

NEWS

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NEW REGS MEAN TIGHTER CONTROLS ON INDUSTRIAL DISCHARGES TO WASTEWATER TREATMENT PLANTS

Recent revisions to rules governing the kinds and concentration of wastes industries may discharge to publicly owned treatment works (POTWs) are expected to have significant impacts on some industrial users in North Carolina, particularly in the larger metropolitan areas.

According to Dana Folley, Acting Pretreatment Coordinator with the N.C. Division of Environmental Management, changes to the General Pretreatment and National Pollutant Discharge Elimination System (NPDES) regulations

which became effective in August will beef up industry and POTW reporting and planning requirements, strengthen POTWs' enforcement authority, bring additional industrial users under the pretreatment program, and possibly help cut down on "midnight dumping" of septage into municipal sewers.

Changes Meant to Insure Proper Treatment of RCRA Wastes

The new regulations were promulgated by EPA under section 3018(b) of the Resource

Conservation and Recovery Act (RCRA) and sections 307 (b) and 402(b)(8) of the Clean Water Act, which direct the agency to revise rules to assure that hazardous wastes discharged to POTWs under the RCRA Domestic Sewage Exclusion are adequately controlled to protect human health and the environment.

Under the Domestic Sewage Exclusion (Section 1004[27]), wastes defined as hazardous under RCRA are exempt from RCRA requirements related to disposal, treatment, and storage if they are disposed of with domestic sewage to

POTWs. The assumption underlying the Domestic Sewage Exclusion has been that POTWs control through their pretreatment requirements or treat hazardous wastes adequately to protect the environment and public health.

In the 1984 Hazardous and Solid Waste Amendments to RCRA, Congress directed EPA to study and report on substances discharged to POTWs under the Domestic Sewage Exclusion. That report, the Domestic Sewage Study, was delivered in 1986 and concluded that the Domestic Sewage Exclusion should be retained but that pretreatment controls under the Clean Water Act should be enhanced.

Certain provisions of the Clean Water Act mandate that industrial wastes be pretreated before being discharged to POTWs to prevent discharge of any pollutants that would interfere with effective operation of the plant or that would directly pass through the POTW treatment process. The new regulations strengthen controls on the discharge of hazardous wastes covered by the Clean Water Act but exempted from RCRA.

Major Provisions of New Regulations

Among the provisions of the new rule are the following:

- * POTWs will be required to test their effluent for toxicity which may be caused by industrial user discharges of hazardous wastes or other toxic substances. If the tests indicate a water quality violation, the POTW may receive new permit limits. To comply with revised permit limits POTWs may alter their operations or impose more stringent local limits on industrial users.

- * Industrial users must notify POTWs, State programs, and EPA of the nature and mass of RCRA hazardous wastes they introduce into the sewers.
- * POTWs must evaluate in writing when they submit data from toxicity testing, the need to revise local limits. (This will allow NPDES permit writers to evaluate the rationale for not imposing more stringent local limits.)
- * No substances that exhibit the RCRA characteristic of ignitability may be introduced into POTWs, and several specific substances (including petroleum oil) have been excluded or restricted.
- * No trucked or hauled wastes may be introduced into POTWs except at designated discharge points.
- * The term "Significant Industrial User" (SIU) has been defined to provide that "categorical" industrial users, and "non-categorical" industrial users that discharge 25,000 gallons per day or more are to be considered SIU. The definition also provides that an industrial user which has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement may be defined SIU.
- * POTWs must develop and implement enforcement response plans, detailing how they will respond to violations of pretreatment limits.

- * POTWs must determine whether each of their Significant Industrial Users needs a spill or slug plan, and when such plans are needed, must evaluate the effectiveness of the plans.

According to Folley, requirements for effluent toxicity testing will not mean a major change for POTWs in North Carolina since the State has required toxicity testing for several years.

The provision that industries notify POTWs, the State and EPA of RCRA wastes discharged to POTWs will mean industries must do additional reporting, Folley said. However, because state regulations already require industries to tell POTWs what's in their discharges, it's unlikely that the new regulations will uncover unknown hazardous wastes in many industrial discharges or lead to reopening of large number of pretreatment permits.

New Definition Will Bring More Industrial Dischargers Into Pretreatment Program

A provision that is expected to have an important impact in North Carolina is the definition of Significant Industrial User, Folley said. Under the existing state definition, an industrial discharger that did not fit into one of EPA's industrial categories had to discharge 50,000 gallons of waste per day or be responsible for 5 percent of more of a POTWs daily flow to be considered a Significant Industrial User and be subject to pretreatment requirements. The broader federal definition, which includes non-categorical dischargers of 25,000 gallons or more per day, may bring a significant number of additional industrial dischargers under

pretreatment regulation. The impact of this change is expected to be felt more in larger cities, such as Charlotte, Raleigh, Durham, and Burlington, where industrial users with flows between 25,000 and 50,000 gallons may not have been designated SIUs because they do not account for 5 percent of the city's municipal wastewater treatment plant flow.

Septage Dumping Is Now a Violation of Federal Regulations

Another provision that could have an important impact in North Carolina is the prohibition against introducing trucked or hauled wastes into POTWs at undesignated points. This provision means that it is now a violation of federal regulations to dump septage and other wastes into sewer lines. EPA has authority to impose civil fines of up to \$25,000 per day per violation of federal environmental regulations; therefore, the new rule provides an additional deterrent to "midnight dumping" of septage and other wastes.

According to Folley, this provision along with the requirement that POTWs develop and implement written enforcement response plans addressing all categories of violations likely to occur will greatly improve enforcement of pretreatment program requirements. In developing such a plan the POTWs can think ahead and formulate an enforcement "plan of action" without the influence of "heat of the moment" issues such as political pressure from the violator.

EPA estimates that there are more than 870 million pounds of toxic substances, including arsenic, cadmium, cyanide, and lead, being discharged to publicly owned wastewater treatment plants each year. *Environmental Engineering News*, Purdue University July/Aug 1990

EPA ANNOUNCES FIRST BIENNIAL PLAN FOR EFFLUENT GUIDELINES

As required by Section 304(m) of the Clean Water Act, the Environmental Protection Agency has announced its first biennial plan for reviewing and revising existing guidelines and promulgating new guidelines for treatment of industrial wastewater that is discharged into the nation's rivers and streams. The announcement also includes plans for new or revised pretreatment standards for indirect dischargers.

Section 304 (m) directs that every two years EPA identify categories of industries discharging toxic or nonconventional pollutants for which effluent limitation guidelines have not been published and establish for each source a schedule for promulgation of guidelines. It also requires the establishment of schedules for reviewing and revising previously promulgated guidelines.

EPA's first biennial plan calls for new ("new" meaning first-time best available technology economically achievable [BAT] or new source performance standards [NSPS]) guidelines to be promulgated by Feb 1991 for the following:

Pesticide Chemicals: This category includes 92 facilities engaged in manufacturing and more than 3,000 facilities engaged in formulating/packaging pesticide chemicals. These facilities discharge in the range of 175 million to almost 1 billion pound-equivalents of highly toxic pollutants per year. The Agency has promulgated limitations based on Best Practicable Control Technology (BPT) for this

category and is under both statutory and judicial mandates to develop BAT and NSPS guidelines.

Offshore Oil and Gas

Extraction: This category includes about 4,300 facilities engaged in production, field exploration, drilling, well completion and well treatment seaward of the inner boundary of the territorial seas. Many are covered by NPDES general permits and all are currently subject to BPT level controls. EPA is under legal mandate to develop additional guidelines for this category as well.

Hazardous Waste

Treatment, Phase 1: This category includes (1) facilities that treat aqueous hazardous waste, (2) hazardous waste incinerators with wet scrubbers, and (3) municipal and hazardous waste landfills with leachate collection. These facilities generate 20 million pounds of priority pollutants in raw wastewaters annually, and perhaps as much as five times that amount in non-priority hazardous and toxic pollutants.

Machinery Manufacturing and Rebuilding: This category covers facilities that perform wastewater-generating processes on metal machinery and equipment and includes 15 major industrial groups comprising 970,000 separate facilities. The majority of these are small businesses with fewer than 10 employees. The EPA intends at this time to develop guidelines covering seven of the 15 groups (aircraft, aerospace, hardware, ordnance, stationary industrial equipment, mobile industrial equipment and electronic equipment). The seven groups represent about 195,000 facilities and account for 32 billion pounds of organic and toxic

metal pollutants each year, most of which go to public wastewater treatment plants.

Coastal Oil and Gas

Extraction: This category includes about 30,000 facilities engaged in production, field exploration, drilling, well completion and well treatment in coastal areas. EPA estimates that these facilities discharge about 4.2 million pounds per year of priority organic and inorganic pollutants in the produced water wastestream and an estimated 12.9 million pounds per year of priority and other organics and metals in the drilling fluids and drill cuttings wastestreams. Currently these facilities are subject only to BPT requirements.

The plan also calls for:

- * *Revisions to Existing Guidelines* for organic chemicals; plastics and synthetic fibers; pharmaceutical manufacturing; pulp, paper, and paperboard
- * *Review of Existing Guidelines* for petroleum refining; timber products processing; textile mills
- * *Studies to determine whether to establish guidelines* covering drum reconditioning; hospitals; industrial laundries, paint formulating; solvent recycling; stripper oil and gas extraction; transportation equipment cleaning; used oil reclamation and re-refining

For the last 12 years, EPA's agenda for the development of effluent guidelines has been set by a consent decree which settled litigation with the Natural Resources Defense Council (NRDC). The first biennial plan represents the Agency's effort to set its own agenda for future

rulemaking. However, NRDC commented extensively on the plan, asserting that EPA is required by section 304(m) of the Clean Water Act to identify in the first biennial plan all categories of sources discharging toxic or nonconventional pollutants for which guidelines have not been promulgated and to promulgate guidelines for all categories that discharge more than trivial amounts by Feb 1991.

WRII INVITES PROPOSALS FOR 1992 RESEARCH PROGRAM

Applications from faculty members of senior colleges and universities in North Carolina for grants under the Institute's Federal Cooperative Program for fiscal year 1992 will be accepted until January 18, 1991. No exceptions will be made to this cut-off date. Special consideration will be given to proposals that involve the use of Institute funds to match those from other agencies.

Details and instructions for preparation of proposals can be obtained by writing or calling the Institute: WRII, Box 7912, NCSU, Raleigh, NC 27695-7912 (919/737-2815).

Water resources problem areas identified by the Institute's Advisory Committee as priorities for 1992 are

WATER QUALITY, with focus on industrial and municipal wastewater treatment discharges, agricultural runoff and pesticides, and monitoring techniques and analysis;

WATER MANAGEMENT, with focus on legal, institutional and financial arrangements, water transfers or diversions, flood

control, drought planning, financing and pricing, water conservation and reuse, upgrading supplies, and state and/or federal and interstate interaction or compacts;

WATER QUANTITY, with focus on the basin water cycle, surface and groundwater interaction, and use and user impacts;

AQUATIC AND ENVIRONMENTAL PROTECTION, with focus on wetlands and their interaction with other habitats.

In addition the Advisory Committee has recommended the following specific research topics as worthy of particular attention:

- * Land use management and its impact on water quality
- * The relative significance of point and nonpoint sources of pollution
- * Interbasin transfer
- * Testing for and controlling toxics in municipal and industrial effluent
- * Development of indices for surface and ground water
- * Evaluation of the transport of nutrients and toxicants in sediments
- * Relationship between residential development patterns and runoff characteristics
- * Relationship between toxicants and surface water quality
- * Water budgets for wetland types
- * Dynamics of river and estuarine flows
- * Methods for restoration of groundwater quality
- * Identification of effective structural controls for stormwater runoff

USGS DOCUMENTS NORTH CAROLINA'S 1985 WATER USE

According to the recently released U.S. Geological Survey *National Water Summary 1987*, North Carolina withdrew about 7,880 million gallons per day (MGD) of freshwater from surface- and ground-water sources in 1985.

Of the total withdrawals, 94.5 percent was surface water.

Withdrawals associated with thermoelectric power generation constituted the largest single category of water, accounting for 85.9 percent of the surface-water withdrawals and 81.1 percent of the total withdrawals.

Thermoelectric power facilities are mainly along the Catawba River and in the Chowan-Roanoke and Cape Fear basins.

North Carolina ranks tenth nationally in withdrawals for thermoelectric power generation.

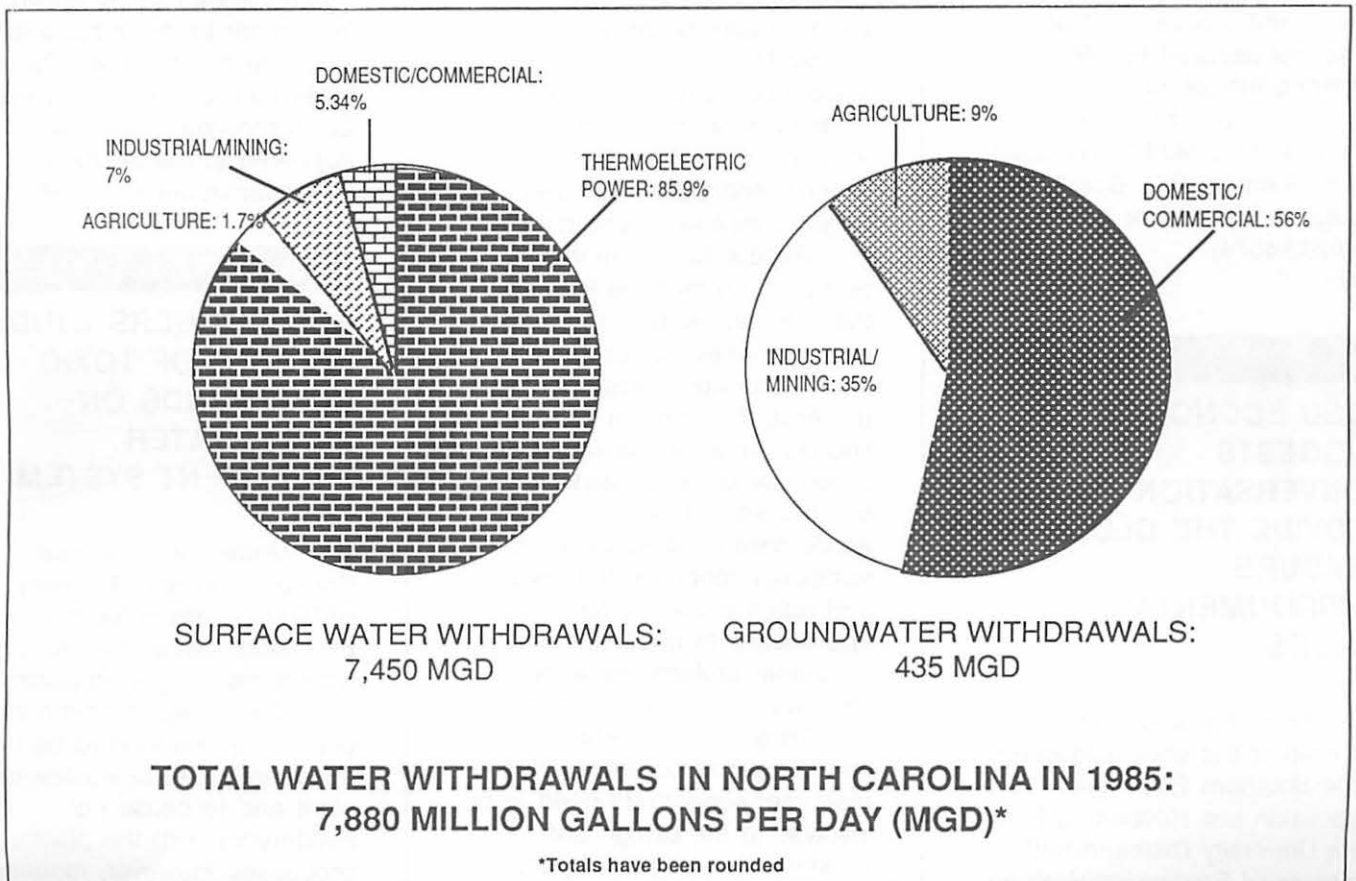
Public water supply systems withdrew 595 MGD per day from both surface and groundwater sources. These systems supplied water for domestic use for about 55 percent of the state's population and also supplied water for some commercial and industrial uses. About three percent (16.5 MGD) of public supply withdrawals was lost in the conveyance of water from supply systems to users. Daily household use by people supplied publicly was 91 gallons. The 1985 per capita use for public supply, including domestic, commercial, and industrial use, was 172 gallons per day, which is a decrease from the 184 gallons per day used in 1980.

North Carolina ranks fourth in the nation in self-supplied domestic use. About 2.8 million

people in the state rely on private wells or springs, and in 1985 they withdrew 169 MGD for domestic use, about 60 gallons per person per day.

In 1985, industrial and mining use totaled 661 MGD, of which 533 MGD was self-supplied. The largest self-supplied industrial water use is for the manufacture of paper products. The second largest self-supplied industrial withdrawals are for mining. Other major industrial water users are textile and chemical manufacturing.

Withdrawals for agriculture are small compared to other water use categories, accounting for only 2.1 percent (167 MGD) of total freshwater use. While agricultural irrigation withdrawals in the state increased by 61 percent between 1970 and 1980, they remained fairly constant from 1980 to 1985.



STATE SETS FEES FOR LAND DISTURBING PROGRAMS

As authorized by the General Assembly, the N.C. Department of Environment, Health, and Natural Resources (EHNR) has set fees in the dam safety, mining, and erosion and sedimentation control programs.

Processing and other administrative fees are now being charged to companies and individuals submitting materials such as mine permit applications and renewals, dam construction and removal plans, and erosion and sedimentation control plans.

Fees were set based on the amount of work required to review and process materials, conduct inspections, and prepare enforcement proceedings. The mining and development industry, engineers, contractors, conservation groups, and local government erosion control personnel assisted EHNR in preparing the fee schedule.

For a copy of the fee schedule, write Mell Nevils, Land Quality Section, P.O. Box 27687, Raleigh, NC 27611 or call (919/733-4574).

NCSU ECONOMIST SUGGESTS CONVERSATION MAY PROVIDE THE CLUES TO MEASURE ENVIRONMENTAL VALUES

In the Presidential Address delivered at the annual meeting of the Southern Economic Association last November, N.C. State University Distinguished Professor of Economics V. Kerry

Smith suggests that when it comes to environmental issues, economists may need to put as much stock in what people say as in what they do.

According to Smith, understanding people's values for the environment requires that we reconsider two principles economists traditionally use for assigning monetary values to commodities or services.

First, economists typically assume that people value resources only because they want to use them in some way. But, he explains, recent studies reveal that people may place a high value on simply knowing that resources like an uncontaminated aquifer or a particular animal species exist, even if they never use the aquifer's water or attempt to see the animal.

Second, because economists have assumed that consumer choices provide the only measure of people's values, traditional economic strategies cannot measure these "existence values" for any resource. "Existence values leave little or no behavioral trail," says Smith. In order to measure them, he asserts, economists need to begin "conversing" with people.

Researchers in marketing and psychology have learned that conversations in the form of questionnaires can produce information about what people do. And, they can be used to find out what people would do in a new set of circumstances, Smith says. He believes that economists must move outside traditional economic frameworks and adapt these conversational approaches to understanding consumer preferences about changes in the environment.

To address questions about how people value environmental resource, economists need to be involved in the design and conduct of surveys. They must

develop new skills directed at understanding how to communicate hypothetical choices to people. Instead of leaving the design and implementation of surveys to other researchers, economists must learn how to structure these conversations and use them to extract the information they need, like how much a person would be willing to pay to preserve an endangered species.

According to Smith, "Economists have paid little attention to participation in the 'front end' . . . of dialogues in an active way, preferring instead to ask for passive reports on what people have done, rather than their plans or how they would respond to new situations. Once the sources of value are generalized to include existence or nonuse values for resources, choice does not provide sufficient information. If these values are to be measured, then we must begin to accept that information about values can be derived from other forms of behavior."

Smith's address, "Can We Measure the Economic Value of Environmental Amenities?" appeared in the *Southern Economic Journal* in April 1990.

RESEARCHERS STUDY EFFECTS OF TOXIC COMPOUNDS ON WASTEWATER TREATMENT SYSTEM

Under the Resource Conservation and Recovery Act (RCRA) Domestic Sewage Exclusion, certain hazardous wastes discharged to publicly owned wastewater treatment plants are assumed to be treated adequately by the wastewater plant and to cause no interference with the plant's processes. However, regulatory

agencies and scientists have become increasingly concerned about the possibility that organic compounds excluded from RCRA regulations under the Domestic Sewage Exclusion are being discharged into the environment without adequate treatment. Recent changes in regulations requiring wastewater treatment plants to reduce ammonia discharge have heightened that concern since it is not known what effect organic compounds might have on processes commonly used to remove ammonia.

Researchers at the EPA Risk Reduction Engineering Laboratory recently conducted a study to assess how well one of those commonly used processes—extended aeration with dual media secondary effluent filters—removes 28 RCRA-regulated compounds and how the compounds affect the treatment process. Two 3.8 L/min pilot-scale systems were spiked—one continuously, one intermittently—with the 28 RCRA compounds at several different concentrations ranging from 0.25 to 1.0 mg/L of each organic. The compounds were selected to ensure a good representation of RCRA compounds with a wide range of properties.

The effect of the compound concentrations on the ability of the pilot-scale plant to adequately treat the wastewater was investigated. Chemical oxygen demand (COD), nitrate, ammonia, and total Kjeldahl nitrogen (TKN) were the variables used to evaluate the systems' performance. Performance was compared under five different spike conditions: baseline, total spike concentration of 1.8 mg/L (average sum of amount of each compound); total spike concentration of 4.8 mg/L; total spike concentration of 19.2 mg/L; and discontinuation of spike. Results seemed to indicate that

nitrification was inhibited even at low spike concentration, although ammonia reduction by secondary treatment was not inhibited until spike concentrations between 4.8 and 19.2 mg/L were reached.

In the treatability phase of the investigation, the influent spike concentration was about 0.1 mg/L for each compound. Concentration of the 28 compounds at different stages of the treatment process were studied. Almost 100 percent of the spiked organic RCRA compounds was removed when the spike concentration was at 1.8 mg/L for the continuously spiked system and at 1.3 mg/L for the intermittently spiked system.

The study indicates that an extended aeration wastewater treatment plant can efficiently remove low concentrations of organic RCRA compound without interfering with BOD, ammonia, and suspended solids removal. The researchers caution that a correlation between this study and a real-life situation is risky, however, because of the many different combinations and concentrations of RCRA compounds that could be expected in the influent to a municipal wastewater treatment plant.

The report, "Treatability of RCRA Compounds in a BOD/Nitrification Wastewater Treatment System with Dual Media Filtration" (Order No. PB 90-194 705/AS) is available at a cost of \$17.00 from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161 (703/487-4650).

The proportion of farm operators in North Carolina claiming their principal occupation to be something other than farming rose from 43 percent to 48 percent between 1978 and 1987. *N.C. State Economist*, October 1990

USGS REPORTS RESULTS OF GROUNDWATER STUDIES AT CHERRY POINT

The U.S. Geological Survey has recently released two reports on groundwater quality studies performed at the U.S. Marine Corps Air Station, Cherry Point, NC, in cooperation with the Department of the Navy, U.S. Marine Corps. The studies, part of a four-year, multi-phase investigation, were undertaken in response to the increasing water supply needs of the Air Station and the potential for contamination of the water supply aquifer (Castle Hayne) by waste disposal and spills.

One report gives results of an examination of groundwater quality in an area that encompasses the Air Station wastewater treatment plant and associated polishing lagoons and other waste disposal sites, including two closed industrial sludge pits. For a number of years until August 1987, rinse and wash water from the metal-plating plant at MCAS flowed from the industrial wastewater treatment plant to the Air Station wastewater treatment plant. The effluent was discharged through polishing lagoons and ultimately into Slocum Creek, a tributary of the Neuse River. Between March and May 1988 data were collected from eight wells completed in the surficial aquifer both upgradient and downgradient from the wastewater treatment plant and polishing lagoons.

Relatively low concentrations of organic compounds and pesticides were detected in water samples collected from all of the wells. Trace metals were detected in concentrations above minimum

detectable limits in all of the wells and were found to be higher in water samples collected from the downgradient wells.

The second report details the second phase of a study of groundwater quality near two unlined hazardous waste disposal sites. Near the northernmost landfill site, differences in hydraulic head between the surficial, intermediate Yorktown, and Castle Hayne aquifers indicate a potential for migration of contaminants downward into the intermediate Yorktown and Castle Hayne aquifers. Movement would be impeded, however, by two confining units of silty sand to sandy clay that separate these aquifers. Data collected near the southernmost landfill, indicate that both the Castle Hayne and Yorktown aquifers discharge into the surficial aquifer, minimizing the potential for downward contaminant movement. Groundwater in the surficial aquifer at both landfills moves laterally away from nearby drinking water supply wells and toward Slocum Creek.

High concentrations of two organic compounds, trichloroethylene and 1,2-dichloroethene were detected in water samples collected from the surficial aquifer near the southernmost landfill. Much smaller concentrations of the substances were detected in samples from wells in the Yorktown aquifer. Only trace amounts of organic compounds were detected in the surficial and Yorktown aquifers near the northernmost landfill. Trace metals were detected in most of the wells sampled near both landfills but none exceeded EPA drinking water standards except for iron and manganese. Highest concentrations of priority pollutant metals detected were for zinc and chromium.

The reports, "Hydrogeologic, Water-Level, and Water-Quality Data from Monitoring Wells at the U.S. Marine Corps Air Station, Cherry Point, North Carolina" (Water Resources Investigations Report 89-4200) and "Hydrogeologic and Water-Quality Data from Well Clusters near the Wastewater-Treatment Plant, U.S. Marine Corps Air Station, Cherry Point, North Carolina" (USGS Open-File Report 89-615) are available from the USGS Books and Open-file Reports Section, Federal Center, Box 25425, Denver, CO 80225.

USGS ANALYSIS CORRECTS LONG-HELD MISCONCEPTIONS ABOUT GROUNDWATER YIELDS IN PIEDMONT AND BLUE RIDGE PROVINCES

Because the potential for further development of surface water supplies in the Piedmont and Blue Ridge provinces of North Carolina is limited, growing communities and industries needing moderate to large water supplies will need increasingly to turn to groundwater development. Groundwater in the crystalline rocks of the Piedmont and Blue Ridge is of good chemical quality, requires little treatment, and is relatively inexpensive to develop. On the other hand, the rocks underlying the Blue Ridge and Piedmont have the reputation of furnishing only small quantities of groundwater.

According to a recently re-released USGS report, however, this impression is the result of the drilling of large numbers of low-yielding domestic wells without regard to geology, topography, and optimal

construction. The report, *Statistical Analysis Relating Well Yield to Construction Practices and Siting of Wells in the Piedmont and Blue Ridge Provinces of North Carolina* by Charles C. Daniel, III, was prepared by the U.S. Geological Survey in cooperation with the N.C. Department of Natural Resources and Community Development (now Environment, Health and Natural Resources). It says that wells yielding tens to hundreds of gallons per minute can likely be developed at carefully selected sites throughout the Blue Ridge and Piedmont.

This conclusion is based on a statistical analysis of data from more than 6,200 water wells drilled in fractured crystalline rocks in an area encompassing 65 counties in the western two-thirds of the state. The analysis shows that wells in draws or valleys have average yields three times those of wells on hills and ridges, that well diameter has a significant influence on yield, and that maximum well yields are obtained from much greater depths than previously believed.

The report, USGS Water Resources Investigations Report 86-4132, may be borrowed from WRRRI and is available from the U.S. Geological Survey Books and Open-File Reports, Federal Center, Box 25425, Denver, CO 80225 (303) 236-7476.

The National Ground Water Information Center (NGWIC), operated by the National Water Well Association, maintains a collection of its own computerized, on-line data bases, accesses other important on-line data base systems, and retrieves documents from an international network of sources to provide customized research on all ground water-related topics. The center also maintains an audio tape loan and transcription service of more than 550 workshops and seminars on groundwater topics and offers inter-library loans from its 20,000-volume collection. For information contact NGWIC, 6375 Riverside Dr., Dublin, OH 43017 (614/761-1711).

VIRGINIA PUBLICATION HELPS CITIZENS UNDERSTAND DRINKING WATER STANDARDS

What do the Standards Mean? A Citizen's Guide to Drinking Water Contaminants published recently by the Virginia Water Resources Research Center offers citizens who are concerned or simply curious about the purity of their drinking water a guide for having their water tested and assessing the test results.

In Part 1, the guide discusses contaminants, symptoms of contamination, drinking water standards, how to select a water testing laboratory,

how to interpret the results of the test, and how to choose a treatment device to solve any contamination problems that might be revealed. Part 2 lists and describes contaminants for which the U.S. EPA has been directed to set standards. Appendices contain a list of regulated contaminants, a discussion of disinfecting wells and water systems with liquid laundry bleach, a list of secondary maximum contaminant levels, and additional sources of information.

The 88-page, soft cover publication is available to those outside Virginia at a cost of \$8.00. Payment must accompany the order. Write: Publication Services, Virginia Water Resources Research Center, 617 N. Main St., Blacksburg, VA 24060-3397.

DUKE ANNOUNCES SPRING PROFESSIONAL DEVELOPMENT COURSES

Duke University's School of Forestry and Environmental Studies offers the following week-long modules of instruction on topics of interest to natural resources professionals:

BASIC GROUNDWATER HYDROLOGY. March 4-8, 1991. Instructor: Ralph Heath

MATHEMATICAL MODELING OF LAKE AND RESERVOIR WATER QUALITY. February 25- March 1. Instructors: Steve Chapra, Ken Reckhow.

COASTAL ZONE MANAGEMENT. April class, times to be announced. Instructors: David Brower, David Owens.

ENVIRONMENTAL TOXICOLOGY AND RISK ASSESSMENT. March 25-29. Instructors: Richard Di Giulio, Ken Reckhow.

HAZARDOUS WASTE MANAGEMENT: THE SUPERFUND PROGRAM. April class, time to be announced. Instructor: Gordon Davidson.

ELEMENTS OF FORESTRY. February 18-22. Instructor: Douglas MacKinnon.

For more information contact Julie D. Gay, School of Forestry and Environmental Studies, Duke University, Durham, NC 27706 (919/684-2135)

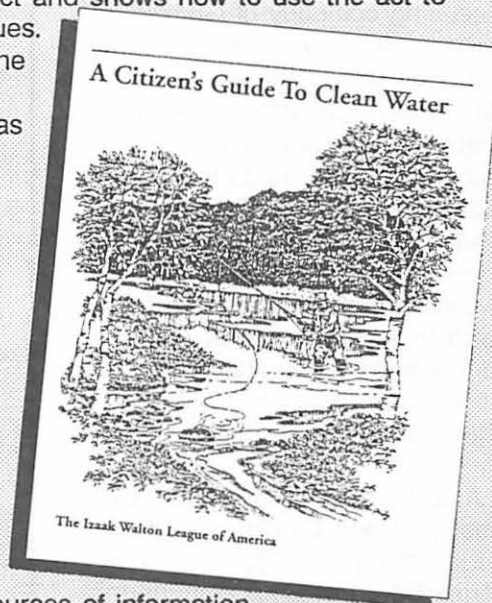
Superfund accounts for about 50% of EPA's resources and about 33% of its personnel. *Environmental Engineering News*, Purdue University, July/Aug 1990.

IZAAK WALTON LEAGUE PUBLICATION IS GUIDE FOR CLEAN WATER ADVOCACY

A Citizen's Guide to Clean Water recently published by the Izaak Walton League of America acquaints citizens with the history and provisions of the Clean Water Act and shows how to use the act to take a positive role in water issues.

The publication discusses the history, objectives, and funding of the Clean Water Act as well as regulatory structure and programs operating under the act. It contains action checklists and hints for collecting information and promoting effective citizen participation, and quick references, including "Highlights of the 1987 Amendments to the Act" and keys to its programs. Appendices list other laws for protection of water quality, relevant offices of the U.S. Environmental Protection Agency, additional sources of information, state NPDES program status, and priority toxic pollutants.

The 50-page, soft-cover publication is available from the Izaak Walton League of America, 1401 Wilson Blvd., Level B, Arlington, VA 22209 (703/528-1818).



DIGEST

N.C. COUNTY COMMISSIONERS' ENVIRONMENTAL POLICY. At its annual conference in Asheville in August, the N.C. Association of County Commissioners adopted a statement of environmental policy declaring that county governments must play a key role in the development and implementation of environmental policy and that powers delegated to counties for the protection of the public health and regulation of development are important tools for carrying out measures to protect land, air and water resources. Included in the policy are five principles the Association says should guide the relationship between the state and local governments. These principles emphasize early involvement of local governments in development of administrative rules, opportunity for review and comment on state-issued permits for activities affecting the environment, flexibility at the local level in carrying out environmental policy, maximum local discretion in setting fees for environmentally related services, and state funding for start-up expenditures resulting from state-mandated local environmental responsibilities. *County Lines*, newsletter of the N.C. Association of County Commissioners, Sept 5, 1990

ROCKY MOUNTAIN DUNES. Using satellite imagery, a geologist at the University of Colorado has identified a pattern of giant sand dunes on the plains east of the Rocky Mountains. The scientist says there is only a thin layer of topsoil precariously supporting vegetative cover on these ancient

dunes and that a drier climate brought on by global warming could reactivate the dunes. If predicted grain price increases encouraged farmers to resume plowing and monocropping marginal grasslands, the resulting return to high erosion rates could accelerate the dunes' re-emergence. *Environment* July/Aug 1990

BROOKLYN AQUIFER CLEANUP. Over the last 40 years, more than 17 million gallons of petroleum products from oil storage facilities have seeped into the groundwater beneath Brooklyn, New York. City officials would like to be able to use the groundwater during droughts, but until now none of the half-dozen oil companies operating in the area would accept responsibility for cleaning up the pollution. Recently, however, Mobile Oil Company agreed to finance a full cleanup, expected to cost tens of millions of dollars. *Environment* July/Aug 1990

PRAIRIE RESTORATION. The licensing company of Garfield creator Jim Davis, with aid from the federal government, is undertaking an effort to restore depleted farmland around Albany, Indiana, to its former state as prairie and forested wetlands. Forty-one acres have been sown with grasses and wildflowers and dikes have been built to replenish five acres of drained wetlands. The goal is to restore 500 acres in 10 years. *Garbage* Sept/Oct 1990

LAKE GASTON PIPELINE. Even though North Carolina continues legal efforts to nullify the U.S. Army Corps of Engineers' permit for the Lake Gaston pipeline, the City of Virginia Beach has awarded the first construction contract on the project. A contract with Dixie Constructors

Inc. of Virginia is the first that will be awarded if the Corps permit stands up. The current estimate is that the pipeline project will cost \$219 million. *Water News* Virginia Water Resources Research Center, Oct 1990

FIGHT OVER THE CHATTAHOOCHEE. Alabama has filed suit to stop a U.S. Army Corps of Engineers' plan to divert more water from Georgia's Lake Lanier, which is fed by the Chattahoochee River. The Chattahoochee forms the border between Alabama and Georgia before flowing into Florida, which is backing Alabama's suit. The Corps plans to reallocate storage capacity from hydropower production to water supply in three reservoirs, including Lake Lanier, to increase Atlanta's water supply. The proposed plan would increase diversions of water from the Chattahoochee by 50 percent to a total of 529 million gallons a day. *U.S. Water News* Oct 1990

AQUIFER STORAGE AND RECOVERY. The injection of treated drinking water into a suitable aquifer during periods of surplus (Aquifer Storage and Recovery-ASR) is proving to be an effective technique not only for storing water from wet periods for use during dry months but also as an alternative to increasing water treatment capacity. ASR is typically used for treated surface water. Once the water has been filtered for sediment and similar impurities it is injected into an aquifer. The only further required treatment is chlorination. The technique has also been used to store in a deeper aquifer water taken from a shallow aquifer subject to limited flow rates. According to an engineer with CH2M Hill, the originator of the process, seven U.S. communities are utilizing ASR. In Chesapeake, VA, the

system is being used to solve dry season water shortages cause by salt encroachment in the Northwest River estuary and to enhance the efficiency of the town's water treatment plant. For the systems to be effective, a community must face a seasonal variation in water supply or demand; have potential for a facility capable of greater than one million gallons per day of recovery; and have a storage aquifer with a strong clay confining layer. *RCRA Review* Sept 1990; *ripples*, newsletter of Oklahoma State University Center for Water Research, Sept-Oct 1990

GREAT LAKES TOXIC HEALTH THREAT. An international commission studying water quality in the Great Lakes says that investigations there strongly suggest exposure to low levels of persistent toxic substances is a potential threat to human health. In its Fifth Biennial Report on Great Lakes Water Quality, the International Joint Commission reports results of a study in western Michigan of mothers who consumed Lake Michigan fish on a regular basis. The results suggest that exposure to chemicals, particularly certain PCBs, was damaging to the offspring of the mothers. The researchers found the length of the gestation period, birth weight, skull circumstances and cognitive, motor and behavioral development of the infants were adversely affected by the mother's lifetime consumption of Lake Michigan fish. Other data suggest that 16 Great Lakes wildlife species near the top of the food web, including minks and eagles, have suffered reproductive problems or declines in populations. Copies of the report can be obtained from the IJC, P.O. Box 32869, Detroit, MI 48232 (313/226-2170). *Water Impacts*, newsletter of the

Michigan State Institute of Water Research May 1990

SAUDI GROUNDWATER CRISIS. Saudi Arabian cities will have to drastically reduce water usage if they are to avoid the health and structural effects of rising contaminated groundwater. Contrary to traditional theory, urbanization and water importation in the Arabian peninsula have greatly increased groundwater recharge. In Riyadh, a tenfold increase in recharge to aquifers under the city has resulted from over-irrigation, leakage from cesspits and sewers, and drain overflows. According to consultant Dames & Moore, two-thirds of Riyadh's daily water use of 900,000m³ goes straight into the ground. The rising sulfate and chloride enriched groundwaters are attacking foundations and concrete structures and endangering drinking water supplies. A formerly dry river south of Riyadh now flow continuously with water losses from the city center and from the artificially high water table. *World Water* Sept 1990

SOVIET DETOX BREAKTHROUGHS. Scientists at the Rotor Scientific Establishment in the Ukraine say they have developed two water purification processes that could revolutionize the removal of heavy metals and pollutants from drinking and factory water. The first method is a cheap, secret-formula powder suspended in water that can remove heavy metals and radioisotopes. According to an Establishment spokesman, the black powder is mainly iron-based and is produced dry with other constituents but is then stored in water as a suspension to remain active. Residue from the powder process, filtered from water after treatment, can be used as toner

in photocopying machines, the spokesman says. The second treatment method-called Magnetic Light Gas Centrifugal pollutant filtering/recycling-can separate metal elements from industrial wastewater. *World Water* April 1990

OIL POLLUTION. By one estimate there are times when 40 percent of the pollution in our nation's water is old motor oil, containing lead and trace amounts of other toxic metals plus a variety of hydrocarbons, many of which are toxic to aquatic life, even at low concentrations. A single pint of used motor oil can create an oil slick the size of a football field. One part oil to one million parts water is detectable to taste and smell. Average estimates indicate that 240 million gallons of used crankcase oil find their way into the nation's lakes, rivers, and streams each year, 22 times more oil than the Exxon Valdez spilled in Alaska. *divining rod*, newsletter of the New Mexico Water Resources Research Institute, Fall 1990

OVER-FERTILIZATION. According to a water quality program manager with the U.S. Department of Agriculture, a majority of the nation's farmers over-fertilize their fields because it is cost-effective for them to do so. Speaking to a recent NATO workshop, Charles Onstad said that 53 percent of the fields surveyed in Nebraska in 1988 were receiving 30 percent or more above the recommended rate of nitrogen. At the same workshop USDA researcher James Schepers said, "Farmers know there is a one-to-one ratio for nitrogen applied and yield received. It's often considered. . . insurance for the uncertainties that occur in farming." *U.S. Water News*, Nov 1990

UPCOMING CONFERENCES AND WORKSHOPS

The N.C. Division of Environmental Health and the NCSU Departments of Soil Science and Biological and Agricultural Engineering are sponsoring the FIFTH ANNUAL ON-SITE SEWAGE TREATMENT CONFERENCE: ALTERNATIVE SYSTEMS: THE NEXT TEN YEARS November 27-29, 1990, at the Jane S. McKimmon Center in Raleigh. This is an advanced conference that will provide the most up-to-date information from across the United States. Classroom sessions will address the environmental and public health effects of on-site systems and the siting, design, and long-term management of alternative systems. Recent on-site research studies will be summarized and a special session will describe some of the latest local health department initiatives. At an NCSU demonstration and field research site, researchers will demonstrate alternatives already in use in the state, those for which rules are currently being drafted, and alternatives infrequently utilized. Advance registration required by Nov 21, 1990. \$60, full-time public agency employees, \$120 all others. Call Bruce Winston/Mavis Stillman, NCSU Division of Lifelong Education (919)737-2261.

The Triangle J Council of Governments is sponsoring the third biennial NORTH CAROLINA GEOGRAPHIC INFORMATION SYSTEMS CONFERENCE January 10 and 11, 1991, in the Raleigh Civic and Convention Center. For information contact Triangle J at (919) 549-0551.

The American Water Resources Association is sponsoring a symposium on WATER SUPPLY AND WATER REUSE: 1991 AND BEYOND in San Diego, CA, June 2-6, 1991. For information contact General Chairperson Steve Pearson, Woodward-Clyde Consultants, 1550 Hotel Circle North, San Diego, CA 92108, San Diego, CA 92108 (619)294-9400).

The American Water Resources Association is sponsoring a symposium on SURFACE AND GROUND WATER QUALITY in Cleveland, OH, Feb 24-28, 1991. For information contact General Chairperson David Kirkpatrick, U.S. EPA, 230 S. Dearborn St. 5WQS, Chicago, IL 60604 (312)886-0132)

The College of Engineering of the University of Texas at Austin is presenting a short course, CONTAMINATED SOIL BIOREMEDIATION

December 5-7, 1990, on the University of Texas campus in Austin. For information on the course call Dr. Raymond C. Loehr at (512) 471-4624. For registration information call Continuing Engineering Studies at (512) 471-3506.

The Gulf Coast Hazardous Substance Research Center will present BIOREMEDIATION: FUNDAMENTALS & EFFECTIVE APPLICATIONS February 21-22, 1991, at Lamar University in Beaumont, TX. Registration deadline is Feb 12, 1991. For information contact GCHSRC, Lamar University, P.O. Box 10613, Beaumont, TX 77710.

POSITIONS AVAILABLE

The Department of Biological and Agricultural Engineering at North Carolina State University seeks candidates for two positions as Extension Water Quality Specialist. These are non-tenure faculty positions with the NCSU Water Quality Group. The group assists agricultural NPS projects, evaluates BMP effectiveness, prepares guidance for watershed management and develops BMP and sediment control manuals. MS in agricultural or environmental engineering, water resources or related field is required. Knowledge of agricultural best management practices for nonpoint source pollution and watershed hydrology is desired. Ability to write and communicate effectively is essential. Positions are available 12/1/90. Search will end when suitable candidates are found. Send resume, transcripts and three references to Jean Spooner, Interim Director, NCSU Water Quality Group, Bio. & Ag. Engineering, NCSU, Raleigh, NC 27695-7625.

The Department of Marine, Earth, and Atmospheric Sciences at North Carolina State University invites applications for a tenure-track position at any level in geophysics (hydrogeophysics, shallow exploration geophysics, or research related to global change) in hydrogeology (including surficial and subterranean fluid transport systems, quantitative geomorphology, water quality). The Earth Sciences faculty is initiating a new directive in environmental geology as part the department's growing emphasis on global change. Successful candidate will be expected to establish strong research program and to teach at undergraduate and graduate levels. Priority will be given to candidates with interdisciplinary interests. Closing date: Jan 15, 1991. Contact: Chair, Earth Sciences Search Committee, Department

of Marine, Earth and Atmospheric Sciences, NCSU, Box 8208, Raleigh, NC 27695-8208.

The University of Connecticut Department of Civil Engineering seeks applications for a tenure-track position in the area of biochemical processes in environmental engineering at the assistant professor level. Duties include teaching and advising undergraduate and graduate civil engineering students, developing sponsored research program, and directing graduate research. An engineering degree, civil engineering preferred, and a PhD in an appropriate field are required. Position available January 1991. Contact: Professor Domenic Grasso, Chairman, Search Committee, Department of Civil Engineering, The University of Connecticut, Storrs, CT 06269-3037.

The City of Durham, North Carolina, seeks candidates for the position of Deputy Director of Water Resources. Professional and administrative work assisting in the direction of the programs and operations which include water supply, water and wastewater treatment and laboratory activities, to include budget and finances and personnel management. Requires four-year degree supplemented by a master's degree in sanitary or public health engineering or a related field and three to four years of experience in a water and wastewater treatment program. Must possess or obtain within specified period N.C. Grade A water and Grade IV wastewater certificates. Salary range: \$40874 - \$62,134. Send resume to City of Durham, Human Resources Department, 101 City Hall Plaza, Durham, NC 27701 or FAX 919/687-0896. Closing Date: December 14, 1990.

The Northwest Florida Water Management District seeks candidates for the position of senior hydrologist. Requires a bachelor's degree in engineering, hydrology, or related field and six years of experience, or master's degree with four years of experience. Position entails organizing and supervising surface water investigations, conducting research relating to surface water resources, training and supervising professional and technical staff, and report preparation. Requires effective communication with engineers, resource planners, environmental scientists, and other professionals. Contact NWFWD Personnel Office, P.O. Box 38085, Tallahassee, FL 32315 for additional information. Closing date: November 30, 1990.

WATER RESOURCES CONDITIONS FOR SEPTEMBER

Preliminary data for September 1990 indicate that temperature averaged across the contiguous United States was well above the long-term mean, with this September ranking as the third warmest on record (record begins in 1895). Areally averaged precipitation for the nation was below the long-term mean, ranking September as the 15th driest on record.

The Southeast was extremely dry during the six-month

period ending with September, resulting in a rapidly growing drought area. April-September precipitation ranks 1990 as the third driest on record in the Southeast. Charleston, SC, had its driest September on record with 0.18 of an inch of rain.

In North Carolina, September rainfall was 1.43 inches at Asheville (2.53 below normal), 1.75 inches at Charlotte (1.84 below normal), 1.16 at Greensboro (2.48 below normal) and 0.30 inches at Raleigh—2.99 below normal and the third lowest September rainfall since 1887.

Streamflow declined seasonally during September

throughout North Carolina. An area of deficient streamflow that developed in August in the eastern Piedmont and southwestern Coastal Plain spread to include all of the northern Coastal Plain, with the flow of most unregulated streams being sustained by baseflow by month's end.

Groundwater levels in unconfined aquifers declined seasonally across the State. They remained above average in the Piedmont and Blue Ridge Provinces and slightly below average in the Coastal Plain.

U.S. Geological Survey

PUBLICATIONS RECEIVED BY THE INSTITUTE

Residents of North Carolina may borrow these publications from the Institute for a period of two weeks. If you need copies to keep, please request them from the organizations issuing the publications. Addresses are provided for this purpose.

Estuaries

A Guide to Estuaries of the Albemarle-Pamlico Region North Carolina. 1989. Judith A. Gale. Albemarle-Pamlico Estuarine Study, N.C. Dept. of Environment, Health, and Natural Resources, P.O. Box 27687, Raleigh, N.C. 27611-7687. (136 pages) (02-H-1)

Where the Rivers Meet the Sea. 1989. Frank Tursi. Albemarle-Pamlico Estuarine Study, N.C. Dept. Environment, Health, and Natural Resources, Raleigh, NC 27611-7687. (68 pages) (02-H-1)

Noncommercial Invertebrate Species and Associated Environmental Factors within the Estuarine Complex of Western Pamlico Sound, North Carolina: An Information Guide. 1989. UNC Sea Grant Working Paper 89-2. UNC Sea Grant College Program, Box 8605, North Carolina State University, Raleigh, NC 27695. (90 pages) (02-H-1)

Hydrogeology

Hydrogeologic Unit Map of the Piedmont and Blue Ridge Provinces of North Carolina. Charles C. Daniel, III, and Robert A. Payne. U.S. Geological Survey Water Resources Investigations Report 90-4035. USGS, N.C. District, P.O. Box 2857, Raleigh, NC 27602. (02-F)

Water Quality

The Quality of Our Nation's Water: A Summary of the 1988 National Water Quality Inventory. 1990. EPA 440/4-90-005. U.S. Environmental Protection Agency, 401 M. Street, S.W.(WH-553), Washington, DC 20460. (24 pages) (05)

National Water Quality Inventory: 1988 Report to Congress. 1990. EPA 440-90-003. U.S. Environmental Protection Agency, 401 M Street S.W. (WH-553), Washington, DC 20460. (188 pages plus appendices) (05)

Metal Speciation and Immobilization Reactions Affecting the True Efficiency of Artificial Wetlands to Treat Acid Mine Drainage. 1990. A.D. Karathanasis and Y. L. Thompson. Research Report No. 175, University of Kentucky Water Resources Research Institute, Lexington, KY. (120 pages) (05-D)

Effects of Aromatic Concentration on Methane Fermentation. 1990. Yi-Tin Wang, Pin-Chieh Pai, and H. David Gabbard. Research Report No. 174, University of Kentucky, Water Resources Research Institute, Lexington, KY. (156 pages) (05-D)

Experimental Evaluation of Food Chain Manipulation as a Means for Preventing Algal Blooms in Lakes. 1990. William R. DeMott. Technical Report Number 190, Purdue University Water Resources Research Center, School of Engineering, Purdue University, West Lafayette, IN 47907. (36 pages) (02-I)

Planning

1990 National Water and Wastewater Rate Survey. 1990. National Environmental Consulting Group, Ernst & Young. 1100 Independence Center, Charlotte, NC 28246 (704/372-6300). (68 pages) (06-C)

Soils

Soil Survey of Bladen County, North Carolina. 1990. (180 pages, 18 soil maps) (08-D)

Soil Survey of Pender County, North Carolina. 1990. (150 pages, 18 soil maps) (08-D)

Soil Survey of Columbus County, North Carolina. 1990. (138 pages, 21 soil maps) (08-D)

Soil Survey of Bertie County, North Carolina. 1990. (116 pages, 20 soil maps) (08-D)

National Cooperative Soil Survey - USDA Soil Conservation Service, 4405 Bland Road, Suite 205, Raleigh, NC 27609.

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