UNIVERSITY
OF THE
DISTRICT OF COLUMBIA

water resources
research center
WASHINGTON, DISTRICT OF COLUMBIA

DC WRRC
Site Evaluation and Briefing
Report

NOVEMBER/DECEMBER 1985

INTRODUCTION

The Center cooperates with local, federal, and state water agencies. These agencies include the DC Department of Public Works, the Washington Aqueduct Division. The Interstate Commission on the Potomac River Basin, the DC City Council, the US Army Corps of Engineers, the Environmental Protection Agency, and the US Geological Survey.

The Water Resources Research Center was established in 1973 under the Water Resources and Development Act of 1964 (PL 88-379). The mission of the Center is to provide the District of Columbia with research support to identify the DC water resources research problems and to contribute to their solutions.

The Center conducts its research through all the DC area universities, i. e., American University, Catholic University of America, George Washington University, Georgetown University, Howard University and University of the District of Columbia.

The funding for the Center comes from the US Geological Survey, Department of the Interior with one and half matching from the University of the District of Columbia.

The Center is designed to conduct and facilitate the development of innovative water research, transfer the results of the research, inform the public about water resource problems, and train future water resources managers and scientists on an interdisciplinary basis.

The DC Water Resources Research Center is advised by its Research Advisory Council (RAC) and its Technical Evaluation Committee (TEC). The Research Advisory Council consists of representatives of the District, federal, and regional water and water related agencies. The principal role of the Center's Research Advisory Council is to identify significant water resources research problems of the District of Columbia. These problems are categorized and prioritized in the Center's five-year plan. Copies of the Center's water resources research priority list along with the regional priority list developed by the Mid-Atlantic research centers are distributed to prospective faculty researchers in colleges and universities within the District of Columbia.

The Technical Evaluation Committee makes recommendations on the Center's policies and advises the Director in the selection of research projects to be funded. The water resources research proposals that are submitted to the institute are the result of a request for proposals which are reviewed by appropriate members of the Technical Evaluation Committee. The selected proposals are integrated in the program of Center's research and submitted to the US Geological Survey, the Department

of the Interior. The Center contacts the principal investigator once his research project has been approved and it is in charge of the management and monitoring of the research projects. Topics of study have been in many water related disciplines including water quantity, water quality, institutional problems, management and economic problems of groundwater, toxic substances of water, mathematical modeling, recreational use of water resources, etc.

Faculty researchers from the six universities within the District of Columbia and personnel from local agencies have contributed to the Center's program. The Center works closely with local, state, federal, and regional water resource management agencies and other water centers particularly in the northeast region. Basic funding for the DC Center and the other fifty three centers and institutes located throughout the United States has been provided through the "Enabling Water Research Act of 1964", later amended as the "Water Research and Development Act of 1978". Funds for the DC Center are complemented with matching funds from the University of the District of Columbia and other cooperating universities.

WRRC PROJECT MANAGEMENT

The following paragraphs describe briefly the processes used in D.C. WRRC to manage its Research and Technology Transfer projects.

RESEARCH PROJECT MANAGEMENT

Water Resources problems are region-specific. What might be critical in one region might be of secondary importance in another. However, there are some basic processes that can be used in the development of Water research programs. The processes include research problem identification, problem classification and ranking, selection of research projects, management of these research projects and transfer of research results (Figure 1). A prerequisite to the design of Water research programs is a thorough knowledge of the environmental situation of the area or the region involved. For instance, the population and land use characteristics, geological characteristics, meteorological characteristics, hydrological and biological characteristics must all be known. A complete description of the District of Columbia (D.C.) area must also be done. Additionally, an examination of the use of the water, land and other resources and of the current related programs will identify the major problems, specifically focusing on the gaps in the research activity, and highlighting the important areas not being addressed by the mission-oriented agencies.

PROBLEM IDENTIFICATION

The early phases of problem identification include the development of a list of problems obtained from a questionnaire sent to the agencies, experts, community groups and to other interested community members. The opinion survey results is compiled into a list of problems which are further synthesized and grouped into appropriate researchable objectives. Then an advisory committee composed of representatives of water resources agencies, universities and other organizations are set up to analyze and identify the most critical and important objectives. Participation of people other than university experts is essential in planning research programs for the following reasons. First, because the is complex and has a large diversity of problems. Second, broad participation tends to increase industry and community awareness and support. Greater awareness fosters a positive exchange between the academic community, the private industry and city managers and the public.

Goals and Objectives

The goals and objectives of the D.C. Water Resources Research Center are:

- o to promote research and development, demonstration and technology transfer dealing with both quality and quantity of water resources;
- o to identify and find practical solutions to the state water and water resources related problems;
- o to promote the training of scientists, engineers, and other skilled personnel in the fields related to water resources;
- o to foster and supplement present programs for the conduct of research, technology development and transfer, and innovative water resources management, conservation, and operating practices;
- o to provide for research, development, technology demonstration, and transfer with respect to converting saline and other impaired waters to waters suitable for municipal, agricultural, industrial, recreational, or other beneficial uses;
- o to disseminate information through the maintenance of a water resources scientific information center with adequate information bases so that the state water research community, by utilizing the center, can be fully informed of research activities and other types of information necessary for them to effectively conduct their work;
- o to coordinate with the local water related agencies.

The D.C. Water Resources Research Center has passed the decade. During its 10 years of operation, the center has conducted more than 50 projects, organized more than 20 major conferences and seminars and trained about 52 students in the field of water research. A number of these students obtained their Ph.D., Masters, and/or B.S. degrees. The center's reports were widely distributed and were received in all the states and in a number of foreign countries. Some of the center's investigators have gained local recognition, while others have become nationally and internationally known. After a period of uncertainty in 1982 and 1983 and much scrutiny, Congress has recognized the need to continue water research in the United States and voted overwhelmingly to continue the program for the next 5 years.

PROBLEM CLASSIFICATION AND RANKING

In classifying and ranking the problems, water resources managers and researchers must interact to use experience and knowledge from both sides in order to categorize the problems in the proper field and to rank them according to the city needs. The private industry and city managers, through their daily involvement with urban problems, have a better feel for the degree of criticality of a given problem. The researcher then contributes by analyzing the complexities involved in addressing such a problem. However, expertise might not always be available at the level needed for critical problems. In the long-range plans, such aspects as training, information transfer and potential changes in policies and program directions must be taken into consideration. The product of problem classification and ranking can be displayed in a matrix form or as a prioritized list of problems. Both the problem identification and the problem classification and ranking must undergo periodic revisions to reflect current needs.

SELECTION OF RESEARCH PROJECTS

Request for proposals which provide the research priorities and guidelines are sent to universities and other interested researchers within the District of Columbia who in turn prepare proposals and submit them for evaluation. The guidelines sent in the request for proposals are exhaustive and include such items as the format to be followed, the instructions on how to fill out forms, etc. The uniform format allows for an easier and more equitable evaluation of the proposals submitted. (see attachment 11).

After preliminary screening, the evaluation of the proposals is left to the Technical Evaluation Committee which comprises the faculty from area universities and representatives of the related organizations and private industry. The criteria for evaluation of the proposals include the priority of the problem addressed, the relationship of the proposed work to the solution of the problem, the proposed methodology, the qualifications of the researcher(s) involved, the cost of the project and the availability of the background support for the proposed project, etc. The probability of success of the project is also a factor in the selection process. Close scrutiny is given to such items as duplication of research as well as research that consists of tabulation of simple data acquisitions or tabulation and analysis of data already existing without being part of an integral research effort. Some fundamental problems might arise in evaluating research problems, however. The groups comprising the technical committees are not habitually homogenous; therefore, biased judgments can be made on technical preferences for given fields of water resources. Problems such as-those popularized by the news media may cloud the selection process. Care must be taken not to fund only the high priority areas and neglect the problems which are classified as low priority. Due to the desire to respond to the city needs, the researchers might tend to neglect the basic and more fundamental research. Basic research, although not yielding immediate, tangible benefits, is of great importance and can lead to creative and innovative solutions for the future.

MANAGEMENT OF RESEARCH PROJECTS

The role of the management in research projects is to make sure that the project will meet the established objectives within the time and the budget allocated. The researcher interacts with his peers and other experts in the field to develop his project. The principal investigator will be fully responsible for his project and conducts it independently. However, his project is monitored and he is required to submit periodic progress reports. The fiscal management, in the case of the universities, is done by the financial accounting offices of the universities or the principal investigator's department. The library maintained by the research center and other specialized libraries is available to the researcher. Publications and copies of the presentations produced in the course of the project are reported to the center. The final reports, including both the technical and financial reports, follow an established format and are submitted at the end of the project. The final report is reviewed by peers and distributed to appropriate agencies for their comments. It is then sent to the U.S. Geological Survey for final review.

Subsequent to completing the written report, the principal investigators may utilize report findings to publish journal and other scientific articles. They may also deliver lectures or present papers at conferences based on their research project.

FACULTY INVOLVEMENT

Outside of funding issues, no greater problem exists for the operation of a center within an institution than that which surrounds the issue of faculty support.In most institutions, there appears to be little assistance forth coming from faculty members to aid their research projects. An adequate reward system and faculty involvement can stimulate a heavy participation by university teachers in programs aimed at resolving urban problems. In the District of Columbia Area Universities there are no difficulties presented for faculty members obtaining release or leave of absence time to do research and the problem of additional or adequate compensation for research efforts need not, therefore, be a major one. Faculty is reassured of protection in terms of promotion and salary increases by deans and department heads in the participating universities. The D.C. WRRC is putting forth a major effort to recruit researchers from the major Historically Black Colleges and Universities namely Howard University and U.D.C. A closer involvement of talented individuals with the problems of the community where they reside and work will ensue; and an enhancement of the center's influence in the lives of its citizens will occur.

UNIVERSITY SUPPORT

The center is expected to be located at the University of the District of Columbia. UDC is a commuter university with close to 90 percent of its students residing in the District of Columbia. Eighty percent of its approximately 14,000 students are black and more than half are women. A sizeable number of Washington's international student population is enrolled at UDC. More than two-thirds of all students attend the University part-time and generally plan on taking an extra year to complete their degree programs.

The UDC faculty is a cosmopolitan mix of races and cultures, reflecting the ethnic diversity of the nation's capital. Among them are graduates of prestigious private and public colleges and universities here and abroad. The nearly 600 faculty members are dedicated, experienced teachers and scholars; many are distinguished leaders in their respective disciplines. More than 40 percent have earned terminal degrees. The other universities within the District of Columbia also have distinguished facilities and a mix of students who will participate in the center.

UDC is committed to the highest standards of scholar- ship. Academic life is centered in five colleges and the Graduate Studies Division. The colleges include Liberal and Fine Arts; Business and Public Management; Education and Human Ecology; Life Sciences; and Physical Science, Engineering and Technology. Each college offers students a wide array of two-and four-year programs that prepare them for graduate school or

careers in engineering, business, media, government, the scientific and technological industries, education, and the arts.

UDC has a comprehensive computer center and a number of urban oriented laboratory facilities. Additionally, the university can provide all the required administrative support through its procurement, accounting, grants management, personnel, printing, and other offices.

INFORMATION DISSEMINATION AND TECHNOLOGY TRANSFER

DEFINITION

Until recently, information dissemination was considered an interesting subject but still remained on the periphery of research 'activities. Today information dissemination has assumed new importance and is now considered an integral part of research programs. Its importance is recognized at the local, national and international levels. It is essential to the practical application of research and development. Information dissemination involves a combination of activities resulting in the adaptation, the adoption or demonstration of new technologies or ideas. It is a tool by which the end results of research can be measured. In these times of fiscal constraint, information dissemination technology transfer takes on a new dimension of continuously monitoring the impact of benefits provided by research. Since accountability is a determining factor in the survival of many programs, research must account for its product and provide measures, to the extent possible, of its short-term and long-term productivity. There is evidence to indicate that the priority of research areas strongly influences the type of technology transfer which takes place. If the research projects conducted are not meeting the present and future needs of society, no matter how attractive the result may appear, the technology transfer involved is likely to be ineffective.

The purpose of technology transfer is to expedite the useful application of new or improved technology generated by research. The information provided must be appropriate and timely. The users of research results may be officials, policymakers, managers, researchers, teachers, students, private interest groups and the general public. Additionally, technology transfer provides researchers and scientists with current information which can be of help to prevent duplication of research and thereby increase innovation. It also provides the direction and the state-of-the-art for a particular technology. It gives a measure of the advancements of knowledge. A further purpose of technology transfer is to create an increased public awareness concerning specific problems.

THE PROCESS

The design of technical transfer programs requires a knowledge of the needs of researchers, plant and systems managers, design engineers, as well as that of policymakers, businesses, and the general public. The technology transfer specialist must, therefore, be well grounded technically and also be knowledgeable of the social habits, institutions and needs of the urban community. Communication, both formal and informal, is essential to the process. The research findings which consist mainly of new ideas, products or processes must have relative advantages over previous findings and be compatible with existing institutions, values and attitudes. These innovations must be presented in a manner that is both useful to and useable by the decision maker. They must be communicable and understood on their own merits.

The D.C. WRRC can recruit qualified individuals with strong communication capabilities to interact with local agencies and organizations. PRODUCTS

The access to ongoing and completed research information is predicated on the continuous evaluation and availability of the research findings of universities, private industry and government programs.
Subsequent to research activities, priorities are set and technology transfer products are designed, produced, and disseminated. Products that meet the quality control requirements are tailored to specific uses. Technology transfer products range from highly technical manuals to workshops or seminars for the community. In D.C. WRRC, information is transferred through the following means:

- computer utilization

- reports which present a synthesis of information on a given technology for technical managers and scientists;

- a description of the state-of-the-art or a short description of a process or a technique for a non-technical reader;

- manuals, handbooks or guidebooks designed to provide sufficient information for the needs of engineers and other professionals

- newsletters, description sheets or bulletins which provide concise or broad information for general audiences;

- audio-visual presentations on slides or films;

- conferences, seminars and workshops which provide

direct opportunity for interaction and communication;

- exhibits and field trips which provide information of general interest, etc.

Additionally, the Center compiles Directories, information brochures, reports, and other Water related documents .

1. RESEARCH RELEVANCE

Since its inception in 1973, the DC WRRC has been involved in many water resources problems pertaining to the District of Columbia. A Research Advisory Committee was organized to advise the WRRC in research direction. Members of these committees were selected by various agencies directly working with the District of Columbia's water resources problems. These agencies include the DC Department of Public Works, the Interstate Committee on the Potomac River Basin, the Metropolitan Washington Council of Government, and the Soil Conservation Service. (See Attachment 1 - Research Advisory Committee List.)

The Center has a Technical Evaluation Committee which is comprised of members representing the area universities and area agencies. The Technical Evaluation Committee evaluates and reviews the proposals and projects submitted by the Principal Investigators. (See Attachment 2 - Technical Evaluation Committee List.)

As evidenced by the attached letters the in-state evaluators hold a high opinion of and support DC WRRC research projects. (See Attachment 3 - Letters of Support/DC Dept. of Consumer Regulatory Affairs - US Dept. of Army, Corps of Engineers.)

Attachments 4 and 5 demonstrate the linkage between the research program and identifiable problems within the District of Columbia. The Center conducted a survey which resulted in the classification, prioritization and ranking of the DC water problems for the period 1982-1985 and 1985-1987.

The WRRC has received adequate matching funds from the University of the District of Columbia (UDC) and from participating area universities. The matching funds have increased steadily to meet the Department of the Interior's requirements on the matching of the Federal monies.(See Attachment 6 - Summary of Matching Funds from FY 1981 - FY 1984.)

For the most part, the research carried out by the WRRC has directly addressed the District of Columbia's problems and the Mid-Atlantic region problems. A portion of the projects are basic and fundamental in nature, others have attempted to address the city's more general problems, the water quality problems, the recreational issues and others as they pertain directly to the DC situation. For example, as a result of projects conducted by the Center on groundwater, the District of Columbia is planning to set-up a groundwater-monitoring program in order to complete regulations concerning groundwater. The Center's research projects such as the ones on water quality have led to the District of Columbia Water Bill, which addresses all the political issues regarding the District of Columbia. Recommendations from studies conducted by the Center have played an important role toward the upgrading of the Mac Millan Treatment Plant in the District of Columbia. Subsequently, the Center has received public recognition from the Corps of Engineers. (See Attachment 7 - List of Projects conducted by DC WRRC.)

2. RESEARCH QUALITY

The D.C. WRRC's Principal Investigators publish their reports through the WRRC in the NTIS (National Technical Information Service). They also publish in national and international referred journals. (See Attachment 8 - List of Publications. See Appendix 1 - Abstracts of Research Publications.)

The WRRC researchers and Principal Investigators are held in high professional regard by their colleagues. Most of them have gained national and international acclaim. To name a few, Dr. Yevchevich is a world renowned figure in hydrology/hydraulics and is the current director of the International Water Resources Center at George Washington University; Dr. Michael Champs, who began his career at the Center, is now a member of the Presidential Science Advisory Committee (p; Dr. Donald Spoon, a locally known expert, is an expert key referee in the Potomac River Water Quality Program; Dr. Harvey Lieber is a well-known expert for institutional management problems whose reports are distributed nationwide; Dr. Jose Jones has gained a solid reputation locally and in the Caribbean as an environmental scientist.(See Attachment 9 - List of Principal Investigators.)

The Administrators, Deans and Department Heads of participating universities are highly supportive of the WRRC research program. They approve the proposals before they are submitted and monitor the development of the research projects. At the University of the District of Columbia, the Deans hold the D.C. WRRC in high regard and continue to encourage the faculty members to participate in the program. (See Attachment 10 - Letter of Support.)

The research project from its inception to its completion follows stringent quality control measures. The following procedures are usually followed:

(1) Discussion of the proposal idea; (2) Review of the proposal to meet committee selection criteria; (3) Monitoring of projects; (4) Peer review of final report. (See Attachment 11 - Criteria and Guidelines for Proposal Selection.)

3. RESEARCH COORDINATION

Attachment 12 provides DC WRRC cooperation with participating area universities and agencies.

Proposals are actively solicited from the University of the District of Columbia and from all the participating universities in the District of Columbia. A Request for Proposal (RFP) is sent to all the colleges and faculty members interested. (See Attachment 13 - RFP Sample and Attachment 14 - Researchers contacted.)

Since its inception the Center has sought to increase its level of activities not only through the funds from the Department of the Interior but also through funding from other private and public sources. It has written several proposals to various agencies for increased work. The Center has been funded by the District of Columbia Government Water Agencies for training programs. (See Attachment 15 - Cover page of report submitted to DC government for Training Program and Attachment 6 - Funds obtained from other sources.)

Through its participation in local and regional conferences the Center has been instrumental in initiating a number of research projects and related activities concerning the District of Columbia's resources. The Center has participated in the Hydrilla Committee, the Anacostia Forum, the Washington Waterfront Action Group, the Interstate Commission on the Potomac River Basin and the Council of Government meetings. It also has reviewed a number of reports issued by other agencies such as the National Park Service concerning Rock Creek Park studies and Anacostia studies. (See Attachments 16 and 17 - Testimonies by the DC WRRC.)

4. INFORMATION TRANSFER

As part of its public service, the WRRC has made significant accomplishments in the information transfer program. These services include: publication and distribution of scientific reports, preparation of conferences, seminars, field trips, exhibits and demonstrations. (See Attachment 18 - List of Seminars; Attachment 19 - Documents Compiled by WRRC; Attachment 20 - List of Computer Programs in System.)

As a service to the professional staff and to the public, the DC WRRC periodically publishes a newsletter called Water Highlights. These newsletters contain information ranging from Federal and District policy issues to special articles related to water in the metropolitan area. (See Attachment 21 - Newsletters.) Public awareness activities are of major interest to the DC WRRC. The Center participates in all the major activities related to land And water resources of the District of Columbia such as, the Potomac Riverfest and the Soil Conservation Service Activities, etc.. The Center holds many lectures in schools and in public forums. Additionally, the Center conducts field trips which are open to the general public. (See Attachment 22 - Field Trips.)

The WRRC staff and Principal Investigators have developed skills in communicating the research results to the management and to the layperson. Dr. Lieber of American University has made many presentations to regional meetings along with Mt. Jim O'Connor of UDC who has high communication skills in explaining hydrological processes to high school students and to the general public. (See Attachment 9 - List of Principal Investigators.)

The DC WRRC has put forth a great effort to increase its communications with area universities and other research centers located in the District of Columbia. It has had cooperative projects with various agencies as previously indicated in Attachment 12.

The Center has large holdings of research publications and provides reference services to researchers and students through the Library of UDC. (See Attachment 23 - DC WRRC Holdings.)

5. TRAINING

The DC WRRC functions as an integral part of the University of DC.

As such, its operation is dedicated to promoting the education and training of future scientists. Although the Center does not have course instruction leading to a specific degree, it supplements the already existing university programs through theoretical and practical exposures of students through internship programs. Undergraduate and graduate students work on real life environmental problems under the supervision of a Principal Investigator.

With its modest resources, the Center intends to continue its commitment in order to enable the city to eradicate the complex environmental problems to be face in future years.

Areas of concentration in the training of students include: Engineering (Agricultural, Civil and Environmental), Biology, Fisheries, Wild Life, Chemistry, Hydrology, Resources Planning, Law, Economics and Geography. (See Attachment 24 - Student Training.)

All the students are from participating universities that have been involved with the WRRC and who have found high quality work. Some former UDC students are in management positions within the Department of Public Works in the DC government and some are in managerial positions with the Maryland Department of Natural Resources. Others have gone on to become researchers, professors and technical staff members. (See Attachment 25 - Letter from Howard University.)

Serious promotional efforts have been put forth to increase the interests of senior high school students in the District of Columbia in the Environmental Fields. The DC WRRC also recruits undergraduate students from UDC with the purpose of introducing them to basic approaches in Environmental Science research and getting them particularly interested in the Center's Water Research Program.

6. ACCREDITATION

The University of the District of Columbia is accredited by the Commission of Higher Education - Middle States Association of Colleges and Schools. In addition to the Middle States accreditation several specific University programs have earned the recognition of specific local and national professional organizations which review educational courses of study in specialized area. The Aviation program is approved by the Federal Aviation Administration. The Architectural Engineering Technology, Civil Engineering Technology, Electrical Engineering Technology, and Electrical Engineering programs are accredited by the Engineers Council for Professional Development.

7. PHYSICAL RESOURCES

There are a number of universities and research agencies located in the Washington DC area. UDC, where the DC WRRC is housed, has facilities for research including laboratories, libraries and computer facilities. (See Attachment 26 - Computer and Research Facilities.)

The WRRC has recently acquired laboratory space, wherein two IBM computer terminals are stored. The Center also has an IBM PC. It is about to acquire, on loan, from the Federal Highway Administration, two sediment samplers, current meters, sampling sheds, etc. There are test tubes, chemicals and assorted glassware in the newly acquired laboratory which the Center has access to for its research. The Center also has access to the Water Quality Branch of the DC Public Works and the Civil Engineering Dept. Laboratory. (See Attachment 27 - WRRC Access to Facilities.)

8. INTERDISCIPLINARY RELATIONSHIPS

The DC WRRC's work cuts across various disciplines. In order to have an objective view of its projects, the Center has selected an Advisory Committee whose members represent people with an interdisciplinary background. These backgrounds include Environmental Chemist-, Aquatic Biologists, Administrators, Sanitary Engineers, etc.(See Attachments 1 and 2).

The Center has funded projects in a variety of disciplines including institutional problems, water quality problems, problems of basic and fundamental nature, recreation problems and training problems, etc. (See Attachment 7).

In the past the Center has encouraged and continues to encourage interdisciplinary projects. In the future the Center will emphasize computer modeling, studies involving legal, social and economic aspects of water resources and hydrology and hydraulics of the Anacostia River and its tributaries.

9. ADMINISTRATIVE RELATIONSHIPS

The DC WRRC is located in the College of Life Sciences at the UDC. The Director reports to the Dean of the College of Life Sciences who in turn reports to the Provost and Vice President of Academic Affairs and to the President's office. The Director has the authority to take all personnel actions and all purchase and acquisition actions. The Director plans the Center's budget and monitors the spending of the projects. The Director sits on many Advisory Committees in the University and is actively engaged in encouraging research in the UDC and in the colleges and universities in the District of Columbia. Additionally, the Director participates in committees to create or to develop other research centers in the District of Columbia. (See Attachments 28a, 28b and 29 - Director's Activities and Public Involvement.)

The Center's expense and budget are handled by the UDC Division of Financial Services, Accounting Office, Procurement Office and Grants Management Office. (See Attachment 30 - UDC Financial Division.) During the past four years, WRRC has remained within its budget objective. (See Attachment 31 - Fiscal Year Report.)

10. INSTITUTIONAL COMMITMENT

The positions of the DC WRRC Director and staff are programmed in each of the budgets submitted to the Office of the Vice President and managed through the Personnel Department of the University of the District of Columbia.

The Center's line item budget is included in the Vice President's of Academic Affairs budget and the Center has already secured matching contributions in cash and in-kind from the UDC during the past four years. (See Attachments 6 and 32 - Matching Funds and FY '86 Allocations.)

The UDC administrators are knowledgeable and interested in the DC WRRC program. (See Attachment 33 - Letters of Support.)

In each budget process the Director of the WRRC is invited to submit his proposed budget for future fiscal years.

DC WRRC ATTACHMENTS

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ATTACHMENT 1

ADVISORY COMMITTEE

Dr. Edward H. Bryan
Program Director
National Science Foundation

Mr. Paul W. Eastman
Executive Director
Interstate Commission on the Potomac River Basin

Hon. Walter E. Fauntroy
Member of Congress

Mrs. Marguerite Gras, alternate
Research Assistant
Office of Representative Fauntroy

Mr. Herbert Freiberger
District Chief
U.S. Geological Survey

Mr. James H. Hannaham
Assistant for Ocean Policy Staff,
Oceanographer of the Navy Naval Observatory

Mr. William B. Johnson Director
D.C. Department of Administrative Services

Mr. Donald Murray
Deputy Director
D.C. Department of Consumer and Regulatory Affairs

Mr. William Trieschman
Chief, Planning Division
Department of the Army
Baltimore District, Corps of Engineers

Mr. Stan Udhiri
Chief
Natural Resources Division
Maryland National Capital Park and Planning Commission

Mrs. Renay Weissberger
Assistant to the Manager
Greater Washington Board of Trade

Mr. Wallace White
Administrator
Water and Sewer Utility Administration
D.C. Department of Public Works

ATTACHMENT 2

TECHNICAL EVALUATION COMMITTEE

Dr. Edward H. Bryan
Program Director
National Science Foundation

Dr. Frederick Carson
Associate Professor
The American University

Dr. Benedict T. DeCicco
Professor
The Catholic University of America

Mr. Robert Ford
Environmental Resource Management U.S.
National Park Service

Dr. A. Jose Jones
Chairman
Department of Environmental Science
University of the District of Columbia

Mr. Austan S. Librach
Director
Department of Environmental Programs
Metropolitan Washington Council of Governments

Dr. Kenneth Mountford
Chesapeake Bay Program
U.S. Environmental Protection Agency

Dr. Daniel P. Sheer
Planning Engineer
Interstate Commission on the Potomac River Basin

Dr. Monshin Siddique
Water Pollution Control Branch
D.C. Department of Consumer and Regulatory Affairs

Mr. Stan Udhiri
Chief
Natural Resources Division
Maryland National Capital Park and Planning Commission

Dr. M. M. Varma
Professor
Howard University

Mr. Harry Ways
Chief
Washington Aqueduct Division

Dr. Tong T.S. Yang
Chairman
Department of Engineering and Computer Science
University of the District of Columbia

Dr. Vujica Yevjevich
Research Professor and Director
The George Washington University

ATTACHMENT 3

OCT 8 1985

Mr. Pete Mayfield
Engineering Research Centers Program
National Science Foundation

Washington,.D.C.- 20550

Dear Mr. Mayfield:

The Department of' Consumer and Regulatory Affairs, which is responsible for *the* administration of *the* District of Columbia's Environmental Protection Program, has reviewed the proposal entitled "Engineering Research Center for Inner City", submitted to you by the Water Resources Research Center, of the University of the District of Columbia.

We strongly support the establishment of the Engineering Center for *Inner* City, as the research information would be of immense value in the development *and* implementation of plans for protecting the natural resources of the District of Columbia.

The District of Columbia, which has state level responsibilities under the various Federal environmental statutes, does not have factual data an inner city environmental problems necessary to develop corrective plans. We have found from experience that data collected in other cities are not applicable to the District of Columbia because of wide variations in 'the demography. Any environmental data base developed by the Engineering Research Center would be extremely useful for understanding the nature of the problems facing inner city residents.

We have funded a number of research projects related to the District's water pollution control activities to the D.C. Water Resources Research Center and we have been very pleased with the high caliber of work performed by the group involved in the proposed project.

We reiterate our support for this project, and strongly recommend that you approve the proposal.

Sincerely;

ATTACHMENT 4

Table VI-1

DEPARTMENT OF THE ARMY
PO BOX 1715
BALTIMORE MARYLAND 21203

REPLY TO ATTENTION OF
NABPL-E

Mr. Mamadou H. Watt Director
University of the District of Columbia
Van Ness Campus

4200 Connecticut Avenue, N.W.

Washington, D.C. 20008

Dear Mr. Watt:

As requested in your letter of 30 September, the Corps has reviewed the proposal by Dr,. Robert Waters entitled:, "Assessment of the State of the Art and Development of Proposed Improvements in Recreation Benefit Valuation for Water Resource Planning".

The proposal, as presented, appears comprehensive and reflects a thorough analysis of the recreation benefit and use estimation models. It is with particular interest that we noted that a substantial effort will be made to develop a theoretical rationale for the development and use of unit day values. In our studies we have found that unit day values offer the recreation planner a more efficient approach in assessing the recreation value of a project as opposed to other alternatives. We, therefore, look forward to reviewing the results of this work as well as the other work that is proposed.

If you have any questions or if we can be of further assistance, please feel free to contact Mr. Robert Gore or Mr. Larry Lower of my staff at (301) 962-2558.

Sincerely,

HAROLD L. NELSON

Acting Chief, Planning Division

List of water resources problems for the District of Columbia, compiled from the results of opinion survey conducted may and June, 1980, by the D.C. Water Resources Research Center.

A.Flood plain management is inadequate to prevent flooding.

B. Combined sewers overflow pollutes the receiving waters.

C. Periodically the Potomac River provides an insufficient supply of drinking water; reserve or alternate supplies are not available.

D. Potomac River biota is threatened by insufficient in-stream flow by during periods of low flow and high withdrawal.

E. Water conservation activities in the D.C. area inadequate.

F. Nutrient enrichment of Potomac River waters has resulted in eutrophication.

G. Toxic and hazardous substances are threatening surface water quality.

H. Water treatment plant effluents degrade receiving waters.

I. Non-point source pollution is degrading surface waters.

J. Sediment/siltation is degrading surface waters.

K. Surface waters relied on for drinking water supplies are being lowered in quality by pollution.

L. Surface water quality is unsuitable for healthy growth of submerged aquatic vegetation, aquatic life, and wildlife.

M. Surface water quality is being degraded, and is unsuitalbe for recreational uses of rivers and streams in the D.C. area.

N. Water quality standards and criteria are inadequate for uniform water quality *measurement* and assessment.

O. Water quality monitoring and data collection activities are inadequate.

P. There are many undesirable effects of urbanization/land use policies on watez quality downstream from development.

Q. Erosion of stream banks is increasing.

R. Dredging and spoil disposal threatens wetlands and water quality.

S. Ground water quality is threatened by contamination from surface pollutants.

T. Sewage treatment capacity is inadequate for the future.

U. Adequate disposal of wastes from water treatment (sludge) is not provided for

V. Deterioration of water distribution lines and sewage transport lines threatens future water quality and promises to be an expensive future public works project.

W. Allocation of surface water flows during low flow periods is unresolved.

X. Water rates throughout the region are not uniform and do not encourage water conservation.

Y. Raw water and finished water interconnections between jurisdictions are inadequate.

Z. There is inadequate coordination/cooperation between jurisdictions for water management in the D.C. area.

SECOND ITERATION

RANK	PROBLEM
1	Combined sewers overflow pollutes the receiving waters.
2	There are many undesirable effects of urbanization/land use policies on water quality downstream from development, e.g., viruses, heavy metals, sediment, debris, loss of submerged aquatic vegetation, organic toxic substances.
3	Sewage sludge disposal is inadequate.
4	There is a lack of coordination and cooperation for waste disposal management.
5	Deterioration of sewage transport lines threatens future water quality, and promises to be an expensive future public works project.
6	Non-point source pollution, particularly sediment and siltation, is degrading surface waters.
7	Toxic and hazardous substances are threatening surface water quality.
8	Periodically the Potomac River provides an insufficient supply of drinking water; reserve or alternate supplies are not available.
9	Sewage treatment capacity is inadequate for the future.
10	Impacts of current disinfection methods of waste water treatment effluents.
11	Criteria for determining satisfactory local water quality standards are inadequate.
12	Provide training for water and waste water treatment plant personnel, at management, technical, and engineer. levels.
13	Effects and fates of nutrients on receiving waters are unknown.
14	Water conservation activities in the D.C. area are inadequate.

Table VI- 2

The effects and fates of nutrients on receiving waters are unknown, although many investigators have studied the problem over the past 10 or so years. The current USGS 5-year study of the Potomac Estuary is addressing several aspects of this problem. The outcome of these studies will indicate future research needs in this area.

The four problem areas that follow cannot be addressed by the District of Columbia separately from surrounding jurisdictions in Virginia and Maryland. The District, Virginia, and Maryland, and the local governments in the Metropolitan Washington Area, must cooperate in the coordination of water resource management programs.

Sewage sludge disposal in D.C. is part of the complex regional management difficulty being experienced in the Washington area, and currently under various levels of adjudication. Technology transfer to the District government regarding sludge disposal techniques can be increased.

Recent studies have attempted to describe the details of the problem of lack of coordination and cooperation for waste disposal management in the Washington area. An important contribution towards increasing the effectiveness of the District government's participation in this area-wide process would be to better define the District's water management structure and responsibilities. Because the District of Columbia functions at various times in the capacity of a city, a county, and a state, its role in the area-wide process for water resources management is unclear at times.

Another contribution to the area wide process of cooperative water management would be a comprehensive study of socio-economic benefits which may be incurred by individual jurisdictions as a result of this cooperation.

Future sewage treatment capacity is dependent upon many factors, including population trends, combined sewer overflow management, nonpoint source pollution management, socio-economic trends, etc.

At the heart of the local water quality management issues are the criteria for determining satisfactory standards that can be agreed upon by the several jurisdictions.

ATI'ACHMENT 5

WATER RESOURCES PROBLEM STATEMENTS IDENTIFIED AS OF HIGH PRIORITY WHEN RANKED BY OVERALL WEIGHTED MEAN OF RESPONSE*

RANK	PROBLEM STATEMENT
1.	The water quality of the Anacostia River is poor.
2.	Combined sewers overflow pollutes the receiving waters.
3.	Non-point source pollution is degrading surface waters.
4.	Plans for the removal of unauthorized discharges of hazardous substances, oil or pollutants into rivers and streams are inadequate.
5.	There are many undesirable effects of urbanization/land use policies on water quality down-stream from development.
6.	Toxic and hazardous substances are threatening surface water quality.
7.	Training of minorities in water quality control is needed.
8.	Deterioration of water distribution lines and sewage transport lines threatens future water quality and promises to be an expensive future public works project.
9.	Sewage sludge disposal is inadequate.

* No opinion and no response were excluded from analyses.

MATCHING FUNDS FROM FY 1981 - FY 1984

FY	FEDERAL	N-FEDER.	T. PROG.	OTHER	UDC		RESEARCH		TECH. TRANSFER		ADMIN.	
					Direct	Indirect	%	Amount	%	Amount	%	Amount
1981	110,000	73,810	183,810	25,343	25,000	23,467	79.82	146,716	4.70	8,648	15.48	28,446
1982	110,388	142,983	253,504	63,579	25,000	54,404	80.00	202,784	6.28	15,926	13.72	34,794
1983	115,000	180,381	295,381	25,877	55,000	73,627	77.72	229,567	2.90	8,605	19.38	57,209
1984	115,000	361,166	476,166	26,165	139,633	138,756	79.67	379,353	5.29	25,213	15.04	71,600

ATTACHMENT 7

RESEARCH PROJECTS
D.C. WATER RESOURCES RESEARCH CENTER 1980 - 1985

NO.	YEAR	PROJECT TITLE	FUNDING SOURCE	PRINCIPAL INVESTIGATOR	UNIVERSITY
1	1979	Urban Aquaculture of the Rainbow Trout (Salmo Gairdneri)	D.O.I.	A. J. Jones	University of D.C.
2	1980	An Objective Evaluation of Urban Run-off Models	D.O.I.	K. Mahmood	George Washington U.
3	1980	Five-Year R/D and Supporting Studies	D.O.I.	M. H. Watt D. Darden	WRRC/UDC
4	1980	Water Supply Interconnections	D.O.I.	M. H. Watt H. Sveinbjorsson	WRRC/UDC
5	1980	Water Resources Training Design	D.O.I.	M. H-.Watt D. Swamp	WRRC/UDC
6	1980	Evaluation and Data Base Development Related to Regional Recreation Use Estimating Models for Water Resources Planning	D.O.I.	R. Waters	George Washington U.
7	1980	Water Supply Management in the District of Columbia: An Institutional Assessment	D.O.I.	D. Beard	George Washington U.
8	1980	Photosynthetic Pigments as Indicators of Algae Activity In the Upper Potomac Estuary	D.O.I.	P. Sze	Georgetown U.

NO.	YEAR	PROTECT TITLE	FUNDING SOURCE	PRINCIPAL INVESTIGATOR	UNIVERSITY
9	1980	Five-Year R&D (Phase II)	D.O.I.	M. H. Watt	WRRC/UDC
10	1980	D.C. Water Publications	D.O.I.	M. H. Watt	WRRC/UDC
11	1980	Directory of Organizations	D.O.I.	M. H. Watt	WRRC/UDC
12	1981	Urban Planning Criteria for Non-Point Source Water Pollution Control	D.O.I.	G. K. Young	Catholic University
13	1981	The Effect of Copper on Spat Settlement of the Oyster Crassostrea Virginica	D.O.I.	H. Phelps	WRRC/UDC
14	1981	Analysis of Inorganic Anions in the Potomac Water, Sediment and Floc by Chromatography	D.O.I.	J. Girard	American University
15	1982	Artifacts and Losses in the Sampling of Chlorinated Waters by XAD	D.O.I.	A. M. Cheh	American University
16	1982	Enzymatic Analysis of Nutrients --Phase III	D.O.I.	F. Carson	American University

NO.	YEAR	PROJECT TITLE	FUNDING SOURCE	PRINCIPAL INVESTIGATOR	UNIVERSITY
17	1982	The Fate of Antifoulant Organotin Compounds in Water Systems	D.O.I.	G. Eng	WRRC/UDC
18	1982	Trihalomethane Removal and Formation Mechanism in Water	D.O.I.	R. Chawla	Howard University
19	1982	Assessment of the State-of-the Art and Development of Proposed	D.O.I.	R. C. Waters	George Washington U.
20	1983	Evaluation of the Impact of Urbanization on the Hydro geological Conditions of the Fall-line Cities	D.O.I.	M. H. Watt	WRRC/UDC
21	1983	Development of Frequency Functions for Urban Non-Point Source Risk Evaluation	D.O.I.	G. K. Young	Catholic University
22	1983	Development of an Improved Test for the Determination of Biochemical Oxygen Demand (Progress Report)	D.O.I.	B. T. DeCicco	Catholic University
23	1983	Derivation of Unit-Day-Values for Recreation Benefit Valuation in Water Resource Planning Based on a Comprehensive Theoretical Framework	D.O.I.	R. Waters	George Washington U.

	YEAR	PROJECT TITLE	FUNDING SOURCE	PRINCIPAL INVESTIGATOR	UNIVERSITY
24	1983	Model of Flow and Non-Point Source Pollution in the Tidal Portion of the Potomac River (Progress Report)	D.O.I.	J. Obeysekera	George Washington U.
25	1983	Assessment of the Impact of Non-Point Source Pollutants on an Urban River (Progress Report)	D.O.I.	M. H. Watt	WRRC/UDC
26	1983	Prioritization of Water Resources Research Goals and Objectives	D.O.I.	M. H. Watt	WRRC/UDC
27	1983	Technology Transfer and Water Resources Awareness Project for the District of Columbia	D.O.I.	M. H. Watt	WRRC/UDC
28	1984	Chemical Separation of Water Samples by HPLC	D.O.I.	M. M. Varma	Howard University
29	1984	Model of Flow and Non-Point Source Pollution in the Tidal Portion of the Potomac River	D.O.I.	J. Obeysekera	George Washington U.
30	1984	Assessment of the Impact of Non Point Source Pollutants on an Urban River (Progress Report)	D.O.I.	M. H. Watt	WRRC/UDC

NO.	YEAR	PROJECT TITLE	FUNDING SOURCE	PRINCIPAL INVESTIGATOR	UNIVERSITY
31	1984	Development of an Improved Test for the Determination of Bio-Chemical Oxygen Demand	D.O.I.	B. T. DeCicco	Catholic University
32	1984	Technology Transfer and Water Resources Education for the Public	D.O.I.	M. H. Watt	WRRC/UDC
33	1985	Mutagenesis of Water Contaminated by Nonionic Detergents	D.O.I.	M. M. Varma	Howard University
34	1985	Variables of the Potomac River	D.O.I.	V. Yevjevich	George Washington U.
35	1985	Application of Non-Point Source Response Functions to General Urban Land Uses	D.O.I.	G. K. Young	Catholic University
36	1985	A Study of Erosion and Sedimentation of Selected Small Streams in the District of Columbia	D.O.I.	F. Chang	WRRC/UDC
37	1985	Assessment of the Impact of Non-Point Source Pollutants on an Urban River	D.O.I.	M. H. Watt	WRRC/UDC

ATTACHMENT 8

SELECTED PUBLICATIONS OF PRINCIPAL INVESTIGATORS

B. T. DeCicco

DeCicco, B.T. and P.J. Wirdzek. REMOVAL OF EUTROPHIC NUTRIENTS FROM WASTEWATER BY CHEMOLITHOTROPHIC BACTERIA. ASM Abstracts 77:264. 1977.

DeCicco, B.T. et a1.ALCALIGENES EUTROPHUS GROWN ONWASTEWATER AS A SOURCE OF PROTEIN FOR GROWTH OF CHICKENS. ASM Abstracts 81:209. 1981.

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G. K. Young

MODELING MONTHLY HYDROLOGIC PERSISTENCE, with R. Jettmar, Journal of Water Resources Research, June, 1976.

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A KALMAN FILTER APPROACH TO HOURLY MULTISITE PRECIPITATION MODELING, with R.U., Jettmar, Proceedings of AGU Chapman Conference, University of Pittsburgh, May 1978.

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and J.C. Schaacke, Jr., Journal of Water Resources Planning and Management Division, September, 1979.

CALIBRATION AND TESTING OF AGRICULTURAL RUNOFF MANAGEMENT (ARM) MODEL AND NON-POINT SOURCE POLLUTANT LOADING MODEL, with M.B. Schewnn, R.A. Ferrara and D. McLaughlin, Report to EPA, Region IV, April 1979.

URBAN PLANNING CRITERIA FOR NON-POINT SOURCE WATER POLLUTION CONTROL, with D.L. Danner, Report to D.C. Water Resources Research Center, March 1982.

Michael A. Champ

Champ, M . A . , and Joe T. Lock. ANHYDROUS AMMONIA INDUCED ALTERATIONS WITHIN POND CARBONATE BUFFER SYSTEM., presented

at the Texas Graduate Research Symposium in Water Supply and Water Pollution Control. 1970.

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Ninety-Fourth Congress. pp.3-24. 1975.

Champ, M.A. STORM AND COMBINED SEWER ORGANIC CARBON LOAD I NGS IN THE GREATER WASHINGTON, D.C. AREA. The Fresh Water Potomac Aquatic Communities and Environmental Stresses. ICPRB. pp. 151-154. 1978.

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Champ, M.A., R.C. Bubeck, and 0. Villa. WATER QUALITY OF THE TIDAL POTOMAC RIVER FROM 1913-1980. The Potomac Papers. 1982. ICPRB Paper No. 1. 8p.

Champ, M.A. ETYMOLOGY AND USE OF THE TERM POLLUTION. Canadian Journal of Fisheries and Aquatic Science. 40(suppl. 2): 5-8.

Dr.M.M. Varma

RESISTENCE TO ORGANIC SALTS AND ANTIBIOTICS AMONG SEWAGE-BORNE ENTROBACTERIACEASE AND ACHROMOBACTERICEASE. ,
Journal Applied Bacteriology (Britain), 41:347, 1976.

ACCLAMATION OF WASTEWATER BACTERIA BY INDUCTION OR MUTATION,
Journal of Water Pollution Control Federation, 48:832, 1976.

ANALYSIS OF TRIHALOMETHANES IN AQUEOUS SOLUTION: A COMPARATIVE STUDY, Journal of American Water Works Association,
71:389, 1979.

WATER QUALITY MANAGEMENT FROM TYPHOID TO CANCER, Water Pollution and Management Review, 1984.

PURGE AND TRAP SCORES HIGH WITH LOW THM CONCENTRATION, Journal of Water and Sewage Works, 126:39, 1979.

TRIHALOMETHANE FORMATION IN LYOPHILIZED WATER, presented at the 73 rd Annnual Conference of American Institute of Chemical Engineers, November, 1980, Chicago, IL.

ADSORPTION OF TRIHALOMETHANE BY GRANULATED ACTIVATED CARBON: A BENCH SCALE STUDY OF ADSORPTION ISOTHERM IN BINARY AND MULTI-COMPONENT AQUEOUS SOLUTIONS, AQUA, 7:157, 1981.

RELATIVE DESINFECTION POTENTIALS OF CHLORINE AND CHLORINE DIOXIDE IN DRINKING WATER, Presented at Fifth Conference on Water Chlorination: Environmental Impact and Health Effects, Williamsburg, VA. June, 1984.

Eddie Neal

Neal E. SECOND-ORDER HYDRODYNAMIC FORCES DUE TO STOCHASTIC EXCITATION. Proceedings, 10th ONR Symposium on Naval Hydrodynamics, Massachusetts Institute of Technology, June 1984.

Neal E., et a1.HYDROLOGIC ESTIMATION PROCEDURES IN WATER RESOURCES PLANNING Research Report, School of Engineering, The Catholic University of America.

Vujica Yevjevich

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ANALYSIS OF DROUGHT CHARACTERISTICS BY THE THEORY OF RUNS, October 1975, CSU, Hydrology Paper No. 80.

FLOW VARIABILITY AND MODELING OF RIVER PROCESSES, CH.2 of the book "Modeling Rivers", pp. 29, John Wiley & Sons, New York, 1979.

STATISTICS IN WATER RESOURCES DISCIPLINES, paper published

in the Proceedings of the 3rd International Conference on Applications of Statistics and Probability in Soil and Structural Engineering, held in Sydney, Australia, Jan-29 to Feb2, 1979, pp. 329-351

BENEFITS OF FORECAST IN OPERATION OF RESERVOIRS, Fourth Congress of International Water Resources Association, Buenos Aires, Argentina, 1982.

THE NILE RIVER BASIN: HARDCORE AND SOFTCORE WATER PROJECTS, Water International, Vol. 8, No. 1, Spring 1983, pp. 23-34

A NOTE ON SIMULATION OF SAMPLES OF GAMMA-AUTOREGRESSIVE VARIABLES, Journal of Water Resources Research, Vol. 21,
No. 10, pp. 1569-1572, October 1985.

David L. Danner

A GENERALIZED MODEL OF WATER QUALITY IN THE DISTRICT OF COLUMBIA, Potomac Papers, ed. ICPRB, Oct. 1982.

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MODEL TO DESIGN STORMWATER DETENTION TANKS FOR NONPOINT SOURCE POLLUTION ABATEMENT, Wash., D . C . , 1975.

ATTACHMENT 9

PRINCIPAL INVESTIGATORS

NAMES	INSTITUTION	EXPERTISE
Dr. Mamadou H. Watt	D.C.Water-Resources Research Center	Fluid mechanic, hydraulics, water conser -vation, water resources planning, renewable energy resources, international development
Dr. G.K. Young	Catholic University	Water resource management, water pollution control, operations research,computer models policy analysis, ground-water, rivers, training, cost-benefit analysis.
Dr. Fred F.M. Chang	University of the District of Columbia	Erosion and sedimentation, streamflow and runoff, hydraulics, groundwater.
Dr. Vujica YevJevich	George Washington University	Hydrology, hydraulics, hydraulic engineering, water resources planning and management
Dr. Man M.Varma		Water and wastewater treatment plants; hydraulic computations; *environmental* impact; industrial wastes; water resource planning and management.
Dr.Albert Jose Jones	University of the District of Columbia	Aquaculture heavy metals; recreational uses of water resources sources of pollution
Mr. O'connor, James V.	University of the District of Columbia	Fluvial geomorphology and flood history of local streams, water regime of the District of Columbia, water and

		man in Potomac Basin, ground water.
Dr. Donald Spoon	Georgetown University	Aquatic systems, especially microscopic animals Including aufwuchs (periphyton) and Zooplankton
Dr. James R. Preer	University of the District of Columbia	Heavy metals analysis; land application of sludge-heavy metal up – take by plants; water quality analysis.
Dr. Philip L.Brach	University of the District of Columbia	Education Administration, Transportation and planning, survering and pro ,sect scheduling.
Dr.Joseph Chi	University of the District of Columbia	Turbulence, fluid dynamics, and heat and mass transfer.
Others		There are over 100 Ph.D. level university professors in the District of Columbia who would be potential principal investigators

ATTACHMENT 10

University of the District of Columbia

4200 Connecticut Avenue,
N.W. Washington, D.C.

November 18, 1985

Mr. L. Grady Moore
District Chief, WRD
U.S. Geological Survey
821 E. Interstate Avenue
Bismarck, North Dakota 58501

Dear Mr. Moore:

It is with pleasure and considerable pride that the College of Life Sciences continues to provide strong support for the research activities of the Water Resources Research Center. Since the inception of the University in 1977, the Center has demonstrated its effectiveness in attracting competent and experienced researchers not only in this university but from other major universities (Howard, American, George Washington, Georgetown and Catholic) in the District of Columbia. The Center has established a cooperative relationship with the area universities through sponsoring joint projects with investigators from these institutions to find solutions to water quality problems in the inner city.

In addition to stimulating and encouraging faculty research and promoting community education awareness, the Center sponsors conferences and seminars to disseminate research findings. As one of its major priorities, the Center will focus on studying non-point source pollution of the Anacostia River and the impact of erosion, sedimentation and flooding of small streams. Through the implementation of research priorities and community service activities, the Center has made a significant contribution toward the University's' mission of research and public service.

As an important asset to the College, we are committed to providing the resources necessary to increase the units' research capability and to maintain the flexibility required for responding to changes in water quality and related land use problems affecting District water sources.

Sincerely,

William E. Hyman
Interim Dean
College of Life Sciences

cc: Dr. Watt

ATTACHMENT 11

CRITERIA AND GUIDELINES FOR PROPOSAL SELECTION

CRITERIA

1. Principal Investigators Experience

2. Relevance of Technical Content

3. Cost Considerations

4. Other: For Example, training opportunities etc.

GUIDELINES

1. Timely submission of the proposed proposal.

2. Adequacy in the quality of the proposed research and design procedures.

3. Adequacy of the budget and cost estimate to do the work proposed.

4. Adequacy of the proposed

5. Conformity to District and regional states needs.

6. Adequacy and conformity of the training and research experience of the Principal Investigators.

7. Ability of the Principal Investigator to produce publishable reports within the time period proposed.

8. Adequacy of the inclusion of the training of undergraduate students in the proposed project.

9. Potential of the results from the proposed research to supply fundamental knowledge needed to support research and priority problems.

10. Potential of the Proposed project to promote increased effort in solving the priority problems.

11. Timeliness of the proposed research.

12. Training provided.

ATTACHMENT 12

COOPERATION WITH OTHER UNIVERSITY/STATE COMMUNICATION NETWORKS

AGENCY/UNIVERSITY	AREA OF COOPERATION
1. University Of The District Of Columbia	Advisory committee Research, Information Transfer, Training Administration
a. Agricultural Experiment Station	Info transfer./seminars
b. Cooperative Extension Service	Info transfer/seminars/small streams Research.
2. Howard University	Research, Training
3. American University	"
4. Catholic University	Research, Training
5. George Washington University	"
6. Georgetown University	Research, Training
<u>Other Agencies</u>	
7. D.C. Dept of Consumer and Regulatory Affairs a. Water Hygiene and Quality Assurance brand	Advisory Committee/Anacostia Water Quality
b. Soil Erosion Control branch	Small Streams Investigations
c. Water and Sewer Utility Administration	Research & Training / Potomac river studies/Advisory
8. Metropolitan Washington Council Of Government	Advisory Committee/Computer Modeling
9. Interstate Commission on the Potomac River. Basin	Advisory/policy Issues
10. National Science Foundation	Advisory
11. Corps of Engineers	Advisory
12. Maryland National Capital Park & Planning Commission	Advisory
13. Greater Washington Board of Trade	Advisory

University of the District of Columbia

VAN NESS CAMPUS
4200 CONNECTICUT AVENUE, N.W.,
WASHINGTON, D.C. 20008

D. C. WATER RESOURCES RESEARCH CENTER (202) 282-7333/4

September 9, 1985

Dear Researcher:

Enclosed is the package for preparing research proposals for the FY 86 Water Resources Research Institute Program, Proposals are invited from all qualified universities or colleges in the District of Columbia. The research proposals are to be - submitted to the Director, Water Resources Research Center, 4200 Connecticut Avenue, N.W., Washington., D.C. 20008 on or before November 29, 1985. Telephone: (202) 282-7333/4.

Sincerely

Mamadou H. Watt
Director

MHW: pem
Enclosures (5)

Attachment	I	Instructions and Sample Sheets
Attachment	II	Financial Form
Attachment	III	Sample Proposal Cover
Attachment	IV	Water Resources Research Priorities
Attachment	V	Water Resources Research Categories

ATTACHMENT I

INSTRUCTIONS AND SAMPLE SHEETS

INSTRUCTIONS TO APPLICATIONS FOR
WATER RESOURCES RESEARCH INSTITUTE PROGRAM

Applications for the Water Resources Research Institute Program for funding for FY 1986 appropriations, under the Water Resources Research Act of 1984, PL-98-242, are to be submitted to the Water Resources Research Center, University of the District of Columbia, by November 29, 1985.

Each proposal is to consist of 17 elements. The first 11 elements (a-k) constitute the synopsis (not exceeding two pages) per the sample format attached. Begin a new page with element 1.

Synopsis: (a-k)

a. Number (two digits).. Use 1985 project number if project is *continuing* from the 1985 grant.

b. Title

c. COWRR category (one: best fit--from WRSIC's Abstracting Guide)

d. Keywords (from Water Resources Thesaurus, 3rd edition, OWRT IT 80'/1, 1980, NTIS PB #81198376).

e. Duration (month/year to *month/year).* Use actual beginning and estimated ending month/year for projects continuing from earlier grants.. For the FY 86 grant, all research projects must be reported by January 31, 1987.

f. FY 86 federal funds:

(Total)(Direct) (Indirect)

g. Non-federal funds allocated to project

h. Name(s) and university of principal investigator(s)

i. Congressional District of university performing research

j. Statement of the critical regional or state water problem (s) to be addressed by the project, including explanation of need for research (Who wants it? Why? (two -paragraphs maximum)

k. Statement of results, benefits and/or information expected to be gained

l. Nature, Scope and Objectives of Research

m. Related Research – Show by literature and communication citations the similarities and dissimilarities of this proposed project to completed or ongoing research on the same topic.

.

n. Methods, Procedures, and Facilities - Provide sufficient information to permit evaluation of the technical adequacy of approach to satisfy objectives.

o. Progress Review - Review tasks funded in prior years, if this project is a continuation, and progress at the time this proposal is prepared.

p. Investigator(s) Qualifications - Include resume principal investigator(s).
Note: No resume is exceed 3 pages or list more than 15 pertinent publications.

q. Training potential - Estimate the number of students, fields of specialty and degrees expected to result from participation in the project. Also estimate the number of undergraduate students to expected to participate in the project.

ATTACHMENT II

FINANCIAL FORM

Financial Plan – Time/ Cost Estimate – FY 85

State:	Project Number
Proposed Starting Date: Proposed Completion Date:	Principal Investigator (s):
Project Title:	New Project Continuing Project

Cost Categories and Work Months	Estimated Costs		
	Federal	Non-Federal	Total
1. Direct Costs:			
A. Salaries and Wages Total:			
Principal Investigator (s) No. Work Months:			
Other Professional Staff No. Work Months:			
Graduate Student Asst. & Tech. No. Work Months:			
Undergraduate Student Assts. & Tech. No. Work Months:			
Non-student Technicians & Others No. Work Months:			
B. Employee Benefits Total:			
C. Nonexpendable Property Total:			
D. Expendable Property Total:			
E. Other Direct Costs Total:			
Printing & Duplication			
Travel			
Computer			
Total Direct Costs:			
2. Indirect Costs Based on *MTDC			
Total Project Costs			

- *Modified Total Direct Costs
- Non-expendable property is property having a continuing use as a self-contained unit; is not consumed in use; does not ordinarily become a fixture or lose its identity or form a component of equipment, machine part, etc. List individual items on an attached sheet providing a narrative justification for individual items costing $1,000 or more.

ATTACHMENT III

SAMPLE PROPOSAL COVER

A Proposal to the

U.S. Department of the Interior

through the

WATER RESOURCES RESEARCH CENTER

of the

UNIVERSITY OF THE DISTRICT OF COLUMBIA

Van Ness Campus

FY 85 WATER RESOURCES RESEARCH INSTITUTE PROGRAM

For Research Entitled

(Title)

Cover the period from_____ to April 30, 1986

Requesting support in the amount of $ _____ Federal

_____ Non-Federal

_____ Total

SUBMITTED BY

(Name, Title, and Department)

(Name) Head, Department of (Name) (Name) Dean

(Name) Vice President/Treasurer

ATTACHMENT IV

WATER RESOURCES RESEARCH PRIORITIES

A. Mid-Atlantic Region Research Priorities

1. Studies designed to better understand the relationships between land use and the movement, transformation, and fate of contaminants in surface and groundwater.

2. Research dealing with the impact of point and non-point pollutants on aquatic ecological systems and human health.

3. Studies to document the effects of acid rain on aquatic and terrestrial ecosystems.

4. Research to develop better management schemes to alleviate drought impacts.

5. Studies designed to assess the economic and environmental tradeoffs related to water quality criteria.

H. District of Columbia Priorities

1. The water quality of the Anacostia River is poor.

2. Combined sewers overflow pollutes the receiving waters.

3. Non-point source pollution is degrading surface waters

4. Plans for the removal of unauthorized discharges of hazardous substances, oil or pollutants into rivers and streams are inadequate.

5. There are many undesirable effects of urbanization/land use policies on water quality downstream from development.

6. Toxic and hazardous substances are threatening surface water quality.

7. Training of minorities in water quality control is needed.

8. Deterioration of water distribution lines and sewage transport lines threatens future water quality and promises to be an expensive future public works project.

9. Sewage sludge disposal is inadequate.

ATTACHMENT V

WATER RESOURCES RESEARCH CATEGORIES

FIELDS

01 NATURE OF WATER

02 WATER CYCLE

03 WATER SUPPLY AUGMENTATION AND CONSERVATION

04 WATER QUANTITY MANAGEMENT AND CONTROL

05 WATER QUALITY MANAGEMENT AND PROTECTION

06 WATER RESOURCES PLANNING

07 RESOURCES DATA

08 ENGINEERING WORKS

09 MANPOWER, GRANTS, AND FACILITIES

10 SCIENTIFIC AND TECHNICAL INFORMATION

01 NATURE OF WATER

A. Properties
B. Aqueous solutions and suspensions

02 WATER CYCLE

A General
B Precipitation
C Snow, ice, and frost
D Evaporation and transpiration
E Stream flow and runoff
F Groundwater
G Water in soils
H Lakes
I Water in plants
J Erosion and sedimentation
K Chemical processes
L Estuaries

03 WATER SUPPLY AUGMENTATION AND CONSERVATION

A Saline water conversion
B Water yield improvement
C Use of water of impaired quality
D Conservation in domestic and municipal use
E Conservation in industry
F Conservation in agriculture

04 WATER QUANTITY MANAGEMENT

A Control of water on the surface
B Groundwater management
C Effects on water of man's nonwater activities
D Watershed protection

05 WATER QUALITY MANAGEMENT AND PROTECTION

A Identification of pollutants
B Sources and fate of pollution
C Effects of pollution
D Waste treatment processes
E Ultimate disposal of wastes
F Water treatment and distribution
G Water quality control

06 WATER RESOURCES PLANNING

A Techniques of *planning*
B Evaluation process
C Cost allocation, cost sharing, pricing/repayment
D Water demand
E Water law and institutions
F Nonstructural alternatives
G Ecologic impact of water development

07 RESOURCES DATA

A Network design
B Data acquisition
C Evaluation, processing and publication

08 ENGINEERING WORKS

A Structures
B Hydraulics
C Hydraulic machinery
D Soil mechanics
E Rock mechanics and geology
F Concrete
G Materials
H Rapid excavation
I Fisheries engineering

09 MANPOWER, GRANTS, AND FACILITIES

A Education - extramural
B Education - in-house
C Research facilities
D Grants, contracts, and research act allotments

10 SCIENTIFIC AND TECHNICAL INFORMATION

A Acquisition and processing
B Reference and retrieval
C Secondary publication and distribution
D Specialized information center services
E Translations
F Preparation of reviews

NAMES of INDIVIDUAL CONTACTED (by mail, meeting and/or by phone)

Name	Institution/Department	
Dean Buck, A.C.	U.D.C.	College of Life Science
Dean Brach, P.	U.D.C.	College of Eng. & Tech.
John Britton	U.D.C.	Public Affairs
Jim O'Connor	U.D.C.	Dept. of Environ. Science
Bill Easly	U.D.C.	Coop. Extension Services
Dean Butler J.	U.D.C.	Col. of Liberal & Fine Arts
Dean Cassara, B.	U.D.C.	Graduate Studies
Dean Crump, W.	U.D.C.	Col. of Bus. & Pub. Mgmt.
Dean Kimmons , W.	U.D.C.	Col. of Human Ecology
Chairperson Mildred Scott	U.D.C.	Dept. of Biology
Chairperson Anthony Donfon	U.D.C.	Dept. of Physics
Chairperson Hershel McDowell	U.D.C.	Dept. of Chemistry
Dr. B. Smith	U.D.C.	Col. of Business
Dr. F. Chang	U.D.C.	Civil Engineering .
Dr. Y. H. Choi	U.D.C.	Col. of Business
Dr. Al Wilking	U.D.C.	Col. of Life Sciences
Dr. Victoria Guerrero	U.D.C.	Col. of Life Sciences
Dr. T.S. Yang	U.D.C.	Civil Engineering
Dean Flack	H.U.	Col. of Allied Health Science
Dean Wilson	H.U.	School of Bus. Public Adm.
Dean Walker	H.U.	School of Engineering
Dean Hawthorne	H.U.	Grad. Sch. of Arts & Science
Dean Branton	H.U.	School of Law
Dean Littleton	H.U.	Research Affairs

OF INDIVIDUAL CONTACTS (by mail.,meeting.and/or by phone) -Continued.

Name	Institution/Department	
Dr. Girard, J.	A.U.	Dept. of *Chemistry*
Dr. F.W. Carson	A.U.	Dept. of Chemistry
Dr. M.C. Sayer	A.U.	Dept. of Biology
Clair Buchana	A.U.	Dept. of Biology
Dr. Obeysekera	G.W.U.	Dept. of Civil, Mech. & Environmental Engineering
Dr. R.C. Waters	G.W.U.	Dept. of Engineering Adm.
Dr. V. Yevjevich	G.W.U.	Sch. of Engineering & Applied Science
Dr. D. Spoon	G.U.	Dept. of Biology
Philip Sze	G.U.	Dept. of Biology
Dr. B.T. DeCicco	C.U.	Dept. of Biology
Dr. G.K. Young	C.U.	Dept. of Civil Enginering

CONTACTS (see Attachment #D-1)

Fiscal Year (FY) 1985 State Water Research Institute (WRRI) Formula Grant Program

Results of Institute Contacts with Historically Black Colleges and Universities (HBCU)

Name of HBCU	Contact	- Method	Response
	Dr. A.C. Buck Dean, College of Life Science	In person	Distribution
	Dr. P. Brach Dean, College of Eng. & Tech.	" "	" "
University of D.C.	Mr. John Britton Public Affairs	" "	" "
	Dr. B. Smith Associate Dean College of Business	" "	Interested No proposal
	Dr. Y.H. Choi Prof., College of Business	" "	" "
	Dr. Al Wilkins Prof., College of Life Science	" "	" "
	Dr. J. Jones Prof., College of Life Science	" "	" "
	Dr. T.S. Yang Prof., College of Erg. & Tech.	" "	" "
	Dr. V. Guerrero Prof., College of Life Science	" "	" "
	Dr. F. *Chang* Prof., College of Eng. & Tech.	" "	85-04; $22,820
	Mr. James O'Connor Assoc. Prof., College of Life Science	" "	85-22; $19,826
	Dr. M. Scott Chair., Biology	" "	None
	Dr. A. Donfon Chair., Physics	Mail	None

DC Howard University	Dr. M. Varna Prof., Env. Eng.	Mail	85-02; $16,356
	Dr. Flack Dean, Allied Health	Mail	None
	Dr. Littleton Dean, Research	“ “	“ “
	Dr. Wilson Dean, Business	“ “	“ “
	Dr. Walker Dean, School of Eng.	“ “	“ “
	Dr. Hawthorne Dean, Grad. Sch. of Arts & Science	“ “	“ “
	Dr. Branton *Dean, School of Law*	“ “	“ “

FY 86 REQUEST FOR PROPOSAL PACKAGE

NAME	ADDRESS
1. Mr. Paul W. Eastman	Interstate Commission on the Potomac River Basin 6110 Executive Blvd. Suite 300 Rockville, Maryland 20852-13903
2. Dr. David Blackman	University of the District of Columbia Chemistry Department Bldg. 3, Rm. 304
3. Dr. G. J. Wang	Howard University Department of Civil Engineering 2300- 6th Street, NW Washington, DC 20059
4. Dr. Victoria C. Guerrero	University of the District of Columbia
5. Mr. James V. O'Connor	University of the District of Columbia Department of Environmental Science: Bldg. 44, Rm. 203-g.
6. Dr. M. M. Varma	Howard University
7. Dr. Choi	900 F street N.W. Rm. 914 Washington, D.C. 20004 University of the District of Columbia
8. Dr. Albert J. Jones	University of the District of Columbia Department of Environmental Sciences
9. Dr. William Hyman	Dean College *of* Life Sciences University of the District of Columbia
10. Dr. Brach	Dean College of Civil Engineering University of the District of Columbia
11. Dr. Butler	Dean College *of* Liberal & Fine Arts University *of* the District of Columbia
12. Dr. B. Cassara	Dean Graduates Studies University of the District of Columbia
13. Dr. Fields	Dean University College University of the District of Columbia
14. Dr. Gordy	Dean Continuing Education University of the District of Columbia

15. Dr. Nimmons	Dean College of Education and Human Ecology - Univ. of D.C.
16. Dr. B. T. Harris	Graduate Education University of the District of Columbia
17. Dr. J. Preer	University of the District of Columbia
18. Dr. G. Eng	University of the District of Columbia
19. Dr. I. Posey	University of the District of Columbia
20. Dr. G. Littleton	Research Affairs - Howard University
21. Dr. Harry G. Robinson	Dean School of Architecture and Plan Howard University
22. Dr. Milton Wilson	Dean School of Business and Public
23. Dr. E. W. Hawthorne	Dean Graduate School of Arts and Sc
24. Dr. James E. Girard	American University Chemistry Department
25.-Dr. F.W. Carson	American University Chemistry Department
26. Dr. B.T. DeCicco	Catholic University Department of Chemistry
27. Dr. H.P. Pao	Catholic University Department of Chemistry
28. Dr. Leopold May	Catholic University Department of Chemistry
29. Dr. G.K. Young	Catholic University Department of Civil Engineering
30. Dr. D.W. Armstrong	Georgetown University Department of Chemistry
31. Dr. Donald Spoon	Georgetown University Department of Biology
32. Dr. Philip Sze	Georgetown University Department of Biology
33. Dr. Bruce A. Bell	George Washington University Dept. of Civil, Mech. & Env. Eng.
34. Dr. Yevjevitch	George Washington University Dept. of Civil, Mech. & Env. Eng.

35. Dr. DeWitt Davis Department of Geography
University of the District of Columbia

DESIGN OF A WATER RESOURCES TRAINING PROGRAM FOR OPERATION, MAINTENANCE AND MANAGEMENT

By

Dr. M. H. Watt

Timothy J. Rarikari

Arthur H. Bunyan

The work upon which this report is based was supported by the D.C. Water Resources Research Center with funds provided in part by the Water Resources Management Administration (WRMA), the Department of Environmental Services, Washington, D.C.

The DC Water Resources
Research Center
Dr M.H. Watt, Director

The Water Resources
Management Administration
Mr Wallace White, Administrator

October 1983
(Revised: March 1984)

ATTACHMENT 16

TESTIMONY FOR THE DISTRICT OF COLUMBIA WATER POLLUTION CONTROL ACT

The D.C. City Council
District Building May 7,
1984
1 p.m.

Mr. Chairman, members of the committee, I am Dr. James Preer, Professor of Environmental Science at the University of the District of Columbia. Dr. Mamadou Watt requested that I testify for him on behalf of the University of the District of Columbia's Water Resources Research Center in support of the D.C. Water Pollution Control Act. Dr. Watt is the Director of the Water Resources Research Center and Commissioner to the Interstate Commission on the Potomac River Basin. Due to a prior engagement, Dr. Watt is unable to attend this hearing.

The Water Resources Research Center has conducted numerous studies on the quality of the waters of the District and on the institutional management of the District's water resource problems. A few of these studies dealt with non-point source pollution. Non-point source pollution comes from diffused sources such as runoff from urban developments, gardening, parks, etc. But point source pollution comes from a definite outlet such as a pipe or a tunnel and is usually associated with municipal and industrial discharges. There' are three general types of contaminants involved in non-point source pollution in the District of Columbia. These are toxic materials, such as heavy metals and pesticides; nutrients such as nitrogen and phosphorus; and sediment. At present the District's governmental infrastructure is set up only to deal with sediment and erosion control. The other two types of contaminants; i.e., toxic materials and nutrients, have no designated component of the infrastructure to deal with them. This Bill in Sections 4(c) and 5 begins to address the two types of contaminants mentioned above and the infrastructure necessary to manage the related control program.

There is still a lack of cohesiveness when two organizations within the Department of Consumer and Regulatory Affairs are required to administer what should toe a total non-point source program. We believe that the Erosion and Sediment Control Program is more properly an environmental control program.

As you may be aware, the Congress is considering amendments to the Federal Clean Water Act. One of the amendments is to provide for specific non-point source statutes. EPA has organized a non-point source control task force to put forward its recommendations. We would encourage the District to now forward on non-point source pollution and therefore take a proactive role with regard to this issue. The District should take a leadership position on the Potomac River and more particularly on the Anacostia River. While the Potomac River and Rock Creek have shown improved water quality in recent years, the Anacostia River still remains severely impacted by pollution.

This environmental deterioration is largely due to the effect of non-point source pollution. A general improvement of the Anacostia River will create a suitable environment for its inhabitants, for a large and diverse aquatic biota, for recreational activities and for waterfront developments. Future tax burdens on the citizens of the District of Columbia will also be lessened.

The Water Resources Research Center of the University of the District of Columbia supports this Bill or any attempt to help to alleviate non-point source pollution problems in the District of Columbia.

Thank you for this opportunity to testify.

ATTACHMENT 17

University of the District of Columbia

VAN NESS CAMPUS
4200 CONNECTICUT AVENUE, N.W.,
WASHINGTON, D.C. 20008

D. C. WATER RESOURCES RESEARCH CENTER

(202) 282-7333/4

May 18, 1981

STATEMENT FOR THE RECORD
BY DR. M. H. WATT, DIRECTOR, D.C. WRRC FOR
THE D.C. CITY COUNCIL HEARINGS ON SOIL
AND WATER CONSERVATION OFFICE FOR THE
DISTRICT OF COLUMBIA

The Water Resources Research Center welcomes the opportunity to comment on the possibilities of establishing a soil and water conservation District in the District of Columbia.

An abundance of clean water and good land management practices are the most important natural resources and the principle basis for the District's strong development. The need for conservation of land resources both public and private and for water resources have been recognized and stressed in many instances.

The three (3) major types of non-point source pollution in D.C. Waters are sediment, bacteria and nutrients. Of the three, soil erosion is the largest pollutant, by weight and volume, and also the most costly. A 1963 study by the U.S. Geological Survey and the Interstate Commission on the River Basin estimated that between 2.5 and 2.9 million tons of sediment finds its way into the Potomac estuary annually. At this rate according to the study, the-estuary could be filled from Chain Bridge to Fort Foote in 50 years. The highest yield of sediment per square mile is from urban development, discharged in the Potomac mostly during storm events. Sediment impacts water resources in many other ways. It fills reservoirs and reduces storage capacity. It increases costs to treat water for municipal use. It carries plant nutrients, bacteria and chemical, which contaminate water. It reduces fish and shellfish by blanketing their nests and spawning areas. . .

Water, on the other hand, must be controlled for beneficial uses. Water conservation includes, for instance, directing runoff into channels with the least disturbance to soil. In fact, soil and water conservation are so inter related that they can only be accomplished together. The Clean Water Act, which considers sediment as a major water problem, requires states to control excessive discharges of sediment into surface waters.

Due to its particular situation in an urban setting and surrounded by two other major states, the District of Columbia has problems quite different from other larger states within the United States. The D.C. Water Resources Research Center has conducted a study to identify water resources problems for the District of Columbia. The problems identified include water conservation aspects e.g. survey of plans and studies, implication of legislation, public education and economic demand. It also found that land use and excessive sedimentation on the Anacostia River were of critical nature.

A plan of work for the D.C. Soil and Water Conservation District could address without limiting itself to the following: land management practices, landscaping, better outdoor recreation, wind erosion control, rainfall runoff control, water quality and quantity, water management and conservation, training and public education. If such a plan were implemented, emphasis should be placed on training and public education. Land developers and builders could be trained in and/or informed about better land and soil conservation practices. The general public would also benefit largely from good conservation practices.

The D.G. Water Resources Research Center, because of the large pool of researchers it can call upon, is uniquely qualified to provide scientific support to that office. The Water Resources Research Center was established in April 1973, with the mission to provide the District of Columbia with research support to identify its water resources research problems and to contribute to the solution of these problems. The District and the neighboring jurisdictions in Maryland and Virginia share the surface water sources of the Potomac River and its tributaries. Consequently, most of the solution of the District's water problems will consider the entire Metropolitan Washington area.

The Center cooperates closely with local water agencies to insure that its research programs are responsive to the District of Columbia's water needs and, to increase its effectiveness. The District's water related agencies and universities are represented in the Center's two (2) advisory groups--the Research Advisory Council and the Technical Evaluation Committee.

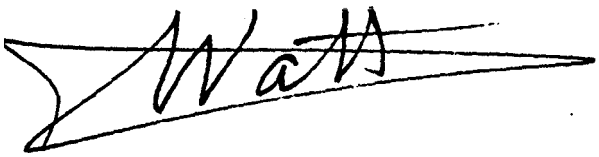
The Center's research projects are conducted by the Center itself or through the area universities: The American University, The Catholic University, The Georgetown University, The George Washington University, The Howard University and The University of the District of Columbia. Technology Transfer and Information Dissemination is another important program of the Center. This program ensures communication with the technical and scientific community and promotes a general understanding of water resources problems.

In the past the Center's research projects dealt mostly with water quality and quantity problems, urban runoff, aquaculture, eutrophication, management, etc. Current projects address: non-point source water pollution, effect of copper on oysters, inorganic anions in Potomac water sediment and floc, and

recreational use of water resources. In the future, the Center will diversify its research activities to include institutional, planning and management problems and others as identified in the study of the water research needs and priorities of the District of Columbia.

In conclusion, we believe that the D.C. WRRC can provide support to the D.C. Soil and Water Conservation District in the areas of research, training and technology transfer.

Mamadou H. Watt
Director



ATTACHMENT 18

WATER RESOURCES RESEARCH SEMINARS 1980 - 1985

DATE	SPEAKER	TOPIC
May 13, 1980 1 - 6 p. m.	Symposium /See Attachment A	"Water Research - The Present and the Future"
February 4, 1982 2 - 3 p. m.	Dr. Daniel Sheer, Director, CO-OP Planning Engineer Interstate Commission on the Potomac River Basin	"Potomac River Overview"
February 18, 1982 2 - 3 p. m.	Dr. Benedict DeCicco Professor of Biology The Catholic Unirversity	"Growth of Bacteria in Purified Waters and its Significance as a Health Hazard"
March 25, 1982 2 - 3 p. m.	Dr. Harry Ways, Chief Washington Aqueduct Division Corps of Engineers	"The Potomac Estuary Water Treatment Plant"
March 26, 1982 2 - 3 p. m.	WRRC and ICPRB Workshop Dr. Jim Smith and Dr. Dan Sheer	"Facing the Problem of Drought with Forecasting Techniques"
April 15, 1982 2 - 3 p. m.	Dr. David Danner, President Ideamatics	"Modeling Water Quality Without Complex Mathematics
May 6, 1982 2 - 3 p. m.	Mr. William Johnson, Director Dept. of Environmental Services	"Wastewater Treatment for D. C."
October 21, 1982	John Kalbermatten The World Bank	"International Drinking Water Supply and Sanitation Decade"

DATE	SPEAKER	TOPIC
November 4-5, 1982	ICPRB, DES and WRRC The 1982 Annual Fall Public Meeting of the Interstate Commission on the Potomac River Basin	"The Potomac in Washington: Recovery, Reflection and Future Role"
December 1, 1982	Michael Champ, American University	"Review of the Water Quality in the Potomac River Estuary from the 1930's to the Present"
January 26, 1983	James O'Connor and Robert Ford	"Rock Creek Park"
February 16, 1983	John R. Thomas D. C. Department of Environmental Services	"Sludge Management in D. C.
March 16, 1983	Frances Flanigan Public Participation Program	"Chesapeake Bay Program"
April 20, 1983	Daniel Sheer, Interstate Commission on the Potomac River Basin	"Regional Water Resource Management"
October 19, 1983	James Burton, Special Assistant Water Research, Department of the Interior	"Microcomputers in Water Research Management"
November 17, 1983	See Attachment B	"Agricultural Experiment Station Program and Activities"
April 12, 1984	See Attachment C	"Sludge Management Seminar"

DATE	SPEAKER	TOPIC
November 1, 1984	G. K. Young Catholic University	"Water Supply Projects: A Case Study"
March 19, 1985	Stuart Freiberg, Michael Sullivan, Tom Schueler Council of Governments	"Utilization of Computer Simulation for Water Resources Management:
April 12, 1985		"Land Applications of Sewage Sludge: A Perspective by Area Agency Representative
April 24, 1985	The D. C. WRRC and the UDC Environmental Sciences Department	"Environmental Career Seminar"
April 29, 1985	M. H. Watt, T. J. Karikari and H. Truong The D. C. WRRC	"Anacostia Water Quality Trends - Past and Future"

ATTACHMENT A

UNIVERSITY
OF THE
DISTRICT OF COLUMBIA

Water Research - The Present and the Future

Symposium

May 13, 1980 1 - 6 p.m.

WRRC

University of the District of Columbia
Van Ness Campus
4200 Connecticut Avenue, N.W.
Washington, D.C. 20008
Student Lounge, Building 38, 2nd Level

- PROGRAM -

OPENING REMARKS .....Dr. Mamadou H. Watt, Director
Water Resources Research Center

INTRODUCTION OF THE PRESIDENT, UDC...Dr. Aunye C. Buck, Dean
College of Life Sciences

WELCOME ADDRESS .....Mr. Lisle C. Carter, President
University of the District of Columbia

INTRODUCTION OF SPEAKERS .....Dr. Mamadou H. Watt

"The Washington Aqueduct Water Supply System" ..... Mr. Harry C. Mayo, Chief
Washington Aqueduct Division

"Blue Plains Wastewater Treatment Plant" .....Mr. Jean Levesque, Administrator
Water Resources Management Administration
Department of Environmental Services

- BREAK -

"Metropolitan Washington Area Water Supply Study" .....Mr. Robert Pace, Community Planner
U. S. Corps of Engineers

"The Research Program of the Office of Water Research and Technology" .....Dr. Mahlon O. Ertel, Water Resources Research Specialist
Office of Water Research and Technology
U. S. Department of the Interior

CLOSING REMARKS .....Dr. Mamadou H. Watt

ATTACHMENT B

AGRICULTURAL EXPERIMENT STATION
PROGRAM AND ACTIVITIES

November 17, 1983

SPEAKER	TOPIC
Mohamed Elhelu, Professor University of the District of Columbia	"Heavy Metals in Urban Gardens"
Victoria Guerrero, Professor University of the District of Columbia	"Urban Raccoons and Rabies: Ecological, Epizootiological and Immuniological Assessment"
James Preer, Professor University of the District Columbia	"Soil Properties Affecting Sorption of Heavy Metals from Waste (NE-96)" of
Joshua Kearney and Thedola Milligan Professors University of the District of Columbia	"Quality Maintenance and Control in Marketing and Storage of Vegetables (NE-116)"

ATTACHMENT C

SLUDGE MANAGEMENT

SEMINAR April 12, 1984

SPEAKER	TOPIC
Wallace White and John R. Thomas Department of Public Works	"D. C. Sludge Management" WSUA,
Lawrence Sikora, USDA Beltsville	"Land Applications"
Donald A. Jackson Geraghty & Miller, Inc.	"Groundwater Monitoring and Sampling at Sludge Disposal Sites"
John R. Short Ecological Services Laboratory Park Service	"Composting of Septage and Liquid Wastes Within a National Park" National
Edward Bryan National Science Foundation	"Innovative Concepts in Sludge Managemen
James Preer District of Columbia	"Heavy Metals in Sludge" University of the
Charles Spooner Environmental Protection Agency	"Existing and Proposed EPA Sludge Management Regulations"

The Sludge Management Seminar was followed by a panel discussion chaired by Austan Librach, Council of Governments and representatives who included:
John R. Thomas/Department of Public Works, Rufus Chaney/U. S. Department of Agriculture, David Sobers/Montgomery, Ed Pison/Prince Georges County, and Charles Spooner/Environmental Protection Agency.

ATTACHMENT 19

DIRECTORY OF UNIVERSITY

WATER EXPERTISE

IN THE DISTRICT OF COLUMBIA 1982

Preparation of the directory was supported in part by Federal funds from the Office of Water Research and Technology, U.S. Department of the Interior, as authorized by the Water Research and Development Act of 1978, PL 95-467.

D.C. WRRC Report No. 40

District of Columbia Water Resources Research Center
University of the District of Columbia 4200 Connecticut Avenue, N.W. Washington, D.C. 20008
(202) 282-7333

DIRECTORY OF WATER-RELATED ORGANIZATIONS IN THE DISTRICT OF COLUMBIA 1982

Preparations of the directory was supported in part by

Federal funds from the Office of Water Research and Technology, US Department of the Interior, as authorized by the Water Research and Development Act of 1978, PL 95-467

D.C. WRRC Report No. 41

District of Columbia Water Resources Research Center
University of the District or Columbia
4200 Connecticut Avenue, N.W. ~-
Washington, D.C. 20008 (202) 282-7333

GLOSSARY OF USEFUL WATER RESEARCH TERMS

The D.C. Water Resources Research Center University of the District of Columbia Washington, District of Columbia

August 1983

WATER RESOURCES PUBLICATIONS PERTAINING TO THE DISTRICT OF COLUMBIA

Document Number DC WRRC Report No. 55

August 30th, 1985

Prepared By Sheila A. Besse

University of the District of Columbia
Water Resources Research Center
Washington, D.C.

PREFACE

The DC Water Resources Research Center was established at the University of the District of Columbia in 1973 under the Water Research and Development Act of 1964. The purpose of DC WRRC is to provide the District of Columbia with interdisplinary research support to identify the D.C. water resources problems and to contribute to their solution. In addition, the Center promotes training, technology transfer, and information dissemination on the water and water resources of the District of Columbia.

The DC WRRC Five-Year Water Resources Research Program for 1982-1987 (DC WRRC 1980) calls for the preparation and publication of three directories as part of it-s information dissemination program.

Two of the three DC WRRC directories have been published to date. They are:

Directory of Water-Related Organizations in the District of Columbia (DC WRRC 1982) and

Directory of University Water Expertise in the District of Columbia (DC WRRC 1982).

This publication is the third of the series, and its purpose is to provide a comprehensive bibliography of water-related publications pertaining to the District of Columbia.

The goals established in designing and compiling this directory are many fold. It is the Center's intent that this directory help interested parties of the District of Columbia identify and locate publications most appropriate to their needs, facilitate communication and information exchange between organizations and individuals interested in the District's water resources, and aid in identifying adequately researched topics as well as new research topics concerning D.C.'s water resources.

References for this Directory were obtained from a 'variety of bibliographic sources. Individuals listed in the Directory of University of Water Expertise were sent a questionnaire requesting information on any publications he, she, government agency or firm had published relevant to water resources in the District of Columbia. Also, bibliographic publications issued by water-related organizations, in particular those listed in the Directory of Water-Related Organizations were reviewed. These organizations included industry, educational centers, state and federal agencies. And last, computer database searches were conducted at the Library of Congress and at the University of the District of Columbia.

It is inevitable that omissions and errors have been made during the compilation of a publication of this size, and for them we apologize. Since it is the aim of the Center to periodically update this publication, we would appreciate learning about these omissions and errors so that later editions will be more complete and correct. As an aid in this effort, an update/ correction form is included at the back of the publication. In addition, comments and suggestions concerning this publication are welcomed. Improvements will be made in subsequent editions.

The design and collection of references were initially carried out by Cheri E. Richards. Sheila A. Besse reorganized and recompiled the data and completed the report. We wish to congratulate Sheila A. Besse for her talent, innovativeness and dedication. This publication was formatted on an IBM 370 using Script software. We wish to thank the Computer Center at UDC, especially Glen Morgan and Byron Tyer for their technical help with this project. We also thank Mr. Julian of the General Council's Office, UDC, for allowing us use of his printer. And finally, we thank the staff at WRRC for their support.

Dr. Mamadou H. Watt Director

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ATTACHMENT 20

As part of the Technology Transfer, WRRC disposes of computer programs not only for its own use but to help also public agencies representatives, researchers with their particular needs.

In addition, the Center has access to automated systems including WATSTORE, STORET and NAWDEX.

SUMMARY OF COMPUTER PROGRAMS AVAILABLE AT D. C. WRRC

NAMES	LANGUAGES	DESCRIPTION
Seaken	Fortran	USGS Program. It is a non parametric statistical technique used to determine long term seasonal trends in water quality.
Seasken	SAS	It is the USGS version of Seaken
Regan	Fortran	EPA program to perform the least squares fit of the the type Y(T) = Al+A2*sin(wt)+A3*sin(2wt) +A4*sin(3wt)+A5*cos(wt)+A6* cos(2wt)+A7*cos(3wt) to observed data by solving the normal equations.
Dynhyd	Fortran	EPA program that describes the dynamic flow of a two-dimensional estuarine system by obtaining an explicit solution to the equations of continuity and momentum. The program can handle a network of 139 channels and 133 junctions.
Dynqua	Fortran	EPA program to predict chlorophyll yield based upon either nitrogen and phosphurus utilization. It can consider both nutrients simulteneously in the production of chlorophyll and then determine which is rate limiting by comparing individual theoretical chlorophyll yield according to first order kinetics.

HSPF 1- 19 Series	Fortran	This EPA program helps users to simulate the transport and transformation of pollutants through a watershed, thus to anticipate problems.
HEC	Fortran	This program determines a water surface profiles, average Monthly stream flows, scour and sediments deposition

ATTACHMENT 21

NEWSLETTERS

As a service to the Professionals and Laymen members of its mailing list, the D.C. WRRC publishes periodically a newsletter called "Water Highlights". These newsletters contain information ranging from Federal and District policy issues to special articles related to water in the D.C. Metropolitan.

Volume	Date	Description
1	February, 1982	Call for papers, FY82 OWRT fundings status, WRRC Seminars, new publications and reports received, area news, job and conference announcement
2	May, 1982	Research projects completed, WRRC seminars WRRC field trips, publications received, Special article: "The Potomac Clean up being successful'
3	September, 1982	Seminar on "The Potomac In Washington: Recovery, Reflection and Future", Seminar, job announcement, publications received
4	December, 1982	WRRC fundings status, Special article: "OWRT functions being transferred", "Regional Pacts solve Metro Water Supply", ICPRB Fall Public Meeting, Completed Projects, Seminars, Publications received
5	March, 1983	FY 83 Annual Cooperative Program, Support for Renewed Federal Funding, WRRC publications available for review, Rock Creek Conservation Study, D.C. Sewer Study Public Hearing, upcoming seminars, publications received, conference announcement
6	July, 1983	
7	October, 1983	Legislation Update, FY83 projects, WRRC projects completed, WRRC Director member of Scientific delegation to China,

	vacancies, publications received, conference announcement, news briefs, Seminars
9	Chesapeke Bay Program, Water Resources Research grant Program, special article: "Hydrilla", Announcement, position vacancy
	Call for proposals, Recent Technology Transfer. Information Dissemination Activities, "Exploring The Anacostia Tidal Estuary And Its Shoreline Uses, Anacostia Forum: public Meeting. WRRC On-Going Projects, WRRC Completed projects, WRRC new projects, Call for papers, WRRC's proposal for an International Symposium

ATTACHMENT 22

LOCAL WRRC FIELD TRIPS

1) Basic Hydrologic Investigations for DC
   Location: Rock Creek
   January 19, 1985

2) Water Supply and Waste Disposal Management for DC
   Locations: Delecarlia Water Treatment Plant
   Blue Plains Wastewater Treatment Plant

3) Exploring the Anacostia and its Shoreline Uses Location: Anacostia Park
   April 26, 1985

4) Potomac Riverfest '85
   Location: Potomac River/Haines Point
   June 8 - 9, 1985

ATTACHMENT 23

University of the
District of Columbia

VAN NESS CAMPUS
4200 CONNECTICUT AVENUE, N.
W. WASHINGTON, D. C. 20008

Learning Resources Division

December 5, 1984

MEMORANDUM

TO: Dr. Mamadou Watt
Director
Water Resources Research Center

FROM: John S. Page, Jr.
Deputy Director

RE: Water Resources Holdings

As per our conversation and your request, the following information is provided regarding our Water Resources materials holdings and services.

1) Our shelflist indicates holdings as follows:
   a) GB 1003 - [Water, Hydrology] 300 titles
   b) b) QE 75- [Geology] 825 titles
   c) TC - [Hydraulic engineering including water supply engineering, dams, canals, etc.] 14 titles.
   c) TD - [Environmental Technology, including water supply for domestic and industrial purposes] 1150 titles.

2) Print-outs of material added to automated circulation/cataloging system or titles that have circulated since the system was implemented in 1980 are enclosed.

3) Periodical titles subscribed to include American Society of Civil Engineers, Irrigation and Drainage, Water Resources Planning Management, and Waterways, Harbors of Coastal Engineering; Water, Air and Soil Pollution; Water Engineering and Management; Water Research; and Sea Technology - eight titles.

4) On-line data bases include Water Resources Abstract, WATERNET, Aquatic Science and Fish Abstracts, IRIS, GEOREF, Aqualine and OCEANIC.

If further assistance is needed, please let me know.
JSP:dr

Attachments

TRAINING

Years	UDC	Consortium of Universities	Total
1980	8	5	13
1981	1	7	8
1982	2	6	8
l983	3	7	10
1984	6	5	11

ATTACHMENT 25

HOWARD UNIVERSITY
WASHINGTON. D.C. 20088

DEPARTMENT OF CIVIL ENGINEERING

November 25, 1985

Dr. Mamadou H. Watt
Director
Water Resources Center
University of the District of Columbia
Van Ness Campus
4200 Connecticut Avenue, N.W.
Washington, DC 20008

Dear Dr. Watt:

I am writing you this letter in connection with the "Site Visit and Evaluation of the Center". Below are appended some details of the students who worked on the projects.

1. Trihalomethane Formation and Removal

Mohan D. Murali. He was a graduate student, at the time the research was in progress. A portion of this research was included in his thesis. He has completed the requirement for his master's degree and is currently working for an engineering corporation.

Rajat Rajan. He worked part-time on this project and is currently enrolled at Case Western in Cleveland. He is making excellent progress. This project has helped him in his course work, especially chemistry.

2. Chemical Separation of Water Samples

Two students, namely B.E. Adebona and D. Patel worked on this project. Both are currently enrolled in our graduate program. The former will graduate next semester.

3. Mutagenesis of Metabolities of Nonionic Detergent

This project is in progress and we are gathering data on it. The HPLC has been calibrated. We hope to publish a paper towards the end of this year.

Based upon this project and HPLC work previously mentioned an abstract has been submitted for presentation of a paper at the "Tenth International Symposium on Column Liquid Chromatography" (see attached abstract). The decision on the abstract will be made around February 15, 1986

In the end, on behalf of the Department of Civil Engineering I take this opportunity to thank you for providing us with the seed money for these grants. We are writing a research proposal for evaluating the health effects of 4-nonylphenol and the proposal will be submitted to the U.S. EPA.

With regards.

Sincerely,

M.M. Varma, Ph.D., P.E.
Diplomate, AAEE Professor

Enclosure

MMV:w

ATTACHMENT 26

COMPUTER AND RESEARCH FACILITIES AT THE PARTICIPATING UNIVERSITIES

UNIVERSITY OF THE DISTRICT OF COLUMBIA

Soil Mechanics Laboratory
Sanitary Engineering Laboratory
Hydraulic Laboratory
Fluid Mechanics Laboratory
Computer Application Laboratory
Computer Hydrological Models
Science and Engineering Library
Geology Laboratory
Chemical Analysis of Water Quality Laboratory
Wastewater Laboratory
Mapping Laboratory
Integrated Science Laboratory Water Resources Library
Computer Systems (IBM-370 & DEC-20)

THE GEORGE WASHINGTON UNIVERSITY

- Civil Engineering
- Computer Science
- Electrical Engineering Computer Engineering Option Premedical Engineering Option
- Mechanical Engineering
  Combustion and Environmental Engineering Option Computer-Aided Design Option Energy and Power Option
  Fluid Mechanics and Thermal Sciences Option
  Mechanical Engineering Design Option Solid Mechanics and Materials Engineering Option

- Systems Analysis and Engineering
  Computer Systems Track
  Control and Instrumentation Systems Track
  Electrical Energy Systems Track Electro-mechanical Systems Track Environmental Systems Track
  Financial Systems Track Management Decision Systems Track Mathematical Systems Track Mechanical Energy Systems Track Network Systems Track
  Naval Systems Track Production Systems Track Statistical Systems Track

THE CATHOLIC UNIVERSITY OF AMERICA

Architecture (Department of Architecture and Planning) Chemical Engineering (Department of Chemical Engineering) Civil Engineering (Department of Civil Engineering) Electrical Engineering (Department of Electrical Engineering) Energy Engineering (Department of Mechanical Engineering) Fluid and Solid Mechanics (Department of Civil Engineering) Fluid Mechanics (Department of Mechanical Engineering) Materials Science (Department of Chemical Engineering) Mechanical Engineering (Department of Mechanical Engineering) Structures and Structural Mechanics (Department of Civil Engineering) Programs which offer a major or minor for master `s degree candidates only are:

Biomedical Engineering (Department of Mechanical Engineering) Engineering Management (Department of Civil Engineering) Vitrous State Laboratory (Department of Mechanical Engineering)

HOWARD UNIVERSITY

Lab for Structures

Fluid Mechanics & Hydraulics
Water Wastewater Chemistry
Computer Science
Chemical Engineering
Electrical Engineering
Laser
Solid State Electronic
Welding Nuclear
Engineering Aerospace

GEORGETOWN UNIVERSITY

Lab Facilities
Biology
Chemistry

ATTACHMENT 2 7

Water Resources Research Center - Access to Facilities

Washington D.C. Agencies

1. Environmental Protection Agency (EPA)
2. Metropolitan Washington Council of Governments (MWCOG)
3. D.C. Department of Consumer and Regulatory Affairs
4. D.C. Soil Erosion Resource Branch
5. Water Hygiene and Quality Assurance Branch
6. D.C. Office of Planning and Development

Local Institutions

1. Howard University Water Quality Lab
2. Catholic University Biology/Water Quality Lab
3. University of the District of Columbia - Civil and Mechanical Engineering Laboratories
4. UDC College of Life Sciences-Environmental Science Water Quality Lab
5. College of Life Sciences Agricultural Experiment Station
6. Library of Congress

Out of State Agencies

1. Washington Suburban Sanitary Commission

Department of Natural Resources

3. Charles County Community College,-Operator Training Department
4. Virginia Waste
5. U.S. Geological Survey-Surface Water Branch & Library Reston, Virginia
6. Arlington Water Pollution Control Plant - Wastewater Operator Training Division-Fairfax, Va.

ATTACHMENT 28a

DIRECTOR'S OFFICE

1. INTERFACE WITH UDC ADMINISTRATION

2. INTERFACE WITH THE DEPARTMENT OF THE INTERIOR, GEOLOGICAL SURVEY

3. INTERFACE WITH D.C. AGENCIES

4. INTERFACE WITH OTHER PARTICIPATING UNIVERSITIES

5. PREPARE SEMINARS AND CONFERENCES

6. DISTRIBUTION OF REPORTS AND OTHER INFORMATION

7. ASSIST IN UDC INSTRUCTIONAL NEEDS

8. MAINTAIN LIBRARY OF WATER PUBLICATIONS

9. PARTICIPATE IN D.C. ADVISORY COMMITTEES, ETC.

10. PUBLISH NEWSLETTERS AND OTHER INFORMATIONAL BROCHURES

11. PREPARE THE FOLLOWING REPORTS:

- BIBLIOGRAPHY OF D.C. WATER PUBLICATIONS
- DIRECTORY OF UNIVERSITY EXPERTISE (UPDATE)

  DIRECTORY OF D.C. WATER ORGANIZATIONS (UPDATE)

  PREPARE 5 - YEAR PLAN

  BOOK OF ABSTRACTS

  WRRC BROCHURE

  WRRC FACT SHEETS

  PUBLICATIONS LIST

  SLIDE SHOW/PICTURE BOOK

- EXHIBIT DISPLAY

University of D.C., Mr.Claude Ford, Acting President Samuel Sullivan, Provost and V.P. Academic Affairs, Dr. William Hyman, Dean College of Life Sciences

U.S.Geological Survey

The Department of Interior

Research Advisory Council

Technical Evaluation Committee

D.C. Water Resources Research Center Dr. M.H. Watt, Director

UNIVERSITIES

The University of D.C.

The Howard University

The American University)

The Catholic University

The Georgetown U.

The George Washington

Gallaudet University

AGENCIES

Dept. of Public Works

Water & Sewer Adm.
D.C. Regulatory Affairs

Washington Aqueduct Div.

W.M.Council of Gorvernts

I.C.P.R.B.(Potomac),

Chesapeake Bay

National Park Services

ATTACHMENT 29

DC WRRC PUBLIC INVOLVEMENT

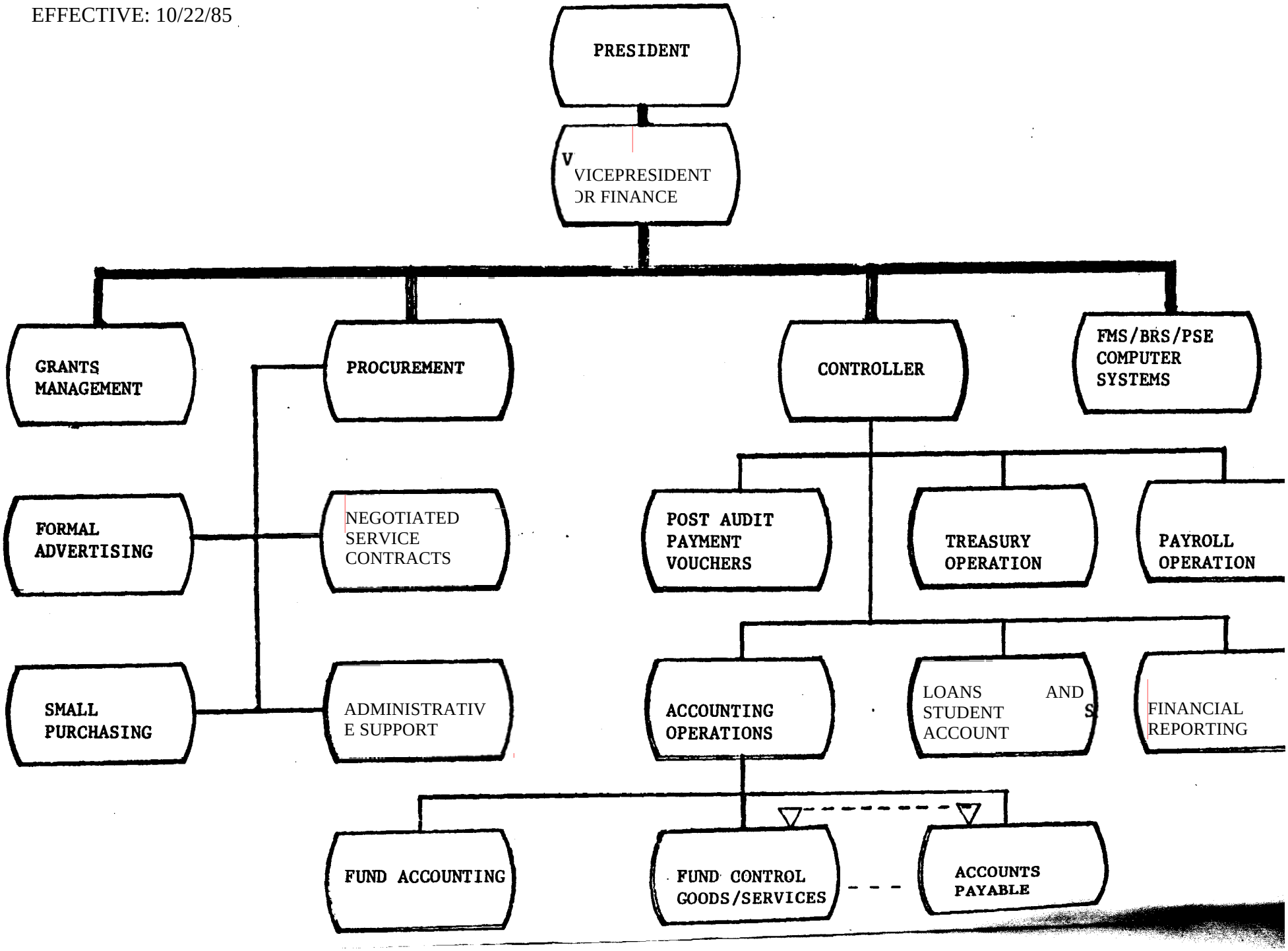
1. Interstate Commission on the Potomac River Basin: DC Commissioner
2. Chesapeake Bay Program: DC Representative to the Scientific and Technical Advisory Committee
3. Potomac River Consortium: Alternate Director for the University of the District of Columbia
4. Hydrilla Committee: Member
5. Anacostia Forum: Member
6. Washington Area Waterfront Action Group: Member
7. Special Science Program for Students: Mentor Student Program
8. National Science Foundation: Proposal Review Committee, Engineering Division

UNIVERSITY OF THE DISTRICT OF COLUMBIA - FINANCE DIVISION

ATTACHMENT 30

TENTATIVE PROPOSED INTERIM ORGANIZATION

EFFECTIVE: 10/22/85



UNIVERSITY OF THE DISTRICT OF COLUMBIA
RESOURCE MANAGEMENT
DIVISION OF CONTROLLERSHIP

MISSION

Manage and operate the functions of Fund Accounting and Financial Reporting in compliance with the fiscal policies of the Board of Trustees and accepted Fiscal Standards of Accountability and Management Integrity as prescribed by the Accounting Principles and Standards of Higher Education Professional Organizations: National Association of College and University Business Officers (NACUBO) and American Institute of Certified Public Accountants (AICPA).

FUNCTIONS

Fund Accounting and Financial Reporting are functions through which financial data necessary to the efficient administration of the University are recorded, classified, and reported to Program Managers, Administrative Officers, President, Board of Trustees, legislative bodies and the general public. The objectives of these functions are the providing of financial information to assist (1) administrative management in the effective allocation and use of resources, and (2) the governing board, legislative bodies, resource investors, and general public in evaluating the effectiveness of University management in achieving institutional goals and objectives.

ADMINISTRATION : The Controller works under the direction of the Assistant Vice President for Resource Management and is responsible with commensurate authority in concert with Directors for planning, organizing, staffing, implementing, managing, and supervising the functions of Fund Account fig and Financial Reporting. This involves specifically: (a) developing, coordinating and maintaining an integrated financial accounting and reporting operation which includes competent personnel interfacing with functional--activities: (b) exercising effective control over the financial resources of--t-he University; (c) coordinating and synthesizing financial management, procurement, and budgetary data, interpreting the composite financial accounting and reporting results for all levels of the University; (d) advising on developing, coordinating, and carrying out financial and reporting, Procurement, and budgetary policies, procedures, and plans; (e) analyzing, evaluating and reporting on program accomplishments in financial terms; and (f) advising and assisting top management by providing budgetary, procurement, and financial management information as required to make managerial decisions and establishing program goals and objectives.

OPERATIONS : Fund Accounting and Financial Reporting departmental operating functions are:

a. Treasury Operation
b. Student Loans and Accounts Receivable
c. Fund Control of Budget Allocations
d. Accounts Payable
e. Payroll Operations
f. Accounting Operation
g. Financial Reports Preparation and Dissemination

UNIVERSITY OF THE DISTRICT OF COLUMBIA (An independent agency of the District of Columbia Government)

Notes to Financial Statements

September 30, 1984

(1) Summary of Significant Accounting Policies

(a) General

The University of the District of Columbia (UDC) is a land-grant institution and an independent agency of the District of Columbia (the District). UDC is governed by its Board of Trustees.

Annually, UDC's budget request is a component of the overall District budget request to Congress. The UDC budget is subject to review and approval by the Mayor of the District, the District Council and the Federal government prior to actual Congressional appropriation of funds for the forthcoming fiscal period. UDC's budgeted expenditures are initially derived from District revenues.

UDC is provided maintenance, administrative services, and leasing arrangements through other District agencies. The charges for such interagency services approximated $1,267,099 for the year ended September 30, 1984 and are included in the financial statements.

(b) Accrual Basis

The financial statements of UDC have been prepared on the accrual basis of accounting in accordance with the American Institute of Certified Public Accountants' Audit Guide for Colleges and Universities.

Appropriated revenues from the District are recorded when the expenditures to which they relate have been incurred.

Revenues on cost reimbursable grants are reported as costs are incurred. These revenues and their related costs are reported in restricted current funds. UDC records unbilled grant receivables to the extent that reimbursable grant costs have been incurred but not billed. Conversely grant receipts in excess of cost incurred are reported as a direct addition to the fund balance of the current restricted fund.

The statement of current funds revenues, expenditures, and other changes is a statement of financial activities of current funds related to the current reporting period. It does not purport to present the results of operations or the net income or loss for the period as would a statement of income or a statement of revenues and expenses.

(Continued)

To the extent that current funds are used to finance plant assets, the amounts so provided are accounted for as (1) expenditures, in the case of normal replacement of movable equipment and library books; (2) mandatory transfers, in the case of required provisions for debt amortization and interest; and (3) as transfers of a nonmandatory nature for all other cases.

(c) Fund Accounting

In order to ensure observance of limitations and restrictions placed on the use of the resources available to UDC, the accounts of UDC are maintained in accordance with the principles of "fund accounting." This is the procedure by which resources for various purposes are classified for accounting and reporting purposes into funds that are in accordance with activities or objectives specified. Separate accounts are maintained for each fund; however, in the accompanying financial statements, funds that have similar characteristics have been combined into fund groups. Accordingly, all financial transactions have been recorded and reported by fund group.

Within each fund group, fund balances restricted by outside sources are so indicated and are distinguished from unrestricted funds allocated to specific purposes by action of the Governing Board. Externally restricted funds may only be utilized in accordance with the purposes established by the source of such funds and are in contrast with unrestricted funds over which the Governing Board retains full control to use in achieving any of its institutional purposes.

The appropriated current fund accounts for all revenues appropriated by the District. These revenues are expendable for any purpose in the performance of the objectives of UDC.

The student loan fund is used for transactions relating to student loans provided by the National Direct Student Loan and Federal Nursing Loan Programs and temporary loans from funds internally designated for such use by the Board of Trustees.

The land-grant endowment fund is used for transactions affecting the principal of a $7,241,706 grant from the Federal government received in lieu of land in 1969 and 1970. Land-grant endowment funds are subject to the restrictions of gift instruments requiring in perpetuity that the principal be invested and the income only be utilized for current operations.

(Continued)

The plant fund is used for transactions related to investment in plant assets.

All gains and losses arising from the sale, collection, or other disposition of investments and other noncash assets are accounted for in the fund which owned such assets. Ordinary income derived from investments, receivables, and the like is accounted for in the fund owning such assets, except for income derived from investments of endowment funds, which income is accounted for in the fund to which it is restricted or, if unrestricted, as revenues in unrestricted nonappropriated current funds.

All other unrestricted revenue is accounted for in the unrestricted nonappropriated current fund. Restricted gifts, grants, appropriations, endowment income and other restricted resources are accounted for in the appropriate restricted funds. Restricted current funds are reported as revenues and expenditures when expended for current operating purposes.

(d) Income Taxes

UDC as an independent agency. of the District is not subject to income taxes

(e) Other Significant Accounting Policies

Tuition revenues and the related expenses are recorded in the fiscal year in which the majority of the services are rendered. Recognition of fall semester 1984 tuition revenues of $2,766,731 and expenses of $3,143,216 have been deferred as of September 30, 1984. These amounts will be recorded as revenues and expenses, respectively, during the fiscal year 1985. Similarly, tuition revenues of $2,485,607 and expenses of $2,812,543 which were deferred as of September 30, 1983, have been recorded as revenues and expenses during the year ended September 30, 1984.

Certain 1983 comparative amounts have been reclassified to conform with the 1984 presentation.

Other significant accounting policies are set forth in the financial statements and the notes thereto.

(Continued)

ATTACHMENT 31

[redacted]

REVISED TENTATIVE REPORT SUPERCEDES REPORT SUBMITTED 12/17/84 ATTACHMENT 31

FINANCIAL STATUS REPORT

(Follow instructions on the back)

1. FEDERAL AGENCY AND ORGANIZATIONAL ELEMENT TO WHICH REPORT IS SUBMITTED: U.S. DEPARTMENT OF THE INTERIOR GEOLOGICAL SURVEY RM. 2-D-305A

2. FEDERAL GRANT OR OTHER IDENTIFYING NUMBER: 14-08-0001-G-834

OMB Approved No. 80-R0180

PAGE 1 OF 2

3. RECIPIENT ORGANIZATION (Name and complete address, including ZIP code)

University of the District of Coulmbia
Resource Management Division
4200 Connecticut Ave., N.W. Bldg. 38 - Rm. 302
Washington, D.C. 20008

4. EMPLOYER IDENTIFICATION NUMBER: 15360011311-A2

5. RECIPIENT ACCOUNT NUMBER OR IDENTIFYING NUMBER: 68C4 084A-I

6. FINAL REPORT: TENTATIVE ☐ NO

7. BASIS: ☐ CASH ☒ ACCRUAL

8. PROJECT/GRANT PERIOD (See instructions): FROM (Month, day, year) 08/29/83 TO (Month, day, year) 08/31/84

9. PERIOD COVERED BY THIS REPORT: FROM (Month, day, year) 08/29/83 TO (Month, day, year) 08/31/84

10. STATUS OF FUNDS

PROGRAMS/FUNCTIONS/ACTIVITIES ►	(a) 3709-1 Director's Office	(b) 3709-23 Watt/Swaminatha	(c) 3709-8 Watt/Karikara	(d) 3709-02 Watt/O'Connor	(e) 3709-22 Watt	(f) 3709-04 Catholic U./Young	SUBTOTAL (g)
a. Net outlays previously reported	$	$	$	$	$	$	$
b. Total outlays this report period	136,235.49	24,310.48	58,923.77	23,511.73	14,800.60	19,766.22	277,548.29
c. *Less:* Program income credits	N/A	N/A	N/A	N/A	N/A	N/A	N/A
d. Net outlays this report period *(Line b minus line c)*	136,235.49	24,310.48	58,923.77	23,511.73	14,800.60	19,766.22	277,548.29
e. Net outlays to date *(Line a plus line d)*	136,235.49	24,310.48	58,923.77	23,511.73	14,800.60	19,766.22	277,548.29
f. *Less:* Non-Federal share of outlays	114,920.43	14,990.48	45,223.77	9,800.73	9,512.60	6,931.01	201,379.02
g. Total Federal share of outlays *(Line e minus line f)*	21,315.06	9,320.00	13,700.00	13,711.00	5,288.00	12,835.21	76,169.27
h. Total unliquidated obligations	0	98.00	1,265.00	0	0	0	1,363.00
i. *Less:* Non-Federal share of unliquidated obligations shown on line h	0	0	0	0	0	0	0
j. Federal share of unliquidated obligations	0	98.00	1,265.00	0	0	0	1,363.00
k. Total Federal share of outlays and unliquidated obligations	21,315.06	9,418.00	14,965.00	13,711.00	5,288.00	12,835.21	77,532.27
l. Total cumulative amount of Federal funds authorized	20,141.00	9,418.00	14,965.00	13,711.00	5,288.00	13,500.00	77,023.00
m. Unobligated balance of Federal funds	(1,174.06)	0	0	0	0	664.79	(509.27)

11. INDIRECT EXPENSE

a. TYPE OF RATE *(Place "X" in appropriate box)* ☐ PROVISIONAL ☐ PREDETERMINED ☐ FINAL ☐ FIXED

b. RATE	c. BASE	d. TOTAL AMOUNT	e. FEDERAL SHARE

12. REMARKS. Attach any explanations deemed necessary or information required by Federal sponsoring agency in compliance with governing legislation.

13. CERTIFICATION

I certify to the best of my knowledge and belief that this report is correct and complete and that all outlays and unliquidated obligations are for the purposes set forth in the award documents.

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL: Arthur Danner

DATE REPORT SUBMITTED: 1/29/85

TYPED OR PRINTED NAME AND TITLE: Arthur W. Danner, Controller

TELEPHONE (Area code, number and extension): (202) 328-3253

STANDARD FORM 269 (5-75)
Prescribed by Office of Management and Budget
Cir. No. A-110

Mamadou H. Watt
Director, Water Resource Research Center

Prepared by Karen A. Crawford 232-7518

FINANCIAL STATUS REPORT

(Follow instructions on the back)

1. FEDERAL AGENCY AND ORGANIZATIONAL ELEMENT TO WHICH REPORT IS SUBMITTED: U.S. DEPARTMENT OF THE INTERIOR, GEOLOGICAL SURVEY - RM. 2-D-305A

2. FEDERAL GRANT OR OTHER IDENTIFYING NUMBER: 14-08-0001-G-834

OMB Approved No. 80-R0180

PAGE 2 OF 2 PAGES

RECIPIENT ORGANIZATION (Name and complete address, including ZIP code)

University of the District of Columbia
Resource Development Division
4200 Connecticut Ave., N.W. Bldg. 38 - Rm. 302
Washington, D.C. 20008

4. EMPLOYER IDENTIFICATION NUMBER: 15360011311-A2

5. RECIPIENT ACCOUNT NUMBER OR IDENTIFYING NUMBER: 68C4 084A-I

6. FINAL REPORT: TENTATIVE ☐ NO

7. BASIS: ☐ CASH ☒ ACCRUAL

8. PROJECT/GRANT PERIOD (See instructions): FROM (Month, day, year) 08/29/83 TO (Month, day, year) 08/31/84

9. PERIOD COVERED BY THIS REPORT: FROM (Month, day, year) 08/29/83 TO (Month, day, year) 08/24/84

STATUS OF FUNDS

PROGRAMS/FUNCTIONS/ACTIVITIES ►	(a) 3709-05 Catholic U./DeCicco	(b) 3709-06 G.W.U./Waters	(c) 3709-07 G.W.U./Obeysekera	(d)	(e) SUBTOTAL Page 2	(f) SUBTOTAL Page 1	TOTAL (g)
Net outlays previously reported	$	$	$	$	$	$	$
Total outlays this report period	12,073.04	18,314.44	22,180.50		52,567.98	277,548.29	330,116.27
Less: Program income credits	N/A	N/A	N/A		N/A	N/A	N/A
Net outlays this report period (*Line b minus line c*)	12,073.04	18,314.44	22,180.50		52,567.98	277,548.29	330,116.27
Net outlays to date (*Line a plus line d*)	12,073.04	18,314.44	22,180.50		52,567.98	277,548.29	330,116.27
Less: Non-Federal share of outlays	4,233.40	6,104.81	7,393.50		17,731.71	201,379.02	219,110.73
Total Federal share of outlays (*Line e minus line f*)	7,839.64	12,209.63	14,787.00		34,836.27	76,169.27	111,005.54
Total unliquidated obligations	0	0	0		0	1,363.00	1,363.00
Less: Non-Federal share of unliquidated obligations shown on line h	0	0	0		0	0	0
Federal share of unliquidated obligations	0	0	0		0	1,363.00	1,363.00
Total Federal share of outlays and unliquidated obligations	7,839.64	12,209.63	14,787.00		34,836.27	77,532.27	112,368.54
Total cumulative amount of Federal funds authorized	8,700.00	14,490.00	14,787.00		37,977.00	77,023.00	115,000.00
Unobligated balance of Federal funds	860.36	2,280.37	0		3,140.73	(509.28)	2,631.46

INDIRECT EXPENSE

a. TYPE OF RATE (*Place "X" in appropriate box*) ☐ PROVISIONAL ☐ PREDETERMINED ☐ FINAL ☐ FIXED

b. RATE	c. BASE	d. TOTAL AMOUNT	e. FEDERAL SHARE
UDC 72% MTDC	148,025.70	130,324.70	0
CU 54% MTDC	20,674.85		
STRI 50% MTDC	26,996.63		

REMARKS (*Attach any explanations deemed necessary or information required by Federal sponsoring agency in compliance with governing legislation*)

12. CERTIFICATION

I certify to the best of my knowledge and belief that this report is correct and complete and that all outlays and unliquidated obligations are for the purposes set forth in the award documents.

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL: Arthur W. Danner

DATE REPORT SUBMITTED: 1/29/85

TYPED OR PRINTED NAME AND TITLE: Arthur W. Danner, Controller

TELEPHONE (Area code number and extension): (202) 329-3293

Mamadou H Watt
Director, Water Resource Research Center

STANDARD FORM 269 (7-76)
Prescribed by Office of Management and Budget
Cir. No. A-110

Prepared by Karen A. Crawford 282-7518

ATTACHMENT 32

University of the District of Columbia

Office of the Vice President for Academic
Affairs 4200 Connecticut Avenue, N.W.
Washington, D.C. 20008

Telephone (202) 282-3078

November 19, 1985

MEMORANDUM

TO Deans and Directors FROM: Samuel

Sullivan
Acting Provost and Vice Preside for
Academic Affairs

SUBJ: FY 86 Allocations - Other Than Personal Services

Attached is a summary of FY 86 allocations for your respective unit. These allocations are listed by object code and funding source and are for "Other Than Personal Services." Should you have questions regarding the attached summary, please contact Bill Ford at 282-7731.

Attachment

WATER RESOURCES RESEARCH CENTER

FY 86 Allocations
Responsibility Center - 2050

Object	Appropriated	Tuition	Endowment
200			
401			
402			
405			
408 .			
409			
410			
411			
414			
416			
419			
424			
510			
700	$245,000		
TOTAL O.T.P.S.:	$245,000		

University of the District of Columbia
Office of the President
4200 Connecticut Avenue, N.W.
Washington, D.C. 20008

Telephone 202/282-7550

November 12, 1985,

Dr. L. Grady More

District Chief - WRD

US Geological Survey

821 E. Interstate Avenue

Dear Dr. Moore:

The Water Resources Research Center of the University of the District of Columbia is an integral part of the university and an important contributor to its urban land-grant mission through research and information transfer programs on inner-city water problems. It has shown steady growth in its campus programs and its leadership and its participation in water-related projects in the city and in the region. The university has responded by increasing its funding support of the Center over the years. For FY 1986, the university has allocated $245,000 in matching funds for the Center, a substantial increase over the previous year.

The WRRC is budgeted through the Office of the Provost and Vice President: for Academic Affairs. The director of the Center, Dr. Mamadou H. Watt, prepares the Center's budget and participates in budget discussions and in the process that leads to the final formulation of the university budget.

Dr. Watt frequently briefs members of the administration or. Center activities and administrators and faculty attend periodic seminars sponsored by the Center. Moreover,
Dr. Watt is active in general university affairs and is often called on to serve on committees and task forces dealing with university matters unrelated to the Center.

The university administration is well aware of the Center's leadership position among area universities. The Center has encouraged inter-disciplinary research projects between UDC faculty and the faculties of Howard University, The American University, The George Washington University, Georgetown

University and The Catholic University. The Center has fostered excellent cooperative relationships with area universities, all of which contribute matching funds to support the work of the Center. In addition, Dr. Watt represents the university and the city on many of the area's principal water management advisory groups and committees.

The Center is clearly a major asset to the university, the Washington academic community, the city and the region. The continued growth of the Center and its programs and projects are a matter of great interest and concern, to the university administration.

Sincerely,

Claude A. Ford
Acting President

University of the
District of Columbia

Van Ness Campus
4200 Connecticut Avenue, N.W.
Washington, D.C. 20008

Office of the Vice President
for Financial Management

November 18, 1985

Mr. L. Grady Moore
Team Leader and District Chief, WRD
U.S. Geological Survey
821 E Interstate Avenue
Bismarck, North Dakota 58501

Dear Mr. Moore:

During my eight years, as Director of Grant and Contract Management, I have had the opportunity to become quite familiar with the work of Dr. Mamadou Watt, the Director of the Water Resources Research Center and the co-project directors at the participating institutions. They are all highly competent and experienced investigators and directors of research. As a testimony to its progress, the Center's institutional matching yearly budget has grown from a mere $25,000 to a $245,000.

During its history, the Water Resources Research Center, at the University of the District of Columbia (1977-1985), has been a catalyst for water research, programs serving the Washington metropolitan area. Experienced researchers from D.C. universities, who represent a cross-configuration of disciplines in science and engineering have been involved in the program.

The Water Resources Research Center recently completed a survey on the District's major water issues, with the water quality of the Anacostia River and the D.C. combined sewer overflow problems receiving priorities. The research projects at Catholic University r-lati•7e to pollution risks to Washington, D.C. receiving streams, George Washington University on the variable water- quality of the Potomac River and Howard University on the measure of water and sewage sludge around Washington, D.C., have all served to

bring a better and comprehensive understanding o-.L: the carcinogenic and effluent quality of D.C. waters. Additionally, the Center conducts a myriad number of technology transfers and informational dissemination activities which have enhanced its involvement in community affairs.

I am pleased to urge the continued financial support of the Water Resources Research Center and its program.

Yours truly,

L.H. Barnes Director

LHB:pem

APPENDICES

APPENDIX

A Book of Abstracts

B WRRC FY '84 Annual Report

C Publications List

D WRRC Brochure

E Campus Map

F WRRC Conference Flyers

G UDC Grants Management Office

D.C. WATER RESOURCES RESEARCH CENTER
BOOK OF ABSTRACTS

SEPTEMBER, 1985

University of the District of Columbia
Water Resources Research Center
4200 Connecticut Avenue, N.W.
Washington, D.C. 20008

WATER CYCLE
Stream Flow And Runoff

PERSISTENCE MODELING FOR THE POTOMAC ADJACENT RIVERS.

University of the District of Columbia.

Water Resources Research Center.

G.K. Young, And R.U. Jettmar.

WRRC Report no.12.

Case study of three rivers are used to analyze a persistence modeling strategy for the generation of synthetic stream flows for drought assessment probabilities and confidence levels. The predominantly unregulated river sites used in the study are the Patuxent River near Unity, Maryland, the Potomac River at Point Rocks, Maryland, and the Rappahannock River near Fredericksburg, Virginia. In an effort to improve the use of Monte Carlo models to produce drought characteristics from synthetic data, the strategy employed for the study uses the least squares to fit theoric autocorrelation functions to empiric functions. The model is designed to aid in critical period analysis in the designing of reservoirs to meet water requirements by solving the major problems of previous models, having a historic critical period or drought of greater severity than can be captured by the model. A key assumption of the modeling method used is that normalized monthly data are stationary. Flow analysis is discussed and illustrated with a chart. Two types of drought phenomena can be defined from the critical period analysis of historic streamflow, (1) short term drought (extreme low flow for six to eight months), and (2) long term drought (lower than historic yearly average flow for three to five years). Graphs of critical flows are given for the three cases studied. Results show that the least squares method produces lower errors, that all methods produce errors of about 10% or less for critical periods of over three years, and for short droughts all methods produced errors of 10%.

RIVER BASIN MANAGEMENT: THE POTOMAC RIVER EXPERIENCES.

University of the District of Columbia. D.C.

Water Resources Research Center.

M.H. Watt

D.C. WRRC Report no. 52.

Although water resources management is site specific and depends on local and regional factors such as geographic, demographic and legal and institutional factors, the Potomac River Basin experiences can be useful to many other river basins in the world. Like many other river basins, the Potomac River Basin counts among its main characteristics: a wide variety of uses, a large population center, a target of many federal, interstate and local interests. Providing water of good quality and sufficient quantity to meet people's reasonable needs, are of the key requirements for managing water resources. The Potomac River Basin has made great progress in improving both the water quantity and quality. This article describes the experiences that the Potomac River Basin has gained in managing its water resources for meeting, on one hand, water supply problems for the immediate and the future and, on the other hand, for mitigating water quality problems. The progress accomplished by the river clean-up efforts are also described.

WATER SUPPLY AUGMENTATION AND CONSERVATION.

A - Use of water as impaired quality.

AN ASSESSMENT OF THE USE OF POTOMAC ESTUARY WATER

AND AWT EFFLUENTS FOR EMERGENCY WATER SUPPLY.

University of the District of Columbia. D.C.

Water Resources Research Center.

G.K. Young, and R.C. Palange.

D.C. WRRC Report no. 1.

The Washington, D.C. area is experiencing resistance from public and private sectors to the continued development of upland dams to supply future metropolitan water needs. A result of this resistance is a heightened interest in the exploration of alternatives, one of which is direct or indirect reuse including the use of the Potomac estuary.

The purpose of this report is to study and evaluate the reuse of treated wastewater and of estuarine waters for domestic consumption. It is found that professional and lay opinion would generally weight against direct reuse of wastewaters regardless of the adequacy of measurement and treatment practices. Furthermore, only one significant instance of direct reuse is discussed in the literature. Indirect reuse, such as pumping raw waters from the Potomac estuary, is practiced elsewhere and appears to be feasible for Washington.

The report presents guidelines for establishing criteria for safeguards in reusing estuary waters. Until viral and bacterial measurement techniques are improved, physical-chemical monitoring is suggested to use for decisions concerning operating criteria. Such criteria would include: free chlorination, turbidity control, ammonia monitoring, pH adjustment, and high energy mixing at the point of chlorination followed by high contact time. Other specific concerns are addressed such as acute and chronic toxicity, storm water overflows, and public relations.

B - Conservation In Domestic And Municipal Use

EVALUATION OF THE USE OF WATER PRICING AS A

TOOL FOR CONSERVING WATER.

University of the District of Columbia. D.C.

Water Resources Research Center.

M.H. Chiogioji, and E.N. Chiogioji.

D.C. WRRC Report no. 2.

Historically the economics of water supply has been oriented toward the provision of low cost water to consumers, with very little thought given to pricing principles and policies which could govern the efficient use and development of municipal water resources. Empirical data gathered in the Washington (D.C.) Metropolitan Area show that price increases do have an impact on water consumption. The use of demand management through price policy is proposed as a tool for rationing existing supplies. There are evidence that demand curves for industrial, agricultural, and some domestic uses are significantly price elastic. A two-part rate structure is also proposed to cover the off-peak winter period and the peak summer period. Other means for conserving water use also are suggested.

WATER QUALITY MANAGEMENT AND PROTECTION

A - Identification of Pollutants

SURVEY, ECOLOGY AND SYSTEMATICS OF THE UPPER

POTOMAC ESTUARY BIOTA: AUFWUCHS MICROFAUNA - Phase I

University of the District of Columbia. D.C.

Water Resources Research Center.

D. M. Spoon.

D.C. WRRC Report no. 6.

The aufwuchs microfauna was collected on inverted plastic petri dishes (Spoon & Burbank, 1967) supported by floats composed of styrofoam cup sections. These floats tethered to midstream buoys were colonized at one-month intervals at sites 3-1/2 miles apart, one below the outfall of the Blue Plains sewage treatment plant, and two downriver and two upriver from Blue Plains. Special effort was made to include all protozoan and micrometazoan species in the count. Their abundance was converted to numbers from one to seven representing rarity to super abundance. The species list is over 300. Physical-chemical data of the principal investigator is presented with the extensive E.P.A. data for these five collection sites. The biotic and abiotic data for 1974 was compared to similar data collected in 1971. The abiotic data showed a substantial improvement with increase in dissolved oxygen, decrease in turbidity, phosphorus and nitrogenous compounds and organic carbon. The 1974 microfauna showed a doubling in species number of protozoa and micrometazoa. Extensive study was made of the food web of the aufwuchs community using studies of isolated cultures, aquaria, and experimental rivers. It is concluded that predator pressure is a principal force determining aufwuchs species diversity and population numbers.

COLORIMETRIC ANALYSIS OF AMMONIA IN WATER.

University of the District of Columbia. D.C.

Water Resources Research Center.

F.W. Carson, and R.L. Gross.

D.C. WRRC Report no. 11.

An accurate, reliable method of determining concentration of ammonia in water solution was developed using colorimetric techniques. The procedure involves formation of a colored complex of ammonia with 2, 5-dimethoxyoxolane and (E)-p-dimethylaminocinnamaldehyde. This intense blue complex has an alpha sub max of 630 rim and an extinction coefficient of 45,200 at a concentration of approximately 2 x 10(-5)M. The color forms in about 6 minutes and has a half-life of 7.8'hours. The procedure takes only about 3 minutes per analysis for multiple samples and involves a standard error of only 3%. Also, the method is suitable for automation. The lower limit of ammonia concentration is 10(-4)M but this could be reduced to 10(-6)M by incresing cell path to 10 cm and by using a spectrophotometer of 0-0.1 absorbance units.

USE OF ENZYMATIC CYCLING FOR HIGH SPECIFICITY

AND SENSIVITY IN THE COLORIMETRIC ANALYSIS OF AMMONIA

University of the District of Columbia.

D.C. Water Resources Research Center.

F.W.Carson, and H.W. Davies.

D.C. WRRC Report no. 18.

A new method is reported for the colorimetric determination of ammonia in water, based on enzymatic cycling using the ammonia-specific glutamate dehydrogenase reaction followed by an enzymatic cycling reaction that provided controlled amplification of the response to ammonium ion. The cycling reaction product (a tetrazolium formazan) has a conveniently-measured visible absorption maximum at 600 nm. With the established procedure, absorbance versus original ammonium ion concentration plots were linear (correlation coefficients: 0.997-0.998). The new method was simple and precise in the range of 0.0001-0.00001 molar ammonia concentrations. The sensitivity could be extended well below the ten nanomole per sample determination limit of the assay procedure described, using suitable modifications of the procedure. The coefficient of variation was 2% for a serie of replicate measurements on samples containing 0.0000441 molar ammonium ion. A calibration curve for the determination of unknown concentrations could be constructed by carrying standard solutions through the procedure. The method only required the use of volumetric equipment and a spectrophotometer or colorimeter. Analysis time per sample was three hours, and all solutions could be prepared in advance and used for at least two weeks.

DETAILED REPORT ON THE USE OF ENZYMATIC CYCLING FOR HIGH SPECIFITY AND PRECISION IN THE COLORIMETRIC ANALYSIS OF AMMONIA.

University of the District of Columbia.

D.C. Water Resources Research Center.

F.W. Carson, and H.E. Davies.

D.C. WRRC Report no. 21.

A new method was developed for the determination of ammonium ion concentration in water in the range of 0.0001-0.00001 molar, based upon enzymatic cycling. The sensitivity of the method could be extended well below the ten nanomoles/sample limit of determination, using suitable modifications of the procedure. This two-steps method involved the use of an ammonia-specific glutamate dehydrogenase enzyme reaction with simultaneous oxidation of NADH; followed by an enzymatic cycling 'reaction to measure oxidized NADH by means of mesuring the cycling reaction product, a tetrazolium formozan, in the visible at 600nm. Using the procedure, linear plots of absorbance versus original ammonium ion concentration had correlation coefficients of 0.007-09998. The precision (coefficient of variation) of the method on replicate analyses of samples containing 0.0000441 molar ammonium ion was 2%. A calibration curve for the determination of unknown ammonium concentrations could be constructed from standard solutions carried through the procedure. Analysis time per sample was three hours, and all solutions were stable for at least two weeks.

ANALYSIS OF INORGANIC ANIONS IN THE POTOMAC WATER SEDIMENT

AND FLOC BY ION CHROMATOGRAPHY.

University of the District of Columbia.

Water Resources Research Center.

J.E. Girard.

D.C. WRRC Report no. 37.

Recent reports by the authors have shown non suppressed ion chromatography, which uses conventional high pressure liquid chromatography (HLPC) instrumentation, to be a low cost analytical technique for the analysis of inorganic anions. A Varian model 5000 HPLC was coupled with a Wescan Conductivity Detector. All seperations were achieved on a Vydac 302 IC Column at a controlled temperature of 30C. This system is designed to work without a suppressor column. Very efficient separations of anions such as CI super -, NO sub 3 super, and SO sub 4 super-2 are easily achieved with this system. The sensivity we have observed for CI super-ions (0.5 PPM) is comparable to conventional suppressed IC method. Linearity is very good over a wide concentration range. By changing the eluting species, its concentration or the pH, improved sensitivity, chromatographic efficiency, selectivity and resolution may be achieved. This technique has been successfully applied to the analysis of municipal water samples from Howard, Baltimore and Montgomery Counties in Maryland as well as the District of Columbia. Samples of Potomac River water taken at the ChesapeakeBay/Potomac River interface are usually very difficult to analyze, since there is a small amount (10-15 PPm) of Chloride ion. Potomac River samples were also successfully analyzed.

DETERMINATION OF NITRITE AND NITRATE IN WATER

BY REDUCTION TO AMMONIA FOLLOWED BY ENZYMATIC CYCLING.

University of the District of Columbia.

Water Resources Research Center.

F.W. Carson, and P.L. Rogers.

D.C. WRRC Report no. 42.

A procedure has been developed to determine the concentration of biologically significant nitrogen present as ammonia, nitrite and nitrate in water samples colorimetrically. In addition, the concentration of each of these constituents may be determined separately if desired. The method is sensitive and subject to the interferences commonly encountered in nitrate determinations. It involves the reduction of nitrite and/or nitrate to ammonia with Devarda's metal while simultaneously trapping the released gaseous ammonia with dilute hydrochloric acid solution in a modified Conway diffusion cell. Subsequently, the ammonia is determined using the enzymatic cycling assay previously developed by Carson and Davies. Standard solutions of ammonium chloride must be carried through the procedure to prepare a standard curve from which unknown concentrations of nitrate may be determined. Using the established procedure, plots of absorbance change at 600nm versus original nitrate concentration were linear, with correlation coefficients ranging from 0.91 to 0.999. A series of replicate measurements had a coefficient of variation of 3% for samples containing 2.70 x 10 super -5 M nitrate ion when compared to such a standard curve.

ARTIFACTS AND LOSSES IN THE SAMPLING OF CHLORINATED WATERS

BY XAD ADSORPTION

University of the District of Columbia.

D.C. Water Resources research Center.

A. M. Cheh

WRRC Report no. 45. April 1983.

Chlorination of natural waters generates mutagens that most likely are electrophiles. These electrophiles are often recovered for testing and analysis by adsorption to XAD resins. It was found that the production of artifacts stemming from the action of free chlorine on XAD-4 resin could be suppressed at least ten fold by converting the free chlorine to chloramine. Kinetic studies indicate that free chlorine is consumed at least ten times as rapidly by XAD-4 as in chloramine.' Sampling losses during XAD recovery of electrophiles and mutagens were also examined. Mutagenic activity bound to resins generally decreased over a period of several days, but some increase were seen. Electrphiles labeled by 4-nitrothiophenol generally decreased concurrently, but sometimes new species were seen. Organics concentrates in ethanol did not appear to lose mutagenic activity as rapidly as concentrates in DMSO. Simultaneous electrophile assays, however, indicated up to 50% loss of some electrophiles present in ethanol concentrates.

B-Source And Fate Of Pollution

THE DISTRIBUTION, TRANSPORT AND CYCLING OF DISSOLVED AND PARTICULATE ORGANIC CARBON IN THE POTOMAC AND RIVERS IN THE GREATER WASHINGTON AREA

University of the District of Columbia.

D.C. Water Resources Research Center.

M.A. Champ

WRRC Report no. 13.

This project was undertaken to study the distribution, transport seasonal cycling, and sources of dissolved organic carbon (poc) in the two subjects. District of Columbia area rivers, since river of high organic concentrations can have high BOD and COD values that lower oxygen concentrations to levels that can cause high mortality in aquatic life, DOC and POC conconcentrations were measured weekly for 17 main channel stations of the Upper Potomac River Estuary, and the distribution, 'production, transport and cycling of organic carbon were followed over a 12-month period. Special studies were conducted to evaluate the influence of tidal activity, flood storm crests and lateral variation on river DOC and POC levels. Mean DOC and POC levels reflected a seasonal and river mile sigmoid curve. DOC and POC transported annually by the Potomac to its estuary were estimated at 54,000 and 37,000 metric tons, respectively. River DOC did not correlate with discharge, which POC does. DOC and POC levels in street runoff, storm and combined sewer overflows were 4-10 times higher than in Potomac River water.

PHOTOSYNTHETIC PIGMENTS AS INDICATORS OF ALGAL ACTIVITY IN THE UPPER POTOMAC ESTUARY

University of the District of Columbia.

D.C. Water Resources Research Center.

Phillip Sze

WRRC Report no. 30.

The potomac River was monitored at Key Bridge from May-September, 1981. Temperature, major nutrients, photosynthetic pigments, abundance of major groups of photoplankton (direct counts), and potential photosynthetic production (oxygen method) were measured weekly in surface samples collected near mid-river. Chlorophyll A showed the same general trends as the cell counts and production with greatest algal activity in late May and August and a minimum in June. Centric diatoms and chlorococcalean green algae were the major algae in 1981, as in previous years. The accessory pigments were relatively insensitive measures of algal composition. Overall, the activity of phytoplankton did not show any significance from previous years, and there was no evidence for prolonged nutrient depletion as a result of algal activity in the river.

THE FATE OF ANTIFOULANT ORGATIN COMPOUNDS IN WATER SYSTEMS

University of the District of Columbia.

D.C. Water Resources Research Center

I. J. Posey, and G. Eng.

WRRC Report no. 46.

Several antifoulant organotin compounds, pH sub 3 SnOH pH sub 3 SnCl and pH sub 3 SnOCOCH sub 3, were leached by suspending them in distilled water and mechanically for periods up to two weeks at room temperature. Benzene or chloroform extracts of these aqueous solutions were evaporated to dryness and the infrared spectra of the resulting residues were obtained.

Except for the residue resulting from the extract of aqueous pH sub 3 SnOCOCH sub 3, the infrared spectrum of each residue was identical to that of the starting organotin compound. The infrared spectrum of the residue obtained from the chloroform extract of the aqueous pH sub 3 SnOCOCH sub 3 which had been shaken for seven days showed the presence of pH sub 3 SnOH as confirmed by the presence of a small doublet around 910 and 897 cm -superl. The pH measurements on the aqueous solutions of these organotin compounds showed a decrease in pH with time. These results are perhaps indicative of an ionization of the organotin compounds in water. TLC experiments using various developing solvents did not allow for the resolution of mixtures of pH sub 3 SnCl, pH sub 3 SnCl and pH sub 3 SnOCOCH sub 3; therefore, TLC was not feasible for use in this study.

CONCENTRATIONS OF ORGANIC PHOSPHATE, NITROGEN, AND CARBON IN STORM RUNOFF AND COMBINED SEWERS IN THE GREATER WASHINGTON, D.C. AREA

University of the District of Columbia.

D.C. Water Resources Research Center

M.A. Champ

WRRC Report no. 54. September 1983.

Concentrations of organic phosphate, nitrogen, and carbon have been determined in storm and combined sewers, sanitary sewers, street runoff, shopping center parking lot runoff, residential and industrial areas, Rock Creek to determine their range of variation and relative magnitude. Combined sewers exhibit tremendous variation in organic carbon, and nitrogen concentrations. Estimates of the nutrient loads by major sources (storm sewers, combined sewers overflows, etc.) to the Upper Potomac River Estuary for 1977 indicate that during a low flow year, combined sewer overflow contributes an insignificant amount of phosphate, nitrogen and carbon. However, during the same period the. storm sewer runoff did contribute high loads of carbon and was a minor source of nitrogen.

C-Effects Of Pollution

SURVEY, ECOLOGY, AND SYSTEMATICS OF THE UPPER POTOMAC

ESTUARY BIOTA: AUFWAUCHS MICROFAUNA, PHASE II

University of the District of Columbia.

D.C. Water Resources Research Center.

D.M. Spoon

WRRC Report no. 8. August 1976.

Two model rivers, representing Potomac River sites at Haines Point, Blue Plains Sewage Treatment Plant, Rock Creek, and Piscataway Creek connected to a common reservoir containing upriver water, were studied. Each model consisted of four 24-gallon aquaria. In one model at aquarium 2, frozen sewage was added. Four attempts made to duplicate the May 1974 fish kill, which took place when river to sewage flow ratio was 20:1, failed; negative results were obtained with aquaria conditions representing river to sewage flow ratios of 20:1, 5:1, 1:1, and 4:4. It was concluded that the fish kill was caused by a toxin in the sewage and not a heat shock or toxin in the river. Dissolved oxygen sag curves in the river model closely approximated those at Potomac River sites at the same temperature. Other studies were done on a 50,000 gallon pilot activated sludge plant before and after hydrogen peroxide treatment of a bulking condition. A new method for counting and studying the activated sludge community was devised using thin plastic film (handiwrap) coverslips with plastic slides. It was concluded that the protozoan community was little affected by the treatment. The oxygen-induced fragmenting of the filamentous bacteria allowed acanthamoeba to feed. Using tritiated thymidine, a food chain from bacteria to Spirostomum to the Ostracod Cypridopsis was confirmed. Ecological studies are reported on the Cuctorian Lernaeophrya Capitata and a list of protozoan and micrometazoan species cultured in the laboratory is provided.

SURVEY, ECOLOGY, AND SYSTEMATICS OF THE UPPER POTOMAC

BIOTA: AUFWUCHS MICROFAUUNA-PHASE III.

University of the District of Columbia.

Water Resources Research Center.

D.M. Spoon.

WRRC Report no. 39.

These studies utilized two adjacent bench scale rivers, each composed of four interconnected 24-gallon aquaria, stimulating summer flow and temperature (30 degrees C) of the fresh water estuarine Potomac River from Haines Point to Piscataway Creek. Initially all eight aquaria were seeded with the filamentous blue-green alga, Anabeana. To all aquaria was added a mixture of Daphnia, Copepods, and Ostracods from a swamp near Little Falls. (Preliminary studies showed these zooplankters could remove the Anabeana.) The experimental side received activated sludge from the Blue Plains Sewage Treatment Plant, while the control received dechlorinated tap water. Temperature, D.O., pH, phosphate, nitrate and transmittance were determined. In experiment I, we obtained a pronounced algal bloom on the experimental side over the ten day run with reduction of zooplankters and their grazing. In experiment II, with sewage added to both sides, we used a heat shock of 10 degrees C in a bypass simulating the conventional power plant on the experimental side causing decreased zooplankters and increased algal growth.

THE EFFECTS OF AUFWUCHS COPPER ON SPAT SETTLEMENT OF THE OYSTER, CRASSOSTREA VIRGINIA.

University of the District of Columbia.

Water Resources Research Center.

H.L. Phelps.

WRRC Report no. 47.

Studies on the recent failure of oyster spatfall in the Chesepeake Bay have led to speculation of an unknown toxic factor at the setting site. Oyster larvae set on oyster shell surfaces normally covered with aufwuchs which may have the capacity to bind toxic metals such as copper. Over 200 oysters were collected from six mid-Chesepeake Bay sites paired for high and low spatfall. Aufwuchs samples and oyster tissue analysis indicated no significant difference in copper concentrations between paired sites. In the laboratory, aufwuchs concentrated copper from enriched estuarine water up to 20 times ambient levels in one hour, failed to depurate copper over two hours, unlike agar (a neutral polysaccharide). Oyster larvae raised to setting stage from a single maternal spawn were exposed to copper-enriched aufwuchs surfaces. The number of larvae setting on aufwuchs surface vs clean (inner shell) surface decreased significantly with incresing copper in aufwuchs above 100 ug Cu/gm wet weight. Failure of larval metamorphosis ranged from 0% (5 ug Cu/gm) but was significant only above 100 ug/gm. Since mid-Bay aufwuchs samples average 35.5 ug/gm, ranging up to 103. ug/gm, it is unlikely that present levels are affecting oyster spatfall.

D-Water Treatment Process

FEASIBILITY OF ALUM SLUDGE RECLAMATION

University of the District of Columbia.

Water Resources Research Center.

Goldman, M.L. and F. Watson.

WRRC Report no. 5.

A study has been performed in which 96% sulfuric acid was added to sludge from Dalecarlia Water Treatment Plant. Aluminum was recovered and used for phosphurus removal from the preliminary effluent from Blue Plains Wastewater Treatment Plant. Alum sludge properties were measured and aluminum recovery determined therefrom as a function of pH amount of acid added. Optimal conditions for flocculation were determined with respect to flocculant pH, mixing speed, contact time, and Al mole-ratio. Settleability and filterability of acidified alum sludge were observed as well as effluent quality after flocculation. An indication of technical and economic feasibility of alum sludge recycling is presented, as well as recommendations for additional study.

CHARACTERIZATION OF THE NON-VOLATILE ORGANIC MATERIAL DURING PHYSICAL CHEMICAL TREATMENT OF THE DISTRICT OF COLUMBIA RAW WASTEWATER

University of the District of Columbia.

Water Resources Research Center.

M.H. Aldridge et al

WRRC Report no. 9.

A physical-chemical treatment process used in a D.C. pilot wastewater treatment plant was examined; it consists of low lime clarification system which feeds effluent into two parallel systems: (1) breakpoint chlorination, carbon adsorption, and dual-media filtration, and (2) neutralization, carbon adsorption, and dual-media filtration. The systems were operated and tested for a 1-month period in September 1974. Systems, sampling and sample preparation procedures, separation scheme, analytical techniques, and reagents are described. The major portion of the organic materials in treated and untreated wastewater exists as non-volatile materials, of which 90% were classified as ether-insoluble, amphoteric materials. Organic bases represent the least amount of ether-soluble organic material; or more of the ether-soluble material existed as acidic and neutral materials. Following breakpoint chlorination and carbon adsorption, an increase in strong acids was observed; this may have been accompanied by a comparable increase in the volatile chloroform. Fifty percent or more of the nitrogenous organic material in both untreated and treated wastewater may be classified as volatile. The non-volatile nitrogenous organic material existed as ether-insoluble, amphoteric materials. Proteins and amino acids, carbohydrates and hydroxylated aromatic compounds represented about 30% of the organic materials in the treated and untreated waters. Further study recommendations are included.

REMOVAL OF EUTROPHIC NUTRIENTS FROM WASTEWATER AND THEIR BIOCONVERSION TO BACTERIAL SINGLE CELL PROTEIN FOR ANIMAL FEED SUPPLEMENT: PHASE I.

University of the District of Columbia.

Water Resources Research Center.

B.T. DeCicco

WRRC Report no. 14.

The hydrogen oxidizing chemolithotrophic bacterium Alcaligenes eutrophus has been employed for the removal of eutrophic nitrogenous and phosphorus compounds from the final effluent digester elutriate from the Blue Plains Wastewater Treatment Plant.

Average removal levels from final effluent were 98% for ammonia, 67% for nitrate, 93% of TKN, and 84% for total phosphorus. Mixtures of 1 part elutriate to 3 parts effluent yielded 88% removal of both ammonia and total phosphorus. No pretreatment of elutriate or effluent was necessary to support groth, and sterelization of wastewater samples yielded results similar to unsterile samples, i.e., the chemolithotroph need not be grown in pure culture. A hydrogen oxidizing chemolithotroph different from A eutrophus has been isolated from Blue Plains final effluent and has been classified as member of the genus Pseudomonas.

REMOVAL OF EUTROPHIC NUTRIENTS FROM WASTEWATER AND THEIR BIOCONVERSION TO BACTERIAL SINGLE CELL PROTEIN FOR ANIMAL FEED SUPPLEMENTS: PHASE II.

University of the District of Columbia.

Water Resources Research Center.

B.T. DeCicco

WRRC Report no. 15.

The bacterium Alcaligenes eutrophus was grown in phosphurus supplemented digestor elutriate from the Blue Plains Wastewater Treatment Plant using a microbial fermentor. Gaseous hydrogen, oxygen and carbon dioxide were supplied as carbon and energy sources. Ammonia and phosphate removal averaged 87% and 93%', respectively at a time of cell harvest. The cellular biomass was washed, dried, chemically analyzed and employed as the protein component of check diets. The biochemical composition of the wastewater grown biomass was 8.7% RNA, 1.3% DNA, 56% protein, 3.2% carbohydrate, and 30.8% lipid and inert materials.

Chick feeding experiments demonstrated that the bacterial biomass had a protein quality of 88% compared to reference casein. In sterilized samples of sludge: effluent at dilutions of 1:4, 1:8 and 1:20 under a H2, 02C02 atmosphere, growth of A eutrophus was substantial and was proportional to the sludge concentration, reaching 8x10 to the ninth power organisms/ml in the 1:4 mixture. When the gas atmosphere was replaced by air, growth was substantially less. Chemical analyses of the treated mixtures showed 89-92% ammonia removal and 98-99% phosphate removal from gassed cultures. Cultures incubated under air showed increases in ammonia levels 25.67% and phosphate reductions of approximately 90%. The bacterial system employed in these studies appears to be an efficient means of removing nitrogenous and phosphorus pollutants from final effluent, digester elutriate and undigested sludge resulting from wastewater treatment. The bacterial biomass produced during elutriate treatment appears to possess high nutritive value as a protein source for chick feed.

REMOVAL OF EUTROPHIC NUTRIENTS FROM WASTEWATER AND THEIR BIOCONVERSION TO BACTERIAL SINGLE CELL PROTEIN FOR ANIMAL FEED SUPPLEMENT: PHASE III

University of the District of Columbia.

Water Resources Research Center.

WRRC Report no. 16.

We previously have demonstrated that the bacterium Alcaligenes eutroph is an efficient and effective remover of nitrogenous and phosphorus compounds from municipal wastewaters. Further, the biomass generated from growth on wastewater proved to be a source of high quality protein for the growth of chickens. During this phase a quantity of biomass grown in the fermentor on digest elutriate was treated with a variety of conditions in order to find those which promoted cellular ' aggregation since this would allow easier separation of cellular biomass from the treated wastewaters. Two treatments produced sedimentation of the cells; either addition of alkali to pH II or the addition of an anionic exchange resin (Cells D) produced aggregation of the biomass and clarification of the wastewaters. Elutriate samples that were unheated and then inoculated with A eutrophus yielded little growth, while samples heated to 50 to 70 deg. C produced cell densities that were 74% and 94% respectively, as high as a sample sterilized by autoclaving. Thus a heat labile inhibitor of A eutrophus was present in elutriate. Samples of digester elutriate, secondary digested sludge and primary undigested sludge were analyzed for the presence of mutagenic substances using the Ames Salmonella mutagenicity test. Samples were assayed both with and without metabolic activation with rat liver S-9 mix. Tests were negative with all samples and bacterial strains with the possible exception of the marginally positive response with both sludge and elutriate samples tested with strain TA 1537.

E-Water Treatment And Distribution

TRIHALOMETHANE REMOVAL AND FORMATION MECHANISM IN WATER

University of the District of Columbia.

Water Resources Research Center.

R.C. Chawla et al.

WRRC Report no. 48.

Trihalomethane (THM) formation kinetics and removal by Granulated and Activated Carbon (GAC) were studied. The formation studies showed that about 90% of the total trihalomethanes (TTHM) formed is chloroform and the other 10% included the remaining three (TTHM's namely CHCI sub 2 Br, ChBr sub 2 Cl and ChBr sub 3). The THM formation rate decreases with time and the formation potential of TTHM increases nonlinearly with the chlorine dosage. Over a wide range of solids (precursor) concentrations (15-150 mg/1), the mechanism of THM formation appears to remain unchanged. Similar results were also observed for chlorine concentration over a range 2-15 mg/1. A simple kinetic model was applied to the data and a reaction order of 0.3 was calculated for chlorine concentration in. the THM formation rate. THM removal was studied using both batch data and continuous methods, Freundlich adsorption Isotherms fit the batch data very well. 86 - 97% removal of THM was observed over a period of 1 - 8 days. In continuous methods, the % removal dropped significantly when carbon dose was reduced. The removal efficiencies were generally much lower for continuous method than for batch method.

F-Water Quality Control

A CURRICULUM FOR WATER SUPPLY AND WASTEWATER OPERATION, MAINTENANCE AND MANAGEMENT

University of the District of Columbia.

Water Resources Research Center.

M.H. Watt

WRRC Report no. 23.

A curriculum was developed for water supply and wastewater operation/maintenance/management, and is presented in two parts: (1) key water quality courses; (2) academic information to support the water resources courses. The description of the water quality courses includes updates and revisions; the courses separately address the chemical analysis of water, properties of fresh water, water quality management, wastewater technology, and hydrology.

Academic support information provided covers an inventory of laboratory equipments, lists of reference texts and audio-visual materials useful to water resources training, and a survey of employment opportunities for water treatment plant operators in the metropolitan Washington DC area. The survey revealed good employment opportunities for these operators. Specialized courses are also discussed: waterbone disease control for public workers, wastewater treatment plants operators training program (basic and intermediate courses), and environmental protection (homestudy course for professional health workers). The results of this effort serve to revitalize a two-year water quality academic curriculum.

URBAN PLANNING CRITERIA FOR NONPOINT SOURCE WATER POLLUTION

CONTROL

University of the District of Columbia.

Water Resources Resources Center.

Young G.K. and D.L. Danner

WRRC Report no. 35.

The research described in this document couples urban storm runoff quality and control alternatives within the context of an urban sewage system to evaluate various combinations of alternatives through their pollution removal efficiencies and their costs. A model has been developed which simulates the response of a typical urban area to a time series of rainfall events, and which uses the District of Columbia as an example.

The modeling of the flow of runoff and sewage has been performed at a macro level; the control alternatives examined include in-line storage, sewer separation, street sweeping, sewer flushing, stormwater detention, and increased treatment capacity. Each pollution abatement measure is described with a pollution function. The simulation model with its associated decision criterion was validated against actual water quality data for Washington, D.C. The model demonstrates that a macro approach to cost/benefit analysis of nonpoint source water pollution can evaluate control tradeoffs in terms of costs or in terms of abatement effectiveness. The importance of the developed methodology is that it provides an acurate estimate of urban pollution loads, pollution control capabilities, and control costs without requiring complex graphical techniques or large explicit simulations. The user is not required to supply 'any technical or specialized information to run the model; the only inputs to the model are readily available physical characteristics of the urban area.

THE DISTRICT OF COLUMBIA WATER RESOURCES RELATED

ACTIVITIES

University of the District of Columbia.

Water Resources Research Center

M. H. Watt

WRRC Report no. 38.

This report is a summary of events which have taken place in water resources in Washington, D.C. During the years 1980 and 1981 much has been done in water and water related activities. This report addresses the critical water management issues in the District of Columbia, namely, the sludge disposal management, and the regional metropolitan Washington cooperation for water supply.

Important studies and projects concerning the District of Columbia five year strategy for water pollution control, nonpoint source pollution, cooperative water supply operations on the Potomac, and the Blue Plains feasibility studies are described. Brief summaries of other major studies on the upper Potomac estuary and the related water quality models were given. For each activity, the status and the major agencies involved were provided. The Part II of the report is a statistical update of the meteorological, water quality, water supply, wastewater flows, organic loading, and population characteristics data.

WATER RESOURCES PLANNING

Water Law and-Institutions

PROCEEDINGS OF SYMPOSIUM ON WATER RESOURCES NEEDS FACING THE DISTRICT OF COLUMBIA

University of the District of Columbia.

Water Resources Research Center

D.C. WRRC

WRRC Report no. 3.

The report no. 3 is the proceedings of a symposium held in June 1974. It was the very first symposium held by the Water Resources Research Center. It was attended by representatives from water resources agencies of the Washington, D.C. area and the area's universities. Discussions focussed on water shortages for the nation's capital, the state of Maryland water resource planning program, water quality and legal implications, the water supply plans for the nation's capital by the Corps of Engineers, urban runoff problems and setting the goals for water quality. A summary of the symposium by the center's director concludes the report.

INSTUTIONAL ARRANGEMENTS FOR AREAWIDE WATER RESOURCES MANAGEMENT PLANNING IN THE WASHINGTON D.C. REGION UNDER THE FEDERAL WATER POLLUTION CONTROL ACT AMENDEMENTS OF 1972

University of the District of Columbia. Water Resources

Research Center

Harvey Lieber

WRRC Report no. 17.

The project studied the formulation, acceptance and early implementation of areawide management planning for water quality management, water supply, land use and related functions by the Water Resources Planning Board of the Metropolitan Washington Council of Governments, established under provisions of P.L. 92-500. This study evaluated past arrangements and decision making procedures for water resources planning in the Washington area, discussed the new management planning process and evaluated its success in limiting jurisdictional conflicts, integrating related functions and increasing citizen participation. The Washington area water resources planning under section 208 of the Clean Water Act was examined. The accomplishments and failures of the 208 plans were discussed.

NOTES ON WATER SUPPLY INTERCONNECTIONS INSTITUTIONAL FACTORS

University of the District of Columbia. Water Resources Research Center

M.H.Watt and H. Sveinjornson

WRRC Report no. 22.

One way to increase water supply reliability in a given area is through the construction of water supply interconnections. Such an approach encompasses engineering, environmental, legal, and management factors. Some comprehensive overview is provided on the potential benefits and problems associated with interconnections, with special reference to the Washington, D.C. Metropolitan Area.

A brief description of basic features and historical examples of water supply interconnections is given, and recently proposed interconnections were analyzed. The WMA, due to the number of jurisdictions involved, provides a useful example of the potential problems to be overcome for achieving efficient regional water supply management. Completed water interconnections have been proven effective in providing added reliability and more efficient allocations of existing supplies. Institutional factors offer difficult barriers, however. Potential institutional obstacles to implementation of water interconnection projects were discussed.

DISTRICT OF COLUMBIA FIVE-YEAR WATER RESOURCES RESEARCH PROGRAM PLAN, 1982-1987.

University of the District of Columbia.

Water Resources Research Center.

M.H. Watt and D. Darden

WRRC Report no. 24.

The report describes the water resource situation in the District of Columbia. Research needs are identified, a 5-year research and development plan for the D.C. WRRC is presented. Geological, meteorological, biological and hydrological characteristics are described as well as surface and groundwater resources. Water resources problems are categorized and prioritized, and related agencies activities are presented.

The 5-year plan deals with water quantity and other related problems. Three dimensional illustrations show details of physiography for the course of the Potomac River, physiographic provinces and geographic and geologic features of the D.C. region and cross sections of the Potomac River bed from 9 miles above the Great Falls to the Atlantic Coastal Plains. Conditions of high and low flow in the Potomac and Anacostia Rivers, Which supply D.C. region, are discussed, along with neighboring Maryland and Virginia. Major benefits expected from the 5-year plan, in addition to water management, are technology transfer, information dissemination, manpower research, public awareness, and training program development.

B - Evolution Process

AN EVALUATION OF RECREATIONAL BENEFITS AND USE ESTIMATING MODELS FOR WATER RESOURCES PLANNING

University of the District of Columbia.

Water Resources Research Center.

R.C. Waters and V. Moustakis

WRRC Report no. 31.

The objective of the study was (1) to collect and analyze the available recreational benefit estimating models applicable to the development of federal water resources plans, (2) to determine the degree of congruity and generality which exists in the present body of research, and (3) to evaluate the several recreational benefits estimation methods from the perspective that substitutes to the services provided by the new site are considered.

A literature search of over 300 abstracts was conducted resulting in the in depth review of 45 studies (annoted abstracts are provided). Fifteen studies included a consideration of substitutes, however each lacks the inclusion one or more of the following consideration: income of participants, congestion, site quality, and the site as an intermediate destination. Furthermore the validity and reliability of all the studies are undetermined. No expost analysis of the model results has been conducted. Also a number of the models are based on inadequate data collection methods and small sample sizes. Recently the U.S. Water Resources Council indicated it would publish regional recreational models (i.e ones which account for substitutes) that may be used to evaluate proposed projects. It is doubtful at present that the existing literature provides models which. provide a sound basis for water resources plans. Additional research is necessary.

WATERS SUPPLY MANAGEMENT IN THE DISTRICT OF COLUMBIA:

AN INSTITUTIONAL ASSESSMENT

University of the District of Columbia.

Water Resources Research Center.

D.P. Beard

WRRC Report no. 36.

The water supply management structure and its operation are described for the District of Columbia, as well as the issue it will face in the 1980's and how the District is prepared to deal with these issues. They include: adequacy of future water supply; regional cooperation; water supply emergency and drought management; water supply system rehabilitation; water billing/ collection; and rate increase and conservation price.

Major emphasis is given to detailed definition of the Potomac River Basin, the legal and institutional management of the River, the overall water supply network in the Washington metropolitan region, and the water management functions in the District. The District water supply was found to be reliable, inexpensive and of good quality. Other than some administrative concerns (e.g. billing/ collections), the District water management system performs adequately. Recent studies do not forecast water supply shortages, and regional cooperation appears to be improving. However, while the water supply future in the District area appears optimistic, caution is urged to ensure continued and improved cooperation as a critical factor in meeting future water supply needs.

ASSESSMENT OF THE STATE OF THE ART AND DEVELOPMENT OF PROPOSED IMPROVEMENTS IN THE RECREATION BENEFIT EVALUATION FOR WATER RESOURCES PLANNING

University of the District of Columbia.

Water Resources Research Center.

R.C. Waters and V.S. Moustakis

WRRC Report no. 43.

The objective of this study was to examine the issues related to the use of willigness-to-Pay(WTP) based methods in evaluating recreational benefits. This research is a continuation of a research report 'An Evaluation of Recreational Benefits and Use Estimating Models for Water Resource Planning' available through NTIS. A literature search was conducted and its results are reported. The major findings of the research include (1) the use of any WTP based method does not lead to Pareto optimal social arrangements, (2) WTP does not take into account that public resources are commonly owned, which means that each member of a society is an equal resource owner, (3) WTP is an income biased approach, (4) use of the WTP via the travel cost method assumes that a well defined individual (or household) recreation demand function exists, which is heroic assumption, and (5) WTP is not compatible to the political process involved in recreation planning. The report concludes that the Unit-Day-Value method, although minimally treated in the literature, represents a robust alternative to recreation benefits evaluation, and it presents a framework for effective agency UDV implementation. Guidelines for additional research necessary for UDV derivation are provided.

RESOURCES DATA

Evalution, Processing and Publication

THE GLOSSARY OF WATER RESEARCH TERMS

University of the District of Columbia.

Water Resources Research Center

DC WRRC

WRRC Report no. 50.

Report no 50 is the Water Resources Research Center working paper providing a glossary of useful water research terms. This report was taken from a compilation of glossaries from various sources. The terms have been adapted to the D.C. water resources situation, but the vocabulary used by major water agencies was for the most part.

WATER RESOURCES PUBLICATIONS RELATED TO THE DISTRICT OF COLUMBIA

University of the District of Columbia.

Water Resources Research Center

WRRC Report no. 55.

The Water Resources Research Center has prepared a bibliography related to the water resources of the District of Columbia. This report assists researchers in preparing for a preliminary literature search. The report also provides first the publications prepared by various agencies (i.e. Department of Environmental Services, Interstate Commission on the Potomac River Basin, Environmental Protection Agency, U.S. Geological Survey, Corps of Engineers, etc). It provides an author index and a field index.

ENGINEERING WORKS

Engineering Works

The raising of the rainbow trout (Salmo Gairdneri) in a closed recycling water system in an urban environment is described. Germ-free fingerling trout were raised on a controlled diet over a period of nine (9) month in specially constructed, refrigerated aquaria maintained at 10C and 15C. The results show that this trout adapts well to the environment provided for it and increases in weight and length comparable to or at a more accelerated rate than those raised by conventional fish-farming methods.

Rainbow trout raised at 10C have a somewhat slower rate of growth than those raised at 15C. Oxygen concentrations, temperature, and bacterial counts were constantly monitored. This process, with slight modifications, could be used to launch a commercial venture in the urban aquaculture of the rainbow trout.

MANPOWER, GRANTS, AND FACILITIES

A-Education, Extramural

DIRECTORY OF UNIVERSITY WATER EXPERTISE IN THE

DISTRICT OF COLUMBIA 1982

The directory of university water expertise serves to help disseminate information on the water and water resources of the District of Columbia. The directory was assembled for several purposes including: (1) to identify as nearly as possible all the faculty members of universities in the District of Columbia who are actively involved in one or more aspects of water and/ or water resources (86 faculty members were identified), (2) to facilitate communication among faculty members with water expertise and interests, so that duplication of effort can be minimized.

The information on which this directory is based was obtained from the faculty member him/herself. Questionnaires were sent to all universities faculty in the District of Columbia known to be involved in water and/or water related activities. The directory is composed of three sections: (1) an alphabetical list of faculty members, (2) a cross-index in which faculty are categorized by their area(s) of water expertise, (3) a second cross-index in which faculty are listed according to their university affiliation.

DESIGN OF A WATER RESOURCES TRAINING PROGRAM FOR

OPERATION, MAINTENANCE, AND MANAGEMENT

University of the District of Columbia.

Water Resources Research Center

M.H. Watt et al

WRRC Report no. 56.

A long-term training program was designed for operating personnel in three bureaus (Water Services, Sewer Services, and Wastewater Treatment) within Water Resources Management Administration (WRMA),
a division of the D.C. Department of Environmental Services (DES). The project consisted of: an analysis of the agency's structure; a survey of the employees background; a survey of job and task requirements; an assessment and documentation of training needs based on workers and supervisors views; analysis of job and performance functions; and the implementation of a pilot program aimed at providing information about the training level of workers, trainees and supervisors acceptance, selection of training methods, training facilities, and other factors relating to a long-term training program. Recommendations on a comprehensive long-term curriculum leading to certification are provided. The report also gives guidelines for apprenticeship, certification and a comprehensive list of courses related to the water resources operators and technicians.

Research Facilities

DIRECTORY OF WATER RELATED ORGANIZATIONS IN

THE DISTRICT OF COLUMBIA

University of the District of Columbia.

Water Resources Research Center

M.H. Watt

WRRC Report no. 41.

The directory of water related organizations in the District of Columbia provides a listing of organizations working with or related to the field of water resources. The organizations listed include: the federal government, the District of Columbia, regional agencies, research and academic institutions, private firms, citizen committees and private interest organizations.

For each organization the directory gives the name, the key people, the mission and objectives, the structure and the involvement and the interest in water and water related activities. Organizations in the body of the directory are listed by categories. The format of the table of contents should help to understand some of the hierarchical interrelationships among organizations. The glossary of Acronyms is intended to aid the identification of organizations and some of the special vocabulary used among water related organizations. An alphabetic index will help in locating of organizations within the directory.

Grants, Contracts, and Research Allotments

VIEWS ON U.S. WATER RESEARCH AND TECHNOLOGY TRANSFER

University of the District of Columbia.

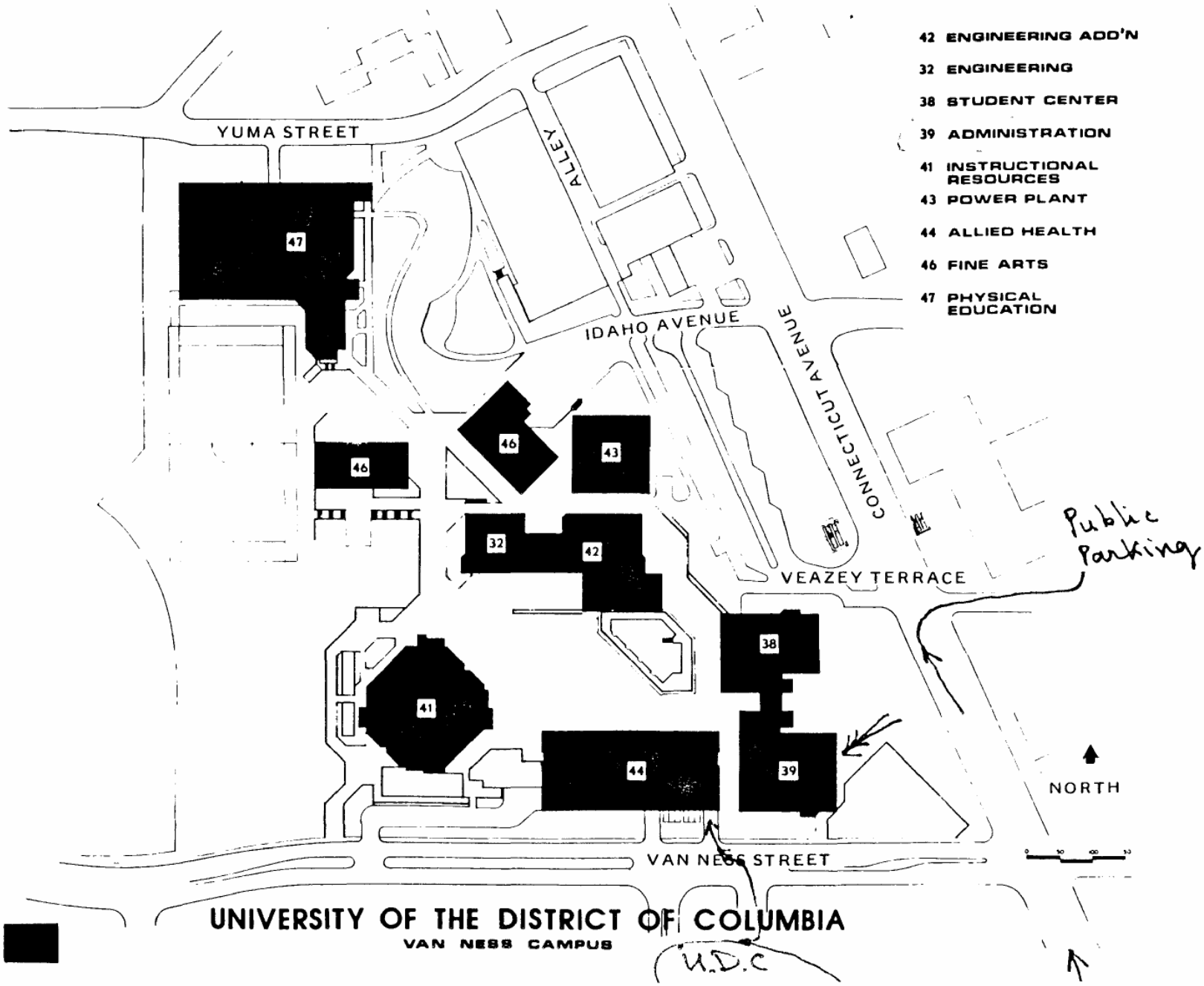
Water Resources Research Center

M. H. Watt

WRRC Report no. 53

This paper examines research and technology transfer activities dealing with water resources in the U.S. It highlights the processes used by the water research institutes to attack water research problems. It also gives detailed analysis for the technology transfer/information dissemination techniques. This paper was presented by Dr. Watt in a scientific exchange program between the United States and China in August 1983.

APPENDIX E



UNIVERSITY OF THE DISTRICT OF COLUMBIA
VAN NESS CAMPUS

APPENDIX F

TRADITION IN TRANSITION

UDC WEEK 1985

Monday, November 4, and Tuesday, November 5

Program of Activities

College of Life Sciences
Building 44, Room A-04

"Serving the Community Through Research"

A seminar featuring research presentations by faculty and staff associated with the D.C. Water Resources Research Center and the D.C. Agricultural Experiment Station. Both the research center and the experiment station are state agencies administered by the College of Life Sciences.

Presiding — Mamadou H. Watt, Director, D.C. Water Resources Research Center

Welcome — William H. Hyman, Interim Dean, College of Life Sciences

"The Hydrology of the District of Columbia" — James V. O'Connor, Associate Professor of Environmental Science

"Water Quality Trends of Anacostia River" — Timothy J. Karikari, Operational Research Analyst, WRRC

Remarks — Emory J. Levant, Assistant Director, D.C. Agricultural Experiment Station

"Heavy Metals Accumulation in Animals Fed Plants Grown on Sludge Compost Treated Soils" — Freddie Dixon, Associate Professor of Biology

"Organotin Compounds as Possible Fungicides Against Dutch Elm Disease" — George Eng, Professor of Chemistry

"Production of Vegetables Grown in Mini-Gardens" — Grady McDonald, Associate Professor of Environmental Science

"Attachment Behaviors of Low Income Mothers on Infants" — Patricia Tompkins, Associate Professor of Nursing

"Biological and Psychosocial Concomitants of Maternal and Infant Health" — Vijaya Melnick, Professor of Biology

College of Physical Science, Engineering and Technology
Building 41, Room A-04

"The Search for Solutions"

A film series focusing on man's search to find answers to problems in the physical sciences.

Center for Applied Research and Urban Policy
Seminar on Homelessness in the Nation's Capital
4 p.m – 6 p.m.
Building 44, Room A-03

During the summer of 1985, a team of faculty researchers, led by Associate Professor of Psychology Katheleen Dockett, conducted research focusing on four aspects of homelessness in the nation's capital. During this seminar, the principal investigators of this project will discuss their research.

Opening Remarks — Steven J. Diner, Director, Center for Applied Research and Urban Policy

"Overnight Shelter: The Need and the Response" — Fred Robinson, Professor of Urban Studies

"The Mentally Ill Homeless: A Systems Analysis of the Referral Network" — Kathleen Dockett, Associate Professor of Psychology

College of Life Sciences

UNIVERSITY OF THE DISTRICT OF COLUMBIA

THE AGRICULTURAL EXPERIMENTAL STATION AND
THE DC WATER RESOURCES RESEARCH CENTER

Invite You to attend the 1983-84 Seminar Series

Topic: *Agricultural Experiment Station Program and Activities*

Date: NOVEMBER 17 3:00 PM

Location: BLDG. 44 ROOM A 03 *Van Ness Campus*

Program:

Dr. M. Watt: Introduction
Dean Annye Buck: Scope of the AES

Dr. Emory Levant, Moderator
Project Leaders:
J. Preer
V. Guerrero
J. Kerney
M. Elhelu

COLLEGE OF LIFE SCIENCES

THE ENVIRONMENTAL SCIENCE DEPARTMENT
AND THE D.C. WATER RESOURCES RESEARCH CENTER
INVITE YOU TO ATTEND:

ENVIRONMENTAL CAREERS SEMINAR

Wednesday, April 24, 1985
Presentations: 1:00 – 2:30 pm
Informal discussion: 2:30 – 3:00 pm

Speakers: James Hannaham
Office of the Oceanographer of the Navy

Preston Leyson
Chapel Valley Landscape Co.

Donald Murray
District of Columbia Housing and
Environmental Regulation Administration

Derek Richerson
Maryland Department of Natural Resources

Clement Shearer
U.S. Geological Survey

James Suddreth
Water Pollution Control Federation

James Walker
Environmental Protection Agency

University of the District of Columbia
Van Ness Campus
4200 Connecticut Ave, N.W.
Bldg. 44, Rm A-03
Washington, D.C.

APPENDIX G

UDC GRANTS
MANAGEMENT OFFICE

TABLE OF CONTENTS

13.0 OFFICE OF GRANTS MANAGEMENT

13.0 OFFICE OF GRANTS MANAGEMENT

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13.4 Personnel Actions on Grants, Contracts, Agreements

13.5 Direct Charges (other than Personnel) on Grants, Contracts and Trust Accounts

13.6 Budget Revisions on Grants, Contracts, Agreements

13.7 Indirect Cost Charges on Grants and Contracts

13.8 Certification of Time or Effort

13.9 Report of Department Administration

13.10 Closeout of Grants, Contracts and Agreements

13.11 General Considerations about Grants, Contracts and Agreements

13.12 Interim Progress Reports Submitted

13.13 University Monitor-Program and Financial Aspects of Grants

13.14 Human Subjets

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13.16 Grants Management System Exhibits

13.1 Notification of Grant Award

Project directors of sponsored programs at the University of D.C. have the programmatic responsibility to achieve the objectives for which the grant, contract and/or other funds have been provided. In order to concentrate on their programmatic goals, many other *components* of UDC assist them in the handling and disposition of related managerial matters. The Office of Grants Management provides coordination and assures managerial assistance and support to these components. Specifically, the office carries out the following tasks:

1. Assists in the development of grant proposals especially, in regard to budgetary and other support matters.
2. Establishes and maintains, for each project, a complete file of correspondence, memoranda, and fiscal reports.
3. Works with each project director to overcome programmatic as well as support-related problems, which hinder the accomplishment of the project's goals.
4. Provides advice and assistance to the various administrative (logistical) support officials in their project-related operations.
5. Reviews the operation of each administrative office to ensure that correct procedures are followed in support of the grant program. Where required, develops new or Improved policies and procedures.

When a grant program/project has been funded, the federal government, or other sponsoring agency, issues a formal Grant Award (or signed contract). In most instances, the award notice is sent to the President of the University or the Vice President for Finance. A grant award (or approved contract) does not immediately authorize the principal investigator/project director to obligate funds. A grant account must first be established in the UDC Grants Management subsystem. Funds may be obligated when notification is received, from the Grants Management Office, which confirms the project's UDC/FMS computer code designators.

Under no circumstances will an agency's "letter of funding intent" be accepted as evidence of program obligational authority.