WATER HIGHLIGHTS
D.C. WATER RESOURCES RESEARCH CENTER,
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- SECTION 105 GRANT APPLICATION ANNOUNCEMENT
- ANNOUNCEMENT SPECIAL U.D.C. WEEK SEMINAR
- D.C. WATER AGENCY BRIEF
- HIGHLIGHT/SUMMARY OCTOBER SEMINAR
- INTERNATIONAL WATER RESOURCES MANAGEMENT
- WRRC NOTES
- MARINE/AQUATIC NOTES
- MEETING SCHEDULE
- VACANCY ANNOUNCEMENTS
- PUBLICATIONS RECEIVED AT D.C. WRRC
GRANT APPLICATION ANNOUNCEMENT


SPECIAL U.D.C. WEEK SEMINAR

The following are abstracts of papers presented by Principal Investigators at a seminar convened by the D.C. Water Resources Research Center and The Agricultural Experiment Station on November 21, 1986 at the Van Ness Campus of the University of the District of Columbia:

NONIONIC SURFECTANTS AND NONYLPHENOL

By

M.M. Varma, D.M. Patel and J.H. Johnson, Jr. School of Civil Engineering Howard University

Nonionic surfactants (4-Alylphenol polyethaxylates) are used extensively in this country (140,000 metric tons) per year. It is estimated that 70 percent of the nonylphenol manufactured in the United States is used by surfactant manufacturers, and the remaining 30 percent is used by plastic, rubber, fungicide, bactericides, and dye industries. 4-Nonylphenol has been measured in European wastewaters and sludges. The average residue in anaerobically digested sludge was 1.588/kg. This, when translated to municipal sludge in this country is approximately equal to 1000 ppm on a dry solid basis. It is more than any other contaminant found in sludge. Preliminary toxicity data shows that 4-Nonylphenol is highly toxic to aquatic organisms. The median lethal dose for fish and shrimp varies from 0.13. to 0.3 mg/1. It is two-fold more toxic than cadmium. This paper will review the impact of nonionic surfactants, methodology for its measurement, and other health implications. Preliminary results show that 4-Nonylphenol is present in some of the treatment plants tested by us.

SOIL PROPERTIES AFFECTING THE SORPTION OF HEAVY METALS FROM WASTES

By

James H. Preer, Professor
Department of Environmental Science
University of the District of Columbia

Land application of municipal sewage sludge has led to concern about food-chain contamination by toxic substances which may be present in the sludge. While both industrial pollution and urban runoff are major sources of a variety of toxic materials in sludge, we have focused on heavy metals from urban runoff. Another common soil amendment available in many urban areas is composted leaves. Because these leaves include materials swept from the streets, leaf compost may also be high in heavy metals. The effect of composted sewage sludge and municipal leaf compost on the heavy
metal content of garden soil and vegetables has been evaluated in a five-year study. Blue Plains sludge compost and District of Columbia leaf compost were applied at the rate of 50 tons per acre per year to experimental plots on an urban soil in the District of Columbia, and vegetables were raised on experimental and control plots. Soil and vegetables were analyzed each year. While soil metal levels increased due to application of sludge compost and leaf compost, vegetable metal levels were not significantly higher on sludge or leaf compost-treated plots. The implication of this research is that although sludge compost and leaf compost do add heavy metals to soil, under the conditions of the experiment the metals are not passed along to vegetables raised on these soils over a five-year period.

HEAVY METAL ACCUMULATION IN ANIMALS FED PLANTS GROWN IN SLUDGE COMPOST TREATED SOILS

By

Freddie M. Dixon, Associate Professor
Department of Biology University of the District of Columbia

Municipalities, including the District of Columbia are continually searching for sources of sludge disposal which are inexpensive and non-polluting. Many sewage treatment districts have found that composting stabilizes sludge and dilutes the metal concentration. The concentration of heavy metals such as cadmium, iron, zinc, copper, lead and nickel in sludge and the assimilation of these metals in plants may be consumed by humans. Studies are being conducted to measure the accumulation of heavy metals in the tissues of animals fed vegetables grown in soil treated with sludge compost. Spinach, lettuce and kale were raised in 10 by 10 feet plots on two compost treatments (33 and 65 dry tons per acre) and control (0 ton per acre). Soil samples were analyzed before and after planting, to determine pH. At harvest, plants were washed thoroughly and dried for 48 hours at 50 degrees centigrade. Female albino Swiss mice caged in nine groups of six mice/group are fed spinach, lettuce and kale as 25% of their diet. Diets and water are supplied ad libitum. The kidneys and liver will be analyzed at the end of the feeding period for Cd, Fe, Zn, Cu, Pb, and Ni. The pH of the soil increased from acidic to slightly alkaline in the 0, 33, and 65 dry tons per acre by the addition of either lime to the control plot or sludge compost which contains lime. The higher increases were recorded in the 33 and 65 dry tons per-acre produced higher yields of spinach, lettuce and kale than the control. Germination of spinach in all plots was poor. All vegetables are currently being analyzed for Cd, Fe, Zn, Cu, Pb, and Ni. Preliminary results of soil, sludge compost and plant tissue analysis by atomic absorption spectrophotometry will be presented.
D.C. WATER AGENCY BRIEF

THE DISTRICT OF COLUMBIA
WATER QUALITY PROGRAMS*

Water pollution control in the District of Columbia began as early as 1858 when the Corporation of Washington stipulated that new sewer connections be equipped with strainers. This kept solid matter out of the sewers and prevented solids from entering the Potomac and the Anacostia River. Present control activities are authorized by the D.C. Water Pollution Control Act of 1985 and the Federal Water Pollution Control Act.

One provision of the federal act requires the District to develop a water quality management plan. The plan identifies water quality problems and describes how to alleviate the problem and preserve water quality. Implementation of this plan has resulted in the upgrading of the Blue Plains wastewater treatment plant. The plant now provides secondary and advanced sewage treatment which has reduced the amount of pollutants entering the Potomac River. Monitoring activities conducted by the District show that Blue Plains is meeting effluent (treated sewage) requirements and that water quality in the Potomac has improved. The improved water quality has resulted in increased submerged aquatic vegetation and increased fish populations.

Water Pollution Control Activities

The sources of water pollution in the District are sewage, storm water runoff, and accidental spills of oil or other chemicals. To control pollution from these sources, the District has implemented four control measures:

Wastewater Treatment Initiatives

The District is constantly looking for innovative ways to maintain a high-quality effluent discharge to the Potomac River from the Blue Plains wastewater treatment plant. When considering possible improvements to the treatment process, the District develops a list that prioritizes the improvements under consideration for partial funding by the Environmental Protection Agency. The District then funds the projects with the highest priorities before funding other lower priority projects.

A high-priority treatment initiative recently undertaken by the District is the upgrading of the disinfection system at Blue Plains. Effluent from the treatment plant is disinfected by chlorine before it is discharged to the Potomac. The District is concerned about the effects of the disinfections on fish and other aquatic organisms. Consequently, the disinfections system is being upgraded so chlorine in the effluent will be neutralized before it enters the Potomac.

The District inspects Blue Plains to ensure the Plant is meeting its discharge permit requirements, and reviews plans and specifications for new treatment process components and modifications to the plant.

Storm Water Runoff

Storm water runoff is controlled through the storm water management and erosion control programs.
Emergency and Oil Spill Response

Responses to oil and chemical spills in the District waters are coordinated through the Mayor's Command Center. The District, in cooperation with the U.S. Coast Guard and the U.S. Environmental Protection Agency, monitors spill cleanup activities. Cleanup operations are conducted and financed by the spiller.

Regional Water Quality Activities

The Chesapeake Bay Restoration Program is a regional program aimed at improving water quality in the Chesapeake Bay. The District of Columbia, Maryland, Virginia, and Pennsylvania participate in this program. The District is represented on the various committees where activities are coordinated. Water quality monitoring samples are collected and analyzed the same way by all participants to ensure the data are comparable. Participants use the same data formats to allow quick access to the data. Models of the bay's water quality are developed with the cooperation of the states and the District.

Groundwater Management

A survey of the District's groundwater resources is planned. The survey will determine how much groundwater is present and the quality of the resource. This information will be used to develop groundwater protection policies.

Water Quality Monitoring

Approximately 3000 surface water samples are collected annually from 77 water quality monitoring stations on the Potomac and Anacostia Rivers, Rock Creek and C & O Canal, the Washington Channel, the Tidal Basin, and other smaller waterways in the District. Analysis of the samples shows water quality has improved steadily since the early 1970's. Every two years the monitoring staff prepares an assessment of the water quality of the District's rivers. The report is available to the public upon request.

Drinking water quality is also monitored. In 1985, the District investigated 650 consumer complaints of impaired drinking water quality with satisfactory resolution of all complaints.
provide information about the fish populations in District waters. To avoid over-exploitation of the fisheries resources, the District will introduce limits on the size and number of selected fish species an angler is allowed to keep. By providing suitable fish habitat, the District hopes to increase the number and diversity of fish in its waters. Plans are underway to construct artificial reefs to increase fish habitat and to make more fish available to shoreline anglers. Angler access to fishing areas will also be improved by construction of boat launching areas, pedestrian walkways, and handicapped ramps.

Research. The District responds to potential problems identified during routine surveys through its research activities. A study of Walleye population was recently initiated in response to concern about the present status of this species. This study will determine where these fish spawn, habitat preference, and the age distribution of the population. Another area of research under consideration is an investigation of the effects of the dam on the Potomac River at Little Falls which may block fish migration.

Education. The goal of the educational fishing program is to make people aware of the fisheries resources in the District. One of the District's first educational effort was the fishing clinic held at the 1984 River fest. The clinic was so successful that it will be repeated annually. Fishing techniques and fishing safety are taught at the clinics. The clinics are open to people of all ages and fishing equipment is provided. In addition, an Aquatic Education Project has been established for children aged 8-14. This class will be offered daily from July to August at waterfront locations throughout the District. Conservation ethics, aquatic biology, fishing techniques, and safety will be discussed; fishing opportunities close to home will be emphasized. Sign-up sheets will be available at neighborhood recreation centers. A children's fishing magazine will be published for participants to maintain their interest.

* For more than one hundred years, the District of Columbia has had effective environmental regulations and laws for the protection of the health, safety, and welfare of its citizens and visitors. During this time span, regulation and laws have been consistently updated in response to new scientific data, issues, and concerns. To carry out its present legislative and legal mandates, the District Government, through the Environmental Control Division, Department of Consumer and Regulatory Affairs, has implemented five major environmental programs to restore and protect the natural resources of the nation's capital. Each of the programs, while similar to the federal program, is designed to address the needs and concerns of a totally urban environment. The five major programs are: Water Quality, Hazardous Waste Man-
agreement, Soil Resources, Pesticides Control, and Air Quality. These programs also provide technical and administrative support for the District of Columbia Soil and Water Conservation District.

**HIGHLIGHTS/SUMMARY OF OCTOBER SEMINAR**

The Pooled Fund Project. Stormwater Management and Analysis System*

By

G.K. Young and J.T. Phillippe
GKY and Associates, Inc.

The presentation described a microcomputer hydrology and hydraulics system developed by GKY and Associates, Inc. with Ideamatics, Inc. for highway drainage applications. The system integrates existing FORTRAN stormwater drainage programs and also uses new programs to provide a modular, expandable, and comprehensive set of analyses. The objective of the effort is to provide state transportation agencies with micro-computer based tools for increasing design capabilities and reducing manpower requirements. The project is contracted through the Federal Highway Administration. The Pooled Fund Project system should have general utility for hydraulic engineers. States desiring to join this Administration (703) 285-2474 for necessary details.

The initial PFP work designed and implemented a system shell to manage the movement of input and output data between various drainage design programs and to provide a facility for file management. The system shell allows the engineer to interactively choose the appropriate analysis or design program (currently these programs are: hydrology, culvert design, bridge/culvert backwater design, and

The key design flow and design rainfall element of the PFP package was developed by GKY and Associates, Inc. to provide users with the ability to derive input data for hydraulic studies. A unique digitized rainfall intensity database that provides rainfall information for any location in the continental U.S. is included. The other analysis programs in the PFP system are used for design and review of highway drainage structures. The storm and sanitary sewer program, PFP-HYDRA, can be used to model an existing sewer system or to design a new lateral or trunk. The Culvert Design System can hydraulically design by review an existing or proposed culvert. Additional modules and programs are planned to be added as the user

* Editor's note. Topic of presentation made to D.C. WRRC sponsored seminar at the University of the District of Columbia, October 1986.
The featured speaker in the first program of this series, September 1986 was Dr. Ulrich Kuffner, senior water resources engineer of the World bank. His topic was “The Current Status of Water Resource Development in Northeast Africa”.

The second program featured Dr. Joseph C. Kennedy, Director of International Development for AFRICARE, November 1986. Dr. Kennedy described AFRICARE’s water resources development in over a dozen African countries.

Editor’s note. Future editions of Water Highlights will contain summary highlights of these informative lectures.

The D.C. WRRC in conjunction with ICPRB and others will participate in "ANACOSTIA RIVER MONTH" (April 1987). Planned WRRC events include "U.D.C. and the ANACOSTIA" - presentations of findings and results of on-going research projects by principal investigators; “A REPORT TO THE ANACOSTIA COMMUNITY” similar presentations on research conducted with emphasis on community relevancy; “THE ANACOSTIA RIVER AS A LABORATORY FOR STUDENTS”. Specific science and engineering problems guidance contributed by local water professionals.

D.C. WRRC - James H. Hannaham
(202) 282-7333
ICPRB – Beverly Bandler
(301) 984-1908
Technology Society, held at the Sheraton Washington Hotel, September 21-25, 1986, was assisted by volunteers from faculty and students of U.D.C., Howard and Georgetown Universities and coordinated through the D.C. WRRC. This also enabled the volunteers to attend conference sessions. One of the most popular sessions was the three-day Organitum Symposium, bringing together scholars from around the world on this timely and important topic. The U.S. Congress is debating the use of organitin, anti-foulant paints, which have been partially banned in France and are under banning consideration in England due to their extreme toxicity and effects on shellfish and the oyster industry. Other major sessions were on Monitoring Strategies (three days) and Advances in Oceanography. This OCEANS '86 Conference was one of the largest and best attended in the series and six volumes of abstracts were produced.

(Harriette Phelps, Professor, U.D.C. Department of Biology)

MEETING SCHEDULE*

January 1987
6-9 INTERNATIONAL CONFERENCE ON INFILTRATION DEVELOPMENT AND APPLICATION. Honolulu, HI. Contact: Dr. Yu-Si Fok, Dept. of Civil Engineering, Water Resources Research Center, 2540 Dole St., Honolulu, HI (808) 948-7298.

February 1987

26-27 EROSION CONTROL - AN INVESTMENT IN OUR FUTURE. Sparks, NV. Contact: ICEA Executive Director, P.O. Box 195, Pinole, CA 94564-0195 (415) 223-2134.

March 1987

9-13 5TH CONFERENCE ON APPLIED CLIMATOLOGY. Baltimore, MD. Contact: Dr. Nathaniel B. Gutman, National Climatic Data Center, Federal Bldg., Ashville, NC 28801 (704) 259-0478.


16-18 14TH ANNUAL CONFERENCE ON WATER RESOURCES PLANNING AND MANAGEMENT. Kansas City, MO. Contact: Dale D. Meredith, 1987 ASCE WRPM Specialty Conference, Civil Engineering Dept., 228 Engineering East, State University of New York at Buffalo, Buffalo, NY 16260.

April 1987

2-3 ADVANCES IN HYDROLOGICAL SCIENCES. San Diego, CA. Contact: AIH, P.O. Box 14251, St. Paul, MN 55101 (612) 379-1030.

SHORT COURSES, SEMINARS, AND WORKSHOPS*

January 15-16, 1987

SEMINAR ON PCSWMM3-U.S.EPA STORMWATER MANAGEMENT MODEL FOR THE IBM PC. Tallahassee, FL. Contact: Dr. W. James Chi, University of Alabama
March 18-20, 1987
BASICS OF GROUNDWATER MODELING. Indianapolis, IN. Contact: International Groundwater Modeling Center, Holcomb Research Institute, Butler University, 4600 Sunset Avenue, Indianapolis, IN 46208 (317) 283-9458.

March 23-27, 1987
APPLIED GROUNDWATER MODELING. Indianapolis, IN. Contact: International Groundwater Modeling Center, Holcomb Research Institute, Butler University, 4600 Sunset Avenue, Indianapolis, IN 46208 (317) 283-9458.

April 13-17, 1987
QUALITY AND POLLUTION OF GROUNDWATER: Indianapolis, IN. Contact: International Groundwater Modeling Center, Holcomb Research Institute, Butler University, 4600 Sunset Avenue, Indianapolis, IN 46208 (317) 283-9458.


CALLS FOR PAPERS*

ABSTRACTS DUE. SEVENTH ANNUAL "HYDROLOGY DAYS. Fort Collins, CO. April 21-24, 1987. Contact: Professor Morel-Seytoux, Hydrology Days, Department of Civil Engineering, Colorado State University, Fort Collins, CO 80523 (303) 491-6762 or 491-8549.


VACANCY ANNOUNCEMENTS*

• Assistant Professor and Assistant Water Management Scientist in the Agricultural Experiment Station in the Department of Land, Air, and Water Resources. This is an eleven-month (plus one month paid vacation) tenure-track position in the College of Agricultural and Environmental Sciences consisting of teaching and research responsibilities. Applications and inquiries should be directed to T. C. Hsiao, Chair, Water Management Search Committee, Department of Land, Air and Water Resources, University of California, Davis, CA 95616. Tel (916) 752-0691/0453.
• Arizona state legislature has appropriated additional funds to enhance the state's capability on an on-going basis to regulate water quality. In response to this challenge numerous positions are available for professional Environmental Health Specialists/Engineers, Hydrologists and Environmental Planners. Contact: Terry Davis on (602) 255-5482 or write: Personnel Division, Employment Section, 1831 W. Jefferson, Phoenix, AZ 85007.

• Hillsborough County, Florida, has an immediate opening for a Water Resources Engineer (Professional Engineer II). This position is responsible for the supervision of a six-member staff. Interested qualified individuals should submit a standard application, available from Hillsborough County Civil Service, P.O. Box 1110, Tampa, FL 33601. Telephone (813) 272-5628.


PUBLICATIONS RECEIVED AT THE CENTER


Pennsylvania Department of Environmental Resources. CHESAPEAKE BAY: YOU’VE GOT A FRIEND IN PENNSYLVANIA. A progress report on Pennsylvania’s Chesapeake, Bay Program. October 1986.


Trams, F. B. and A. W. McIntosh. RELATIONSHIP BETWEEN CHEMICALLY DETERMINED AND BIOLOGICALLY AVAILABLE FORMS OF PHOSPHORUS IN LAKES AND STREAMS. Center for Coastal and Environmental Studies. Rutgers - The State University of New Jersey. September 1985.


The Metropolitan Washington Council of Governments. GROWTH OF THE WASHINGTON REGION BRINGS


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