad River in Asheville, the French Broad Riverfront Planning Committee is sponsoring the following events:

(1) a major four-day community land-planning and design conference ("charette") April 26-29, 1989. At the charette, a ten-member professional riverfront design team will meld community input into a concept for the Asheville riverfront. The team will combine for the first time the Rural/Urban Design Assistance Team (R/UDAT) approach of the American Association of Architects with the Community Assistance Team (CAT) approach of the American Society of Landscape Architects. Leading the charette will be Dr. Peter Batchelor, chairman of the Urban Design Program at N.C. State University.

(2) A national, open riverfront design competition with the possible assistance of a National Endowment for the Arts grant.

The committee is assembling a Charette Advisory Council of professionals and civic leaders from the community, the region, and the state. The committee's activities have been supported by grants from the N.C. Department of Natural Resources and Community Development and the Z. Smith Reynolds Foundation. For further information about the riverfront planning effort, call Jim Stokoe, Land-of-Sky Regional Council (704) 254-8131.

DUKE UNIVERSITY OFFERS CONTINUING EDUCATION COURSES IN NATURAL RESOURCE MANAGEMENT

The Duke University School of Forestry and Environmental Studies is offering the following continuing education courses for the spring. For information on any of these courses, contact Julie D. Gay, School of Forestry and Environmental Studies, Duke University, Durham, NC 27706; telephone (919) 684-2135.

HAZARDOUS WASTE MANAGEMENT: SUPERFUND PROGRAM.....APRIL 3 - 7

Instructor, Gordon M. Davidson. Substantive understanding of the superfund toxic site clean-up program. The course is practical and focuses on application and implementation. Classroom presentations include lectures, case studies, discussions,

problem solving, and guest lecturers who are senior managers from EPA and the private sector.

BASIC GROUNDWATER HYDROLOGY.....APRIL 24 - 28

Instructor, Ralph Heath. Covers the basic principles, concepts and methods of groundwater hydrology. Topics include the water storage and transmission characteristics of rocks, the physical characteristics and features of the groundwater regions of the U.S., the collection and analysis of data used in determining the hydraulic properties of groundwater systems, and problems related to the development and protection of the groundwater resource.

WASTE EXCHANGE WORKSHOPS SCHEDULED FOR INDUSTRIES

The Southeast Waste Exchange is conducting a series of workshops on how industry can use large-scale recycling to reduce disposal costs, lower raw material costs and energy usage, and provide markets for hazardous and nonhazardous waste.

Sponsored by the Energy Division of the North Carolina Department of Commerce, the "Waste Minimization: Success Through Waste Exchange" workshops will be offered in Charlotte on March 21, Asheville on March 22, Greensboro on March 29, Raleigh on March 30 and Wrightsville Beach on April 14.

Workshops will use presentations, panel discussions, and hands-on activities to familiarize participants with waste exchange such

as selecting a vendor, sending waste samples off for analysis, modifying waste streams for marketability, and calculating cost benefits. Workshop leaders will also provide information on regulatory updates and successful waste minimization techniques being used by North Carolina businesses.

For more information or to register, contact Charlene Alston at the Southeast Waste Exchange, UNCC Urban Institute, Charlotte, NC 28223; telephone (704) 547-2307. The cost for the workshops is \$25.

Bacteria in the digestive tracts of cows and the soils of rice paddies produce worldwide on the order of 140 million tons of methane annually.

CONFERENCE IS PLANNED ON GROUNDWATER IN THE PIEDMONT EASTERN UNITED STATES

A multidisciplinary conference designed to address the special groundwater conditions and problems of the Appalachian Piedmont region of the eastern United States is being convened by a group of university, government, and private groundwater scientists, managers, and users. The group has issued an announcement and call for papers for the **Conference on Groundwater in the Piedmont of the Eastern United States** to be held October 16-18, 1989, at the Royce Hotel in Charlotte, NC.

Call for papers: Disciplines targeted include groundwater hydrology, hydrogeology, geophysics, civil, environmental, and agricultural engineering, law and public administration. For information on submitting abstracts contact: Charles Daniel, U.S. Geological Survey--Water Resources Division, P.O. Box 2857, Raleigh, NC 27602; telephone: (919) 856-4791.

The conference: The conference will encompass the major areas of water supply and groundwater contamination, with both specialized technical presentations as well as management and policy aspects. For additional information contact: April Smith, 113 McAdams Hall, Clemson University, Clemson, SC 29634-0357; telephone (803) 656-4073.

PESTICIDE CONFERENCE WILL PRESENT RESEARCH FROM ACROSS THE NATION

Researchers from 23 states, District of Columbia, and Canada will discuss a variety of pesticide issues during the Virginia Water Resources Research Center's Pesticides in Terrestrial and Aquatic Environments,

May 11-12 in Richmond, Virginia. Topics will include pesticide monitoring in ground and surface waters and terrestrial environments, environmental effects of pesticide use, risk assessment, pesticides in water supplies and wastewater sludge, management techniques for nonpoint source pollution control, pesticide waste disposal, cost-benefit analysis of water quality impacts, case studies of pesticide pollution, and environmental regulations.

The conference will be held at the Hyatt Richmond with special rates for conference participants. Call (804) 285-1234. Registration fees are \$120 for pre-registration, \$135 for late registration (after April 21). For more information contact the Virginia Water Resources Research Center, 617 North Main Street, Blacksburg, VA 24060 at (703) 961-5624 or (703) 231-5703.

DAM SAFETY WORKSHOP SCHEDULED FOR APRIL 13

The N.C. Department of Natural Resources and Community Development, Division of Land Resources, Land Quality Section and The University of North Carolina Water Resources Research Institute will present a Dam Safety Workshop on April 13 at the Quality Inn, Mission Valley in Raleigh.

The workshop is being presented to provide current technology and safety expertise on dam construction, operation, and maintenance. It is geared to the needs of state and local government dam safety inspectors, dam owners, consulting professionals, and policy makers engaged in design, construction, maintenance, or regulation of dams.

Cosponsors of the workshop are the North Carolina Society of Engineers, the Professional Engineers of North Carolina, the Consulting Engineers Council, and the American Society of Civil Engineers.

The workshop registration fee is \$25 per person. Preregistration is required by April 3.

For additional information or to register contact: Linda Lambert, WRRRI, Box 7912, NCSU, Raleigh, NC 27695-7912; (919) 737-2815.

WATER RESOURCES CONDITIONS FOR FEBRUARY

February rainfall in Asheville, Charlotte, and Raleigh was above normal for the month, by 1.01, 0.86, and 2.99 inches, respectively, according to the National Weather Service. Significant rainfall occurred in most areas of the state early in the month and again near month's end. Thunderstorms brought unusually heavy rains on the 21st. At one USGS rain gage near Raleigh, 0.45 inches fell in 5 minutes.

Streamflow was in the normal range in most of the Blue Ridge and Piedmont Provinces, although deficient flow was reported in the French Board, New, and upper Yadkin River basins. Flow was excessive at Twelve Mile Creek near Waxhaw. At most of the Coastal Plain index sites, flow continued in the deficient range for the second consecutive month. Across the state, monthly mean flow ranged from 32 percent to 141 percent of the long-term February median flow.

Groundwater levels in unconfined aquifers rose seasonally across the state at month's end. Water levels were below average for the month in the Blue Ridge Province but were above average in the Piedmont and Coastal Plain.

POSITIONS AVAILABLE

Utah State University, Utah Water Research Laboratory, Department of Civil and Environmental Engineering invites applications for two tenure track positions (rank is open) in surface and groundwater hydrology. The responsibilities include continuing development of research programs dealing with theoretical, experimental, and/or computational approaches to the role of surface and/or groundwater in areas which may include: basin, regional and global scale hydrology, hillslope processes, soil-water processes, multiphase fluid flow, passive/reactive transport of tracers and contaminants, use of remote sensing, spatial representation of watershed processes, partial area hydrology, stochastic/numerical analysis, arid zone hydrology, and hydrology for fractured rock systems. The candidate is expected to teach two or three courses from his or her specialty within the graduate and undergraduate programs. Applicant should submit a complete resume, list

addresses of three references to: Chair, Faculty Search Committee, Utah Water Research Laboratory, Utah State University, Logan, Utah 84322-8200.

Duke University, Department of Civil and Environmental Engineering requests applications for a tenure track entry level position in environmental engineering, starting in September 1989 or soon thereafter. Requirements include (1) an ability and interest in teaching, (2) potential for independent scholarly research, and (3) a doctoral degree. Although all areas in environmental engineering will be considered, backgrounds in water treatment processes, water and wastewater design, and aquatic chemistry/biology are preferred. Send resumes and references to: Dr. P. Aarne Vesilind, Department of Civil and Environmental Engineering, School of Engineering, Duke University, Durham, NC 27706.

SUMMARY OF ENVIRONMENTAL LEGISLATION INTRODUCED BY GENERAL ASSEMBLY

House Bills

- H 33 ALBEMARLE-PAMLICO ESTUARINE STUDY.** "AUTHORIZING THE LEGISLATIVE RESEARCH COMMISSION TO STUDY THE PROGRESS OF THE ALBEMARLE-PAMLICO ESTUARINE STUDY." Authorizes cited study with interim report to 1990 session and final report to 1991 session.
- H 34 EXTEND ENVIRONMENTAL CONCERN AREA.** "TO EXTEND THE AREA OF ENVIRONMENTAL CONCERN AROUND OUTSTANDING RESOURCE WATERS AND PRIMARY NURSERY AREAS TO FIVE HUNDRED SEVENTY-FIVE FEET." Amends GS 113-A-113 to add two new categories of areas that may be designated areas of environmental concern by the Coastal Resources Commission: (1) outstanding resource waters and (2) primary nursery areas in the estuarine system. Provides that any existing land uses occurring as of the effective date of the act that are inconsistent with designations as outstanding resource waters or primary nursery areas may continue at the level that existed on that date. The area of environmental concern for any outstanding resource waters and primary nursery areas designated by rule on or before the effective date of the act shall automatically be extended to 575 feet.
- H 35 STATEWIDE STORMWATER STANDARDS.** "TO AUTHORIZE AND DIRECT THE ENVIRONMENTAL MANAGEMENT COMMISSION TO PHASE IN STATEWIDE STORMWATER REGULATIONS." Amends GS 143-215.3 (a) as title indicates. Plan for regulations to be developed by Jan. 1, 1990, and implemented on a priority basis.
- H 39 NONSURFACE DISCHARGE PERMIT/NOTICE.** "TO REQUIRE THAT PUBLIC NOTICE BE GIVEN OF AN APPLICATION FOR A PERMIT OR FOR RENEWAL OF A PERMIT FOR CERTAIN TYPES OF NONSURFACE DISCHARGES AND TO PROVIDE FOR A PUBLIC HEARING CONCERNING THE ISSUANCE OR RENEWAL OF SUCH A PERMIT IF THE ENVIRONMENTAL MANAGEMENT COMMISSION DETERMINES THAT THERE IS A SIGNIFICANT INTEREST IN HOLDING SUCH A HEARING." Permits would include (a) new or expanded wastewater treatment plants of 30,000 gallons per day or greater; (b) spray irrigation systems not for single family residences; (c) sludge disposal sites; (d) smaller projects that would affect lands or waters having special environmental designations, or having strong public interest, or having severe, unusual or precedent-making impacts. Applies a simplified procedure (14-day notice period with opportunity for written comments but no staff evaluation) to the following classes of "nonsurface discharges": (a) spray irrigation systems for single family residences; (b) sewer lines one mile or longer and with 100,000 gallons per day or larger design flow; and (c) pump stations equal to or greater than 100,000 gallons per day. Effective July 1, 1989; affects permits and renewals applied for thereafter.
- H 40 ENVIRONMENTAL MANAGEMENT COMMISSION CHANGES.** "TO MODIFY THE MEMBERSHIP OF THE ENVIRONMENTAL MANAGEMENT COMMISSION." Amends GS 143B-283 (a) to (1) reduce the number of at-large members of the EMC from five to three; (2) to add a membership category of person with expertise in effects of air pollution and air pollution control; (3) add membership category of person with expertise in freshwater, estuarine, marine biological, or ecological sciences, and (4) refine description of membership categories for public health expertise, agriculture, water supply engineer, fish and wildlife conservation, and hydrology or groundwater pollution expertise. Effective on ratification but does not apply to incumbents until expiration of current terms.
- H 156 WATERSHED PROTECTION RULES.** "TO AUTHORIZE AND DIRECT THE ENVIRONMENTAL MANAGEMENT COMMISSION TO DEVELOP AND ADOPT RULES ESTABLISHING MINIMUM STATE STANDARDS, LIMITATIONS, AND MANAGEMENT PRACTICES FOR THE PROTECTION OF WATER SUPPLY WATERSHEDS." Authorizes and directs the Comm'n to develop and adopt by Oct. 1, 1989 rules establishing classifications for water supply watersheds and the minimum standards, limitations, and management practices necessary to protect them. Requires Comm'n to identify each water supply

watershed in the state and assign it an appropriate classification no later than Jan. 1, 1990. Comm'n to designate critical water supply watersheds, with standards, limitations, and management practices more stringent than those applicable elsewhere. Comm'n rules shall apply throughout the state.

Standards, limitations, and management practices administered by state unless delegated to local governments. Local government with jurisdiction over a water supply watershed may administer program if (i) it submits to the Comm'n a written statement of its intent to adopt local plans and ordinances consistent with or more stringent than those of state, and does so within 120 days after the Comm'n adopts rules and assigns classification; (ii) it adopts a land-use plan, implementing ordinances, and enforcement procedures within 480 days after assignment of classification and adoption of other rules; (iii) it submits those "regulations" to the Comm'n for review; and (iv) the Comm'n finds that the local regulations are consistent with or more stringent than the state's rules.

H 157 STATE WATER PLAN "TO DEVELOP A STATE WATER SUPPLY PLAN." Amends GS 143-355 and adds new GS 130A-317.1 requiring the Dept. of Natural Resources and Community Development and Dept. of Human Resources to develop a state water supply plan. Depts. may require local jurisdictions to submit plans containing population and water use projections, present and future water supplies, and technical assistance required to meet water needs. Depts. to report to Joint Legislative Commission on Governmental Operations by Oct. 1, 1989.

H 159 ON-SITE SEWAGE PROGRAM FUNDS (=S 105). "TO APPROPRIATE FUNDS TO THE DEPARTMENT OF HUMAN RESOURCES AND TO THE BOARD OF GOVERNORS OF THE UNIVERSITY OF NORTH CAROLINA FOR RESEARCH, DEVELOPMENT, AND IMPLEMENTATION OF VARIOUS ON-SITE WASTE TREATMENT PROJECTS, TO AID LOW INCOME PEOPLE IN OBTAINING REPAIRS TO SEPTIC TANKS, AND TO PROVIDE CONTINUING EDUCATION FOR SANITARIANS." See identical bill S 105.

H 187 PIEDMONT TRIAD WATER FUNDS. "TO APPROPRIATE FUNDS TO THE PIEDMONT TRIAD REGIONAL WATER AUTHORITY TO ASSIST IN THE CONSTRUCTION OF THE RANDLEMAN LAKE RESERVOIR AND TO APPROPRIATE FUNDS TO THE PARKS AND RECREATION DIVISION OF THE DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT FOR THE PURPOSE OF PLANNING AND RECOMMENDATIONS FOR THE RECREATIONAL USES OF RANDLEMAN LAKE." Appropriates \$4 million in 1989-90 and \$3.5 million in 1990-91 from General Fund to Office of State Budget and Management to be placed in reserve fund for use in Randleman Lake Project by Piedmont Triad Regional Water Authority. Sets out procedures for release of money and provides that 1989-90 appropriation not to revert.

Appropriates \$75,000 in each year of biennium from General Fund to Parks and Recreation Division of Dept. of NRCD, to make plans and recommendations for recreational use of Randleman Lake. Requires report to 1993 General Assembly.

Senate Bills

S 105 ON-SITE SEWAGE PROGRAM FUNDS. "TO APPROPRIATE FUNDS TO THE DEPARTMENT OF HUMAN RESOURCES AND TO THE BOARD OF GOVERNORS OF THE UNIVERSITY OF NORTH CAROLINA FOR RESEARCH, DEVELOPMENT, AND IMPLEMENTATION OF VARIOUS ON-SITE WASTE TREATMENT PROJECTS, TO AID LOW INCOME PEOPLE IN OBTAINING REPAIRS TO SEPTIC TANKS, AND TO PROVIDE CONTINUING EDUCATION FOR SANITARIANS." Appropriates from General Fund to Department of Human Resources \$1,750,327 for fiscal 1989-90 and \$1,978,904 for fiscal 1990-91 to provide research and development grants for on-site sewer projects, grants to counties to assist low-income people to repair failing septic tanks, and continuing education for sanitarians. Appropriates from the General Fund to the UNC Board of Governors \$725,100 for each year of 1989-91 biennium for research, education, and technical assistance to develop better on-site waste, wastewater, septage, and sludge management systems and \$51,064 for each year of biennium to develop quantitative methods to evaluate high water table soils for on-site waste treatment. Effective July 1, 1989.

- S 110 SOLID WASTE BRANCH STAFF.** "TO APPROPRIATE FUNDS FOR THE STAFF NEEDS OF THE SOLID WASTE BRANCH OF THE DEPARTMENT OF HUMAN RESOURCES." Appropriates from the General Fund to the Dept. of Human Resources, Division of Health Services, Solid Waste Management Section, Solid Waste Branch \$1,187,725 for fiscal 1989-90 and \$2,792,460 for fiscal 1990-91. Funds are to be used to establish 25 positions in the first year and 25 more in second year to provide assistance in permitting, to provide technical assistance, to research waste reduction and handling, to hire a public health educator, to set up an information clearinghouse, to train recycling coordinators and landfill operators, and to propose contracts and grants for solid waste projects. Effective July 1, 1989.
- S 111 STATE SOLID WASTE POLICY.** "TO REQUIRE THE DEPARTMENT OF HUMAN RESOURCES TO COMPLETE THE DEVELOPMENT OF A STATE COMPREHENSIVE SOLID WASTE MANAGEMENT PROGRAM BY JANUARY 1, 1991, AND TO ESTABLISH A STATE SOLID WASTE MANAGEMENT POLICY." Directs Dept. of Human Resources to develop state comprehensive solid waste management program by January 1, 1991. Adds GS 130A-290.1 declaring that the policy of the state is to promote methods of solid waste management that are alternatives to disposal in landfills and to assist units of local government with solid waste management. Sets following hierarchy of waste management methods, in descending order of preference: waste volume reduction at source, recycling and reuse, composting, incineration with energy production, incineration for volume reduction, disposal in landfills. Establishes minimum statewide goal of recycling 25% of total waste stream by January 1, 1993; requires state to give preference to purchase of products with recycled content; and requires counties, in cooperation with its cities, to develop comprehensive county solid waste management program by January 1, 1992. Effective Oct. 1, 1989.
- S 113 LOCAL SOLID WASTE ORDINANCES.** "TO MAKE IT CLEAR THAT A COUNTY AND A CITY HAVE THE AUTHORITY TO ENACT CERTAIN ORDINANCES REGULATING LOCAL SOLID WASTE MANAGEMENT." Amends GS 153A-136 and GS 160A-192 to provide that counties and cities may (i) require source separation of solid waste materials prior to collection for disposal; (ii) require participation in a recycling program approved by the governing board; and (iii) require that the unit's landfill accept for disposal only those solid wastes generated in the geographic service area specified in its state permit.
- S 114 COUNTY LANDFILL DISPOSAL FEES.** "TO PROVIDE THAT A COUNTY LANDFILL THAT IS A PUBLIC ENTERPRISE HAS CONDITIONAL AUTHORITY TO CHARGE A MUNICIPALITY LOCATED IN THAT COUNTY A SOLID WASTE DISPOSAL FEE." Amends GS 153A-292 to permit boards of county commissioners to levy landfill disposal fees on municipalities and municipal residents located in the county if the county levies similar and clearly-designated disposal fees on other county residents and private waste collection firms with county contracts (now, fee to municipality prohibited if county levies count-wide tax for financing landfills). Effective Oct. 1, 1989.
- S 115 SOLID WASTE REVOLVING FUND.** "TO CREATE THE NORTH CAROLINA SOLID WASTE MANAGEMENT REVOLVING LOAN FUND." Adds Part 2A, Art. 9, GS Ch. 130A to establish the North Carolina Solid Waste Management Revolving Loan Program to provide low-interest loans to local units of governments or joint agencies for solid waste management projects.

Funds must be used for the purchase of equipment or facilities, including incinerator construction costs; for the purchase of land to be used for recycling facilities; for leachate collection and treatment systems; for landfill liners; for recycling equipment and facilities; for volume reduction equipment; and for monitoring of wells. The principal amount of a loan to any single unit of government or joint agency during a fiscal year may not exceed \$2 million.

Appropriates from General Fund to the Solid Waste Management Revolving Loan Fund \$10 million for each fiscal year of the 1989-91 biennium.

NEW PUBLICATIONS RECEIVED BY THE INSTITUTE

Residents of North Carolina may borrow these from the Institute for a two-week period. Where individual copies are desired, readers are encouraged to request copies from the organization issuing the publication. The addresses are provided by the NEWS for this purpose.

Water Resources Planning

"Aquaculture Development Plan for North Carolina," by Governor's Task Force on Aquaculture, avail. from N.C. Board of Science & Technology, Office of the Governor, 116 W. Jones St., Raleigh, NC 27611 (08I Aquaculture)

"Critical Water Issues in Tidewater Virginia - Four Papers from Meetings of ASCE," 1989, avail. from WRRC, VPI&SU, 617 N. Main St., Blacksburg, VA 24060-3397; VA residents free; nonresidents \$6/copy. (06B)

"Minnesota Water and Sewer Rates Revisited," (SR#17), 10/88, by K.W. Easter, et al., avail. from WRRC, Univ. of MN, 866 Bioscience Center, 1445 Gortner Ave., St. Paul, MN 55108. (06C)

Water Quality Management

"Sludge Disposal in North Carolina: An Update on Regulations and Trends," 2/15/89, avail. from Prof. Engrs. of N.C., 4000 Wake Forest Rd., Suite 108, Raleigh, NC 27609, price - \$13.00 plus postage & handling. (05D Sludge Mgmt.)

"Transport of Eroded Soil Particles," 10/88, by B.N. Wilson, et al., avail. from Center for Water Research, OK State Univ., 003 Life Sciences East, Stillwater, OK 74078-0281. (02J)

Water Quantity Management

"Water Shortage Response Handbook for North Carolina Water Supply Systems," 1988, by Div. of Water Resources, N.C. Dept. of NRCD, P.O. Box 27687, Raleigh, NC 27611. (03D Water Supply)

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