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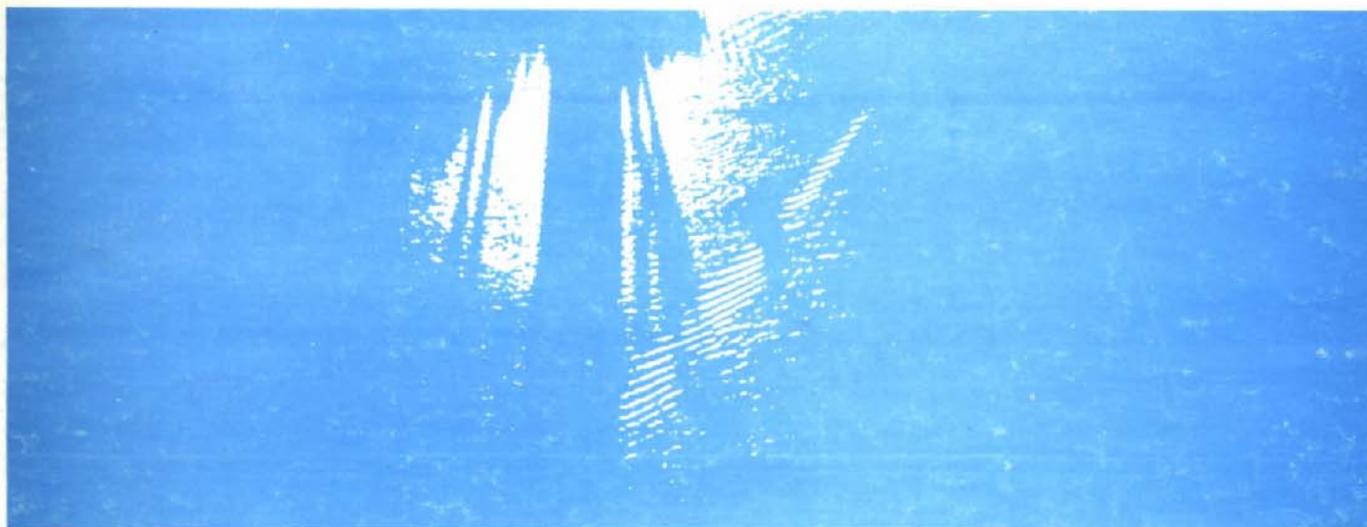
Symposium On

WATER RESOURCES NEEDS FACING THE DISTRICT OF COLUMBIA

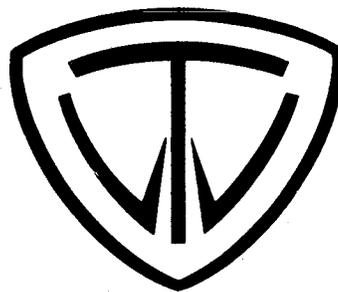
Washington, D.C.
June 20, 1974



WATER RESOURCES RESEARCH CENTER



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



June 20, 1974

Water Resources Research Center
Washington Technical Institute
Washington, D. C. 20008



FOREWORD

The tremendous growth which the District of Columbia and the surrounding metropolitan area have experienced in the past several years has caused a corresponding increase in the need for public services and facilities. Among the more critical of these presently not meeting the demand are the ones relating to water uses-- particularly for water supply, waste disposal, and recreation. The Potomac River and its tributaries are essentially the only surface water courses presently available to the District for satisfying its water resources needs.

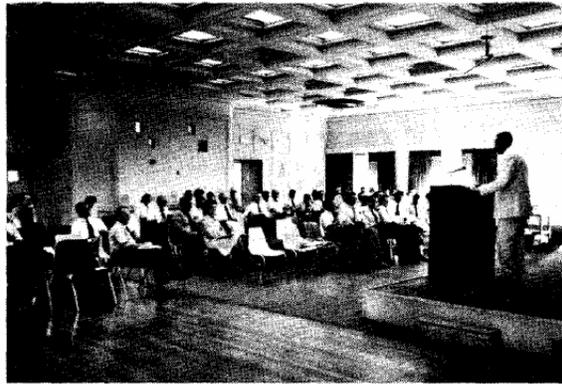
The District covers a relatively small geographic area. Hence, its problems are intimately interwoven with those of the neighboring jurisdictions in Maryland and Virginia, and the solutions to these problems must necessarily take into consideration the entire metropolitan region. Needs for new knowledge and new tools are many and varied. Among the more important are the institutional arrangements bearing upon the planning, managerial, financial, regulatory, and related policies.

It is the mission of the Center, established in April, 1973 to provide the specialized research support required to assist the District of Columbia, in consort with adjacent metropolitan area jurisdictions, in recognizing and satisfying the water resources requirements for its various needs.

This Symposium, held on June 20, 1974, is the first conference sponsored by the Water Resources Research Center, since its establishment. The sessions brought together, both as speakers and audience, many of the region's leading administrators whose decisions bear directly upon the solution of water resources problems of this area.

The presentations, coupled with the exchanges of views and comments, will be highly beneficial to the Center in establishing its future major goals and directions.

Ralph C. Palange Director
Water Resources Research Center



ACKNOWLEDGEMENTS

The efforts and contributions of the speakers and others who participated in the presentations and discussions is gratefully acknowledged. Appreciation is expressed to Ms. A. T. Harris and Ms. T. P. Scott for their capable handling of the many details and arrangements for the Symposium.

Acknowledgement is also made for the valuable assistance provided in the planning stages by the Steering Committee, composed as follows:

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The Symposium, upon which this publication is based, was supported from funds provided by the U. S. Department of the Interior, as authorized under the Water Resources Research Act of 1964, as amended, (P.L. 88-379), through Grant No. 14-310001-9080, Project No. X-136.

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Dr. Benjamin H. Alexander
Moderator, Morning Session



Dr. Cleveland L. Dennard

WELCOME

Dr. Cleveland L. Dennard
President
Washington Technical Institute
Washington, D. C.

Good Morning, Ladies and Gentlemen. It is my pleasure to bring you greetings from the Washington Technical Institute and the Water Resources Research Center. We are delighted to have the opportunity to convene the Symposium and to start examining some of the problems having to do with our water resources.

We are beginning to focus on these problems. They are of interest to us because we live in the District of Columbia and because of our interdependence on the counties and other jurisdictions which surround us. The District is unique, in that it covers an area of only 64 square miles, of which 12 percent is under water. The situation seriously limits the opportunities for development of these resources.

Our Department of Environmental Science, which includes sanitary engineering, water pollution, and marine science technologies, offers opportunities for our students to become involved in finding solutions to these problems. The quantity and contingency aspects of our water supply, the magnitude of pollutants, and the utilization of the area's marine resources are all critical facets to which attention must be given.

Thus, the Center is a vital part of the Institute, not only from the standpoint of research efforts but also from the instructional point of view. The students must be provided with opportunity of this nature, working with us and with our neighbors. Involvement with real-life problems will add a new depth to their training.

Washington Tech is a young and reasonably ambitious institution. We are trying to be systematic in our development, while at the same time remaining technical in our orientation and occupational in our objectives. We welcome "this opportunity to share with you, on an on-board basis, the transfer of knowledge and the application of that knowledge to the improvement of our water resources.

Thank you.



Charles H. Conrad

WATER SCARCITY - A PARADOX IN THE NATION'S CAPITAL

by

Charles H. Conrad
Executive Director
National Capital Planning Commission
Washington, D. C.

HISTORICAL BACKGROUND

Until the beginning of the 19th Century, the residents of Washington carried their drinking water from the area's, "many sweet rivers and springs" first described by Capt. John Smith. In signing the first Act of Incorporation of the City of Washington, President Jefferson, in 1802, granted authority to the city "to sink wells and erect and repair pumps in the streets." In 1809, the city appropriated \$300 to be applied to the laying of a pipe to convey water a distance of several blocks from a spring and the maintenance of public wells became inadequate as the city grew. By mid-century, water supply assumed the proportions of a major problem. In 1850, Congress appropriated money for a study of "the most available mode of supplying water" to the city.

The Army Corps of Engineers was assigned to make the study and had the considerable foresight to recommend obtaining water from the Potomac River at Great Falls. Congress approved the plan and appropriated funds to construct intake works, a conduit from Great Falls to Dalecarlia, reservoirs at Dalecarlia and Georgetown and ancillary facilities.

The Civil War delayed construction, and it was not until 1863 that the planned works were completed. An organization within the Corps of Engineers, named the Washington Aqueduct, was created by the Congress and assigned permanent responsibility for supplying and distributing water to the Federal City. In 1882, Congress gave the municipal government of the District of Columbia the responsibility for distributing the water supplied by the Washington Aqueduct.

This pattern of joint responsibility continued. Today, the Washington Aqueduct performs water supply operations that might best be described as "wholesaling" and the District of Columbia performs the "retailing" functions. In 1905, with the construction of the McMillan filtration plant, the supply was filtered for the first time. This plant was supplied by tunnel from the Georgetown Reservoir to a reservoir built at McMillan.

Pumping facilities were provided to serve areas that could not be served by gravity. Coagulation and chlorination were introduced in 1913 and 1922, respectively. In 1928, the Dalecarlia filtration plant was completed along with a second mission pipelines. Many additions and extensions to the distribution system were made by the municipal government of the District of Columbia.

Too much cannot be said about the great foresight in the plan to tap the Potomac River in 1850. At that time the population of Washington was 40,000. Georgetown contained another 8,000 persons. Smaller and more convenient sources of water could have satisfied the immediate demand and, in the view of many, demand for the foreseeable future. Rock Creek, which was favored as the best source by an earlier report, was rejected by Congress. Great Falls was 9 difficult construction miles from the receiving reservoir to be built at Dalecarlia, but it offered an intake location not likely to be polluted with sewage for a long time to come. The conduit constructed to bring the water from Great Falls was 9 feet in diameter. It had a capacity in excess of 106 million gallons per day (mgd), certainly more than 35 times, and probably more than 50 times, the water demand in 1850.

No other engineering works in or around Washington with the exception of the current METRO project has displayed such bold planning and scope.

Another act of foresight was the creation of the Washington Suburban Sanitary Commission in 1918. The Commission purchased the existing water systems of towns and real estate developments and began supplying water to portions of the Maryland region of the Washington Metropolitan Area.

Over the years, it developed ground and surface water source and built filtration plants to meet the needs of the time. Gradually, the distribution systems in the sanitary district were united until a single system now supplies most of the area. The principal source of water is the Patuxent River, but it is no longer adequate. It has become necessary to tap the Potomac River for additional water.

The Virginia portion of the Washington Metropolitan Area has a history of small ground water supplies and the impoundment of minor streams. The principal deviation from this pattern was introduced in 1926 when the District of Columbia was authorized to sell water to Arlington County. Washington water is also supplied to Falls Church and a small area adjacent to that city. Water supply is complicated by the existence of a

great many private companies which wholesale and retail water. All of these sources and systems, however, are now, or shortly will be, inadequate. As is the case with Washington and suburban Maryland, suburban Virginia must also make plans to secure *additional* water.

Today, the Washington Metropolitan Area faces a decision regarding its water supply which is similar to that which confronted the District of Columbia more than a hundred years ago. It must decide whether to undertake a plan that will provide for the century to come, or whether, by temporary expedients, to postpone for several years at a time, the inevitable-- a water shortage.

ESTIMATES FOR THE FUTURE

The problem of water shortages has arisen at a place and time when few technological or physical obstacles exist for its solution. However, demand for water from the Potomac is already perilously close to the available flow in the river.

On September 10, 1966, the minimum daily flow (before diversions) of the Potomac River at Washington fell to 388 mgd. On July 15, 1971, a record high volume of water was withdrawn from the Potomac River for water supply in the National Capital Region over 400 mgd. The specter which water supply engineers have feared for years is now upon us. A relatively water rich region the seat of the Nation's government, has and continues to be faced with a potential emergency water shortage situation.

Th problem for 1980-85 will be one of potential short-term deficits covering periods of several days. Projected average monthly demand for water in 1980-85 will not exceed (although it will nearly equal for one or two months) the minimum average monthly stream flows of record for the respective months. However, during the July-September period when maximum demands will occur in conjunction with low stream flow, there will be the potential for a situation where demand will equal stream flow.

Present average daily water consumption is 400 mgd in the Washington Metropolitan Area. There is a 7000 mgd average daily flow in the Potomac River. It appears from current projections that in each of the next ten year periods this consumption will, conservatively, increase by 100 mgd.

As a safety factor, to account for peak demands, it appears from various studies that the average daily consumption

estimates should be increased by a factor of 1.5. This means that the total water needed in this region's system should be 750 mgd in 1980, 900 mgd in 1990 and 1050 mgd by the year 2000. The present safe yield (assuming worst historical conditions of flow) for this area is-- Potomac River 388 mgd; Patuxent River, Occoquan Creek, Board Run and Goose Creek-- 146 mgd; other sources including wells-- 9 mgd. The total dependable yield of 546 mgd is capable of meeting average daily consumption needs in 1980, but is some 200 mgd below the estimated needs to meet peak demand. Unfortunately the greatest peak demand periods occur in the summer months, which is usually the period of low flow in the Potomac River.

The present safe yield (assuming worst historical conditions of flow) for this area is-- Potomac River 388 mgd; Patuxent River, Occoquan Creek, Board Run and Goose Creek-- 146 mgd; other sources including wells-- 9 mgd. The total dependable yield of 546 mgd is capable of meeting average daily consumption needs in 1980, but is some 200 mgd below the estimated

ALTERNATIVES TO MEET THE NEED

From an analysis of the studies completed to date, the published reports all conclude that upstream water impoundments are needed to regulate low flows in the Potomac River in the National Capital Region. Where these reservoir sites are to be located and how the water stored in them is to be managed, however, has not been clearly indicated. Studies by the Corps of Engineers originally identified 17 more feasible locations. However, in submitting their 1969 report to Congress, only three sites were recommended for authorization.

One of these, Bloomington, has been authorized and is scheduled to be completed by 1980. The two other impoundments recommended for authorization are Sixes Bridge and Verona. Assuming authorization by the present Congress, they would not be on the line before 1982 or 1983. According to the Corps' report, releases from Bloomington could increase low flows at Great Falls by 137 mgd. The dam would be about 210 miles upstream and flow time would be approximately 22 days from the dam to Potomac intakes. Verona water would be 15 days in arriving and Sixes Bridge water 7 days.

None of the proposed plans, however, could be implemented and the necessary facilities constructed soon enough to meet the immediate needs of the national Capital Region in terms of impending short-term deficits during drought periods or emergency and spill situations.

The most immediate and obvious source of fresh water during emergency periods is the Potomac Estuary. While the Estuary contains a large volume of fresh water, the amount which can be withdrawn, considering public health aspects, is unknown. At present, the Corps of Engineers is planning to construct an emergency system for pumping 100 mgd from just above

77. Bridge into the Dalecarlia Reservoir; this system will not be operational until 1976-

While short-term use of the estuary has undoubted utility, long-term utility is less certain until all public health implications are more fully understood and adequate control measures assured.

While pumping of the estuary and schemes to improve utilization of available raw water storage may be helpful as interim measures, steps to increase the quantity of available nearby storage are still needed: One such step as proposed by the 1968 report by a Board of Engineers for MWCOG would be a single-purpose water supply reservoir on Goose Creek in Loudoun County, Virginia. The Virginia Division of Water Resources has also proposed a 55 BG reservoir on Goose Creek at a cost of \$13 million. Such a reservoir alone, if under regional ownership and control, could provide the capacity and flexibility to meet the Region's needs up to and through 1980-85.

The urgency and magnitude of water supply problems and the need for their positive resolution clearly indicate the need for single-purpose water supply reservoirs responsive to the National Capital Region's spontaneous needs. As a companion to multipurpose basinwide reservoir projects, these would serve to diminish the impact of future increased demands.

Multipurpose basinwide reservoirs have several difficulties with regard to meeting the needs of the Region. They are remote, therefore travel time to the Region would limit flexibility to meet short-term needs. Their utility to provide water on demand would be limited by this multipurpose function in meeting the needs of local communities. For instance, in the Corps of Engineers' proposal for Bloomington and the so-called "six pack"-Verona, Sixes Bridge, Town Creek, North Mountain, Sideling Hill and Little Cacapon-- only the latter four include storage earmarked to help meet the National Capital Region's needs and they have not been recommended for authorization. Bloomington, Verona, and Sixes Bridge are formulated principally to meet upstream, local needs.

Single-purpose water supply reservoirs at nearby locations can solve the problem of flexibility to meet immediate deficits. Their use can be factored with upstream projects to provide better efficiency in meeting long-term needs. Furthermore, their availability can assure the National Capital Region a water supply which will clearly be responsive to its needs.

As we continue to argue the merits of the various major proposals for an adequate water supply for the National Capital

Region we continue to push the solution to the problem further away from the local jurisdictions and from local control. In the 1950's the major reservoir proposed to solve our raw water needs was located at River Bend, about 6000 above the present Dalecarlia water intake. In the 1960's the reservoir was move to Seneca, some 9000' above the present intake. Now, in the 1970's most proposals for reservoirs are located in Pennsylvania and West Virginia.

A number of alternatives have been identified to deal wit the problems of both short-term and long range water supply. These include:

Local impoundments of water within the Washington Metropolitan region.

Interconnection of some water supply streams in the region.

Construction of reservoirs on the Potomac River

Emergency water intakes from the Potomac Estuary.

Use of the Estuary as a permanent, rather than emergency, source o water. This will be the subject of an upcoming Corps study, if \$6 billion authorized by Congress for a demonstration project is released by the President's Office of Management and Budget. The study will be geared toward discovering if there is a public health hazard from any viruses which might enter the region's water supply system if the polluted Estuary is used.

Water demand reduction and/or water saving devices programs;

Reuse of treated waste water-- requiring land treatment and/or advanced treatment of sewage for purifying water to a near-potable state.

Wells to tap Coastal Plain and Piedmont ground water sources.

In summary, it is clear that a water crisis now exists in the Nation's Capital. Various alternatives have been identified to cope with the problem. What is lacking is the institutional organization needed to effectively deal with the problems of water supply and waste water disposal.

INSTITUTIONAL NEEDS FOR WATER RESOURCE PLANNING

A major weakness and deficiency in the National Capital Region's present institutional arrangement for water supply and waste water management is the fragmentation of governmental organization and authority. Congress recognized the problem in its 1972 Amendments to the Federal Water Pollution Control Act which requires the preparation of basin-wide studies of specific water and land-related plans for water resources planning.

Commendable as the Region's record has been in resisting further fragmentation, effective application of regional solutions to area wide water supply and, waste water management problems remains too dependent upon intergovernmental contractual agreements and other forms of voluntary cooperation. As a result, sound regional approaches in all of these programs are too easily frustrated by a single jurisdiction's refusal to cooperate.

About 20 separate governmental and private agencies located in Maryland, Virginia, and the District of Columbia, are involved in water distribution throughout the Region. Coordinating all these interests into a uniform common program of action for the common good is extremely difficult, but absolutely necessary..

In the case of water supply, the multiplicity of agencies and plans for provision of this service impedes sound development of new water supply sources and will increasingly handicap such development as existing supplies of raw water in the future reach the limit of their capacity. This has prevented the Region from achieving important financial savings through the realization of economics of scale, in securing needed credit, in constructing facilities, and in operating programs.

The separation of water supply and waste water management has contributed to the water quality problems in the upper Potomac Estuary because of lack of coordination between the scheduling of needed waste treatment facilities and the expansion of water supply services. In the case of wastewater management, the failure to relate the capacity of treatment facilities to expanding residential and other development in the Region has compelled State authorities to impose costly moratoriums on construction of housing in some suburbs.

Another unresolved institutional weakness at present is an absence, in the regionwide planning mechanism, of the ability

to ensure adherence to regional plans and priorities. Given the fragmentation of governmental organization and authority and the separation of related programs now characteristic of the Region, such a mechanism is essential if regionwide solutions are to be successfully applied to water supply, waste water management, and related problems in the metropolitan area:

Water resources planning historically has been viewed as planning for water supply, be it domestic, agricultural or industrial. Planning coordination was considered sufficient if these competing demands were satisfied along with, perhaps, recreational water use or, at most, one other factor.

There is a real need in the Potomac River Basin for comprehensive water resources planning – an effort which would include, at a minimum, water quality, water supply, flood control, recreation, sediment and erosion control, and land use associated with water resources.

Regardless of the nature of the organizational structure finally decided upon to resolve this pressing problem, it is clear that the following criteria must be present in any new agency created:

1. Authorization to not only plan, but also to finance, construct, and operate both regional water supply and waste management facilities.
2. Power to exercise broad authority for water quality throughout the entire Potomac River basin.
3. Financial self-sufficiency.
4. Relationship with existing governmental institutions in the metropolitan area conducive to coordination and implementation of municipal water resource management programs.
5. Recognition of, and adequate provision for, the Federal Government's special interest in the National Capital Region.

CONCLUSION

The paradoxical situation in the Nation's Capital revolves around the fact that we have crises in our water resource management only because of lack of an institutional arrangement to

cope with the problem. Until the National Capital Region can organize itself to deal effectively with the critical water management crisis now facing it, plans, studies and alternative water source proposals will be futile. After all, it was thirty years ago, that the U. S. Army Corps of Engineers prepared the first of a long series of studies aimed at solving the water problems of Washington.

The definitive study on this matter completed by the Corps in 1963 went unheeded. We now have underway the NEWS (Northeast U. S. Water Supply Study) Study, yet another in the series dealing, in part, with the water needs in the Potomac River Basin.

We know the problem and we know the solution-- but, we simply do not have the institutional framework for realistically dealing with water management in the Basin.

QUESTIONS AND DISCUSSIONS

QUESTION: In making the point that there is no organizational structure to deal with the problem, what do you propose as a solution to setting up a structure or beginning?

MR. CONRAD: There are many solutions proposed. There are organizations that already exist. However, we need one organization to take over this function. My report does not mention which organization should have this responsibility but rather points out the kinds of powers any organization must have in order to be effective.

In pooling together, all of the functions of the plans for the Basin as whole, I believe such*an organization should be able to plan for water supply, management, waste and right down the line. It should be oriented so it is self sufficient, particularly financially.

It should be similar to the Washington Metropolitan Area Transit Authority, which can construct as well as plan. It is time to get such an organization together and start constructing these facilities.

QUESTION: I work with the Inter-State Commission on the Potomac River. I am not speaking for them at this time. I would like to commend Mr, McKinney in stopping the waste of a million gallon loss of water a day in the incinerator. I am a farmer. I would like to deplore your recent action in recommending a dam

to stop the Patuxent River. We sailors know the value of water. I have been given two quarts to take a bath in every other day. We farmers know the value of water. We make our own water supply and keep it up. I would look very critically into the recent engineers study of 128 gallons per person use in the Metropolitan area. What do you think are the proper demands for Metropolitan area use?

MR. CONRAD: You have more qualified people to answer that question than I. I cannot answer that.

QUESTION: When you are talking about the water supply crisis it is important to realize that crisis is temporary. The average flow is 20 times as much as we use today. How are you considering the length of time of any crisis?

MR. CONRAD: Once again, I think there are technical engineers here who can answer that question. It is temporary, but it becomes permanent when you have to go through a period of water shortage. When a city, particularly the Nation's Capital, has only about a one or three day water reserve and other cities in the United States have three months to three years, I think you see the problem. I don't think it is a matter of whether it is a temporary case or whether it is permanent. The fact is our capital city does not have an adequate supply of water to provide its citizens even in a temporary kind of arrangement.

COMMENT: I think you should record the new study. You might answer the question in terms of reservoirs.

COL. McGARRY: I think this afternoon my talk will discuss those things in more detail.

QUESTION: Do you know of any existing organizations that are now doing what he proposes this organization should do? This is what we have in the back of our mind.

MR. CONRAD: I am sure there are other areas in the United States that have the same set-up as in Washington, D. C. that crosses jurisdictional lines in regard to water supply and water waste management. I cannot give you a specific example. I am sure we could come up with quite a list. To establish such an organization here it would be necessary to have the support of the States of Maryland, Virginia, Pennsylvania, West Virginia, the District and the Congress of the United States. It is a rather time-consuming process. In the case of the Washington Metropolitan Transit Authority, a Federal Agency, NCTA, was first created in view of the fact that it would be two or three years before an interstate-regional Transit Authority could be realized. I think it is a good example of what might be considered here. I am not

saying if you take that kind of organization and put it on top of water supply and waste management, it is all you need. I am sure it is going to have to be tailored. I think you can learn quite a bit from it.



Herbert M. Sachs

THE STATE WATER RESOURCES PLANNING PROGRAM IN MARYLAND

by

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Water Resources Administration Maryland Department of
Natural Resources
Annapolis, Maryland

INTRODUCTION

In the last five years a number of new programs and activities to aid effective water resources management have been instituted in Maryland. Let me mention only a few to give you some idea as to their magnitude and diversity.

1. The State enacted legislation regulating both open water and private wetlands. In simplest terms the program consists of delineating wetlands and prescribing by license or permit the type of use which will be permitted. While this is primarily a regulatory program, the State more recently initiated a Coastal Zone Management program under authority of the enabling legislation administered by the National Oceanic Atmospheric Administration. The Department just two weeks' ago received notice of its first grant award under this program and contracts are being let for a number of planning studies. These include (1) an evaluation of the various wetland types, (2) an identification of critical coastal zone resources, and (3) a boating needs and carrying capacity study.
2. In 1970 the Maryland General Assembly created the Maryland Environmental Service ... a State utility agency with, planning, construction, financing and operational responsibilities for water and wastewater treatment facilities. It is this agency which is carrying out the comprehensive water quality studies required by Federal law. It is also operating all waste treatment facilities at State institutions. The Maryland Environmental Service is cooperating with a number of local governments in construction of liquid and solid waste projects.

3. In recent years the State has enacted several laws relating to control of sediment. At present, there is a State-wide program wherein every project involving grading requires a permit either from the local government or the Department. The program is gradually being expanded to include storm water management.
4. A Power Plant Siting Program was established within the Department in 1970 in response to supposed conflicting needs of additional power plant sites and the effect such facilities are purported to have on the environment. The Power Plant Siting Program is engaged in identifying feasible sites for power plant facilities and carrying out environmental studies necessary to determine whether these sites are suitable.
5. In 1970 the General Assembly enacted legislation creating an Abandoned Mine Reclamation Program. This program,, funded by an initial appropriation of \$5 million has progressed to the point where sites to be reclaimed in 5 Western Maryland watersheds have been identified and detailed engineering is soon to proceed. Several million dollars in Federal grants to assist this program have been received.
6. In 1969 the Maryland Potomac Water Authority was created as the mechanism to provide for non-Federal financing of the Bloomington Reservoir project being built by the Corps of Engineers. I -will come back to this program later.
7. The WRA administers both the State and Federal water quality discharge permit programs. While the Federal program will formally be delegated to the State later this summer, Maryland as its own program defined by State law and regulation which in many instances is more comprehensive than the Federal.

While the listed programs are primarily of an operational nature, each results out of a need or an objective identified by the resource planning function within the State. A problem or need was recognized and sufficient planning was carried out to determine the implementing tool needed to respond to the identified problem or need.

Some of the credit for the establishment of these programs must be given to the Federal Government, but in a back-handed manner. While the Federal agencies were not directly involved, Title III of the Federal Water Resources Planning Act made possible the necessary support required to create the aforementioned programs. Title III provided unconditional grants for water resource planning. In Maryland this money was either used to employ staff or engage consultants for studies that led to the creation of nearly all the new resource activities in the State. This program was handled with a minimum of paperwork shuffling and none of the voluminous regulations characteristic of other Federal programs. For whatever reasons there may be, this program has fallen by the wayside and must be considered a real loss.

PLANNING MECHANISMS

In Maryland there are a number of resource planning mechanisms in operation at both State and local levels. At the local level, County master plans and the HUD 701 studies undertaken by each County over the last 15 years include elements of land use, facility development and other resource considerations.

Local water and sewerage planning was given a shot in the arm by passage of the 1970 Comprehensive Planning Act which required each County and Baltimore City to prepare detailed studies delineating their water and sewerage needs, and to update them annually. This Act put the burden on the State-- specifically the State Department of Health to review and approve these plans. Now any project involving Federal or State grant money must conform with the approved Plan.

At the State level, the State Department of Planning is responsible for formulating a State Development Plan. Although the enabling legislation is somewhat general as to the scope of the Plan, it does specifically delineate land use and natural resource elements. As the agency responsible for preparing the State's capital budget as well as being the Clearinghouse under the Federal Bureau of the Budget Circular A-95 for all Federal grant projects, the planning Department is capable-of assuring that all capital programs in the State are in compliance with the Development Plan.

Within the Department of Natural Resources, a number of the agencies have specific water resource planning activities. As early as 1967 the State embarked upon comprehensive water quality studies stimulated by the Section 3C program under the Federal Water Quality Act Amendments of 1965. Again, as was the case with the Water Resource Planning Act, inadequate funding frustrated the Federal program. While Maryland authorized \$4 million

for these studies (supposedly to match Federal funds), only \$1 million in Federal funds was appropriated for the entire country.

The Maryland Environmental Service inherited the 3C program and the available funds and subsequently initiated the needed studies. This program predated by several years the sewerage planning program mandated, under the 1972 Federal Water Quality Act and gave Maryland an edge over most other states.

I could, list ad infinitum the specific planning activities the Department is engaged in, but such a list would be probably, not too different from any other state's resource planning program. For example, these include participation in the River Basin studies of the Corps, the watershed planning activities of the Soil Conservation, Service, the resource identification inventory of specific watersheds, the economic base studies, etc Again, the statements of objectives and goals for each of these are not too different than that compiled by anyone else. I do however, want to emphasize the basic fact that unless there are ways of implementing these programs, the planning effort is wasted.

PLANNING IMPLEMENTATION

Let's be even more specific about this relationship between planning and implementation. I have three examples to illustrate.

1. The Bloomington Reservoir Project on the North Branch Potomac was authorized in 1961. Although all of the usual cost benefit studies and all the planning had been done, construction on this project did not begin for 10 years despite the fact there was no real opposition to the project and none of the environmental considerations we face today. The problem boiled down to the fact that there was no institutional arrangement for handling the re-payment of the non-Federal cost associated with this project. It was not until Maryland decided to go it alone (rather than waiting for participation by other Basin states) and created the Maryland Potomac Water Authority to be the contracting agency for this project that we got some action.

I previously mentioned the requirement in State law for counties to prepare comprehensive water and sewerage plans. The initial plans were far from adequate; and in many areas of the State the whole program was considered a joke. However

with the advent of the municipal discharge permits as 'required under both Federal and State law, the Department made it a requirement that before any project could be considered for permit and subsequently any construction grant money, it had to be included in an approved County Plan. Needless to say, far more attention `is now being given to the County Plans.

3. My third example relates to the water supply situation in the D. C. metropolitan area. All projections point to a shortage situation some time before 2000. This, by the way, is not that far off considering the time frame required to get any kind of project implemented. Nevertheless, the solution to D. C. water supply problem is not going to be a single measure; rather it will be some combination of impoundments, use of the estuary, inter-basin diversions and inter-connections systems, and possibly even flow augmentation from ground water. A great deal of planning has already gone into this problem. A good deal more is going to be required. The crucial point is that how once a program is decided upon we do have the tools of implementation. Basically they involve the State's authority through the appropriation permit system.

PLANNING CRITERIA

By my remarks to this point, I -don't want to suggest that our planning tools are completely adequate and that our only problem in good resource management is coming up with the appropriate means of implementation. From my perspective, I have observed that many resource planning programs are functioning without support of standards and criteria for determining needs. Compare, for example, the adequacy of water supply and water quality planning to date.

In the water quality program there is no shortage of underlying philosophies, program objectives, standards or criteria. These are spelled out in both Federal and State law and regulation. So are the responsibilities of the various levels of government. Perhaps not always clear and consistent, but nevertheless they are there. We have classified our waters both by use and by water quality problem. We know what instream water quality we are trying

to achieve and from this follows the specific point of discharge or effluent standards. This information is incorporated into county, basin and regional plans which hopefully make the tie with land use and other economic and resource considerations. As I have indicated, the planning mechanism is far from perfection but nevertheless the essential elements are there. With adequate staffing, this activity should be capable of producing plans w (1) have public acceptance, and (2) will result in the necessary capital improvements.

In contrast, water supply planning criteria are minimal a best and, for the most part non-existent. There is no better case in point than the situation in the Potomac River Basin. Why is it that despite the millions of dollars spent for planning there is no water supply plan for the Potomac? One obvious reason is there has never been agreement on criteria for determining what is needed.

Our planning effort to date has been primarily to develop projected population need, add some industrial water requirements maybe add a little more to dilute wastewaters and protect the little fishes during drought, apply a fudge factor, total up t "need" and compare it with a statistical stream flow measurement such as the low flow expected on one day in 30 years. In the Potomac this kind of planning has gotten us nowhere. If there is an imminent water shortage, we certainly haven't proved it, either to the local governments, to the Basin states, or to Congress.

A good case in point is the experience with the recently authorized Sixes Bridge project on the Monocacy River in Maryland. Based on the methodology used by the Corps for justifying projects, Sixes Bridge was recommended for construction in the 1964 report of the Corps. Almost as if planned, the next seven years was a period of continuing low flow condition in the entire Potomac basin. Everyone supported the project, including the two Maryland counties, the WSSC, and the b strict. Before authorization could be obtained, the drought condition lifted and al of a sudden, the support for the project ceased. Eight years later, the project received Congressional approval and that was over a lot of opposition. The point I'm making is that if the project justification process, including the criteria for determining supply and demand, were more substantial and had public acceptance, then the short term consideration would have been discounted. Unfortunately, planning criteria didn't exist the They still don't.

Again in contrast to the water quality program, nowhere the respective roles of the individual governments defined experience to date has shown us that the burden of providing

water supplies cannot be left to local governments entirely, yet no substantial effort has been made to spell out appropriate functions of Federal, State and possibly regional governments. Specific problems I have encountered are:

1. determining that portion of water needs that should be provided for in Federal projects as opposed to local facilities,
2. the role the states should be playing in the planning, financing and construction of water supply projects. I indicated Maryland's role in the Bloomington project as one of expediency-- should this be continued and expanded?

Having just recently been involved in working out a voluntary low flow allocation formula among the Metropolitan governments and an appropriation permit for Fairfax County, I have been made well aware of these problems, and I don't feel the least bit comfortable about the situation. If there W4s ever a need for some sound planning work, this is it.

Much of what I have said about water supply planning is applicable to recreation planning. We have many jurisdictions involved numerous resources both existing and potential, and perhaps some basic criteria for determining recreation need. But the whole effort is woefully inadequate. As one step, the Maryland Department of Natural Resources is now reassessing all of the State owned lands and determining the validity of the current use policies. There is need for a great deal more planning in this field.

In summary, I have tried to stress that planning is not some tool which is used in the initial phase of resource program and then shelved. Planning must be a continuing process, utilized in every aspect of resource management. I realize that my concept of planning is far more encompassing than what many would consider, but I believe the Maryland experience has shown me to be correct.

QUESTIONS AND COMMENTS

QUESTION: My question is about the Maryland Potomac River Authority. As I recall, it does have authority in so far as Bloomington Reservoir. The contract calls for the sale of water to other states outside the states. The other is that it is restricted to the Bloomington Reservoir, but I assume there is

no reason why that could not be amended.

MR.SACHS: In both cases, you are right: The Corps w ready to move on the Bloomington Reservoir project. We tried for a number of years to work out an arrangement wherein we could raise the money or provide for the money needed to pay the non Federal share of this project. (9hen the Corps builds a multipurpose dam, non-Federal interest must pay the water supply for the project.) I was personally involved from '62 on in trying to work out something on the contracting problem with the other states and the Inter-State Commission. Everything failed. The year prior to creating the authority, legislation was introduced which allowed the State to assess costs on counties for repayment. That got us exactly nowhere in the Maryland General Assembly.

The Maryland Potomac Water Authority legislation was enact in the following year. It is an authority made up of Maryland counties along the Potomac. In it is a formula which explains how the Maryland counties will pay the reimbursable costs for the Bloomington Reservoir. It also says they can enter into any type of agreement with jurisdictions outside of Maryland. In the permit recently issued to Fairfax it states that when Bloomington is built, Fairfax will be assessed according to the formula. The Authority is limited strictly to the Bloomington situation. As a matter of fact, it is only to the initial water supply cost, if that distinction is still maintained. There is no reason why this cannot be expanded. Assuming we don't have a Potomac Compact Commission for a number of years, there is no reason why the Authority Mechanism could not be expanded to handle other projects in Maryland.

QUESTION: I am interested in the low flow allocations for the various utilities in the Washington area.

MR SACHS:_I thought it was worked out. I am getting comments back that it has not been agreed to by the jurisdictions involved.

QUESTION: What are you proposing to do knowing that WSSC has an intake two miles upstream from D. C.?

MR. SACHS: WSSC has storage but it is not adequate. WSSC would like to get an intake structure into the Potomac River. This is being held up by Congress. One reason is the low flow allocation formula which we are trying to set up. A number of agencies have been working at this for years without success. Two years ago, I suggested the state should do it through its regulatory powers. Basically, the state stays out of it unless its enforcement powers are needed.

When the river flow drops down the Corps would advise the other jurisdictions. to apply all conservation methods that they can. If the flow continues to drop to the point where all needs cannot be met, there is a basic rationing formula based on previous use. Again on a voluntary basis the jurisdictions would agree to accepting their respective portion of the flow that is available.

QUESTION: Charlie Conrad talked about the strength existing in terms of institutional arrangements between Maryland, Virginia and the District. You talk about institutional arrangements that seemed to work within the State of Maryland. Would you expand that and talk about the relationship between Maryland, Virginia and the District in terms of District problems and how you think these will work?

MR. SACHS: D. C. has always had the problem of getting Congressional approval for anything they wanted to do. When we were involved in setting up this Maryland Water Authority, we were in constant contact with the D. C. people, keeping them advised as to what we were trying to do. The District could not get involved in the initial legislation. We passed a Maryland bill. Subsequently, D. C. got enabling legislation from Congress allowing it to participate in the Maryland Potomac Water Authority. The District will be participating with the other Maryland jurisdictions. I think we are in good shape in the District.

The State of Virginia is probably a little different. Where there is a withdrawal from the Potomac River, the Virginia jurisdiction must get a permit from the State of Maryland. We have issued one to Leesburg and one more recently to Fairfax County. I would like to believe we were unbiased in our consideration of these permits. We look upon the Virginia jurisdictions as being the same as any other needing water from the Potomac.

The regulatory stick is being used as an implementing tool. A lot of people in the jurisdictions put faith in the fact an inter-Basin commission was going to be established. It passed in Virginia and Maryland. The other jurisdictions have not passed it. I would say today there is probably not as much push for it as there once was.

QUESTION: Who in the State of Maryland ultimately deals with the problems that exist between Maryland, Virginia and the District? You have principles governing counties with their own attitudes of what ought to be and what ought not to be. You have the Resources Department. I think this is what Mr. Conrad was talking about. Who coordinates the program or does anybody?

MR. SACHS: We can't say coordination is perfect, but Maryland has a strong State government and substantial legislation supporting State activity. When it comes to a shove and

push to get action done, there is sufficient legislation on books for the Governor of the State of Maryland to say this it. This is the decision. He doesn't have to go back to eve jurisdiction to get their blessing, although politically, I am sure he does in many situations.

QUESTION: What procedure exists for allocating low flow above Harper s Ferry which affects the production of base flow?

MR. SACHS: At present, there is none. If the Pots mainstream on a Maryland tributary is involved, an appropriate permit must be obtained from the State. There is no mechanism such as that being proposed for the Metropolitan area.

QUESTION : The permits you issued, are they on a c basis for allocation of low flow or are they permits which continue through a period of years for a certain specified flow?

MR. SACHS: These are issued on a 20-year basis, with a triennial review. At that time, the application is reviewed to determine what modification would be in order.

QUESTION: Is it a first in time, first in right?

MR.SACHS: No, sir. We have the appropriation per system here. It covers all uses except agricultural. The f have not seen fit to want to join the rest of the State in getting permits. One of these days when there is a shortage of and farmers begin, to feel it, they will see the desirability having an appropriation permit.

To answer your question specifically, we have to act on permit application that comes in. We do have sufficient plans to take a look at a water shed or river basin to see what of use is contemplated.

QUESTION: What type of plan do you have for developing underground potential and how would the State take care of the underground?

MR. SACHS: Our appropriation law applies to ground as well surface water, including the triennial review of permits.

QUESTION: Mr. Sachs, you left the Sixes Dam at the time of the Federal authority. Could you bring us up to date please?. Is there any money for it?

MR. SACHS: There is money authorized for. . . the Colonel is shaking his head. I will defer to the Colonel.

COL. MCOARRY: I will do it at either time, but I will have something to say this afternoon.

QUESTION: I have a question concerning the criterion used for allocation. The point in time will come when one of the Metropolitan jurisdictions may be damaged. How can the conflict be resolved without going to something like that?

MR. SACHS: You are assuming supply is not going to keep up with your demand. That is a rather negative attitude. I disagree with you. I hope I am right and you are wrong. Tapping streams or pumping water out of the coastal sands, or whatever, there is no technical reason why we should run out of water.

COMMENT: I think we have touched on the item I wanted to touch on. The study should be made of the possibility of some of the appropriation doctrines being modified to fit the situation that exists in the Washington Metropolitan Area. This is to bring a better institutional structure to the area.

MR. SACHS : We should find out whether or not we have a problem. Then, we can develop the institution. I think your institution should follow the setting of the problem itself. Depending on the problem, that will determine the type of institution that you create.

COMMENT: I don't think we have disagreement. I am saying research this problem, and have the answer ready when the problem develops.

QUESTION: I think we might get a debate going with Mr. Sachs. I tend to think the institutional rights are important. They are important in terms of implementation. When you deal between jurisdictional boundaries, it is important that everybody understand the constraints. Is there anything in the series of studies done that evaluated and discussed the kinds of institutional arrangements that prevail and what they have done to affect the problem?

MR. SACHS: I don't want in any way to underplay the institutional arrangements. The formal talk I gave emphasized the importance of implementing plans. I am saying we first ought to identify the problem. Once you know what the problem is, then you develop the institution to meet that problem. As I indicated in my paper, I don't think it is the institutional problem that is causing the water supply situation in this area.

QUESTION: If you have not commented on the status of the use of the estuary, would you do that please?

MR. SACHS: I think the Colonel is going to cover that this afternoon.



William C. McKinney

LEGAL RAMIFICATIONS AND IMPLICATIONS OF ACHIEVING WATER QUALITIES

by

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I am deeply appreciative of the kind invitation of your program committee to participate in this Symposium. I am intrigued with the title of the subject assigned to me for discussion since I possess no formal legal training nor do I consider myself a technical professional expert in the water resources field. Nevertheless, I feel that I can bring you some objective views based on my continuing association with the legal profession during the past several months (including those Philadelphia lawyers whom I have on my staff in the Department) as well as the professionals; engineers and others, who have been keeping me on the straight and narrow in dealing with legal problems facing my Department. May I say, the super-imposition of the professional engineers' viewpoint on that of the legal profession in the attainment of water quality has at times developed into a rather chaotic situation where confusion reigns supreme.

Gilbert and Sullivan summed up the situation very nicely when they stated, "A policeman's lot is an unhappy one". However, they failed to recognize the other side of the problem which could be succinctly stated as "The lot of the policed is also unhappy". The Department of Environmental Services, as both the regulating and regulated agency of the District Government is frequently subjected to the double trauma incident to both responsibilities.

Seriously, the legal constraints incident to the attainment of certain levels of 'water quality in the surface waters of the nation require a substantial increase in resources to carry out the mandated functions. For many years, the regulatory responsibilities of the environmental control field, including water pollution control, was lodged, for the most part, with the health agencies of the nation. These agencies historically had operated on an educational basis coupled with persuasion in order to achieve their objectives. This approach met with lethargy and lack of interest on the part of the public in maintaining and, improving the water resources of the country and did not generate a meaningful program of water pollution control nationally. The last several years have seen a dramatic change in the direction of the approach-- namely, from one of education and persuasion

to regulatory action. During this evolutionary process, the major responsibility for the attainment of improvements in water quality has been transferred from health agencies to environmental control agencies which are better oriented to the use of the regulatory techniques in the attainment of their objectives. It is also obvious that a greater utilization has been made of trained legal professionals in the direction and operation of the program. The legal mind, as you all know, is better directed toward the use of legal authority through the courts, if necessary to attain their goals.

The past few years have seen the development of a nation program for the protection and improvement of the environment with the concurrent development of a fairly high level of sophistication on the part of the public on environmental problems, particularly water and air pollution control. The public has become increasingly anxious to see a quick and rapid solution to the problems. This fact is highlighted in the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500) which makes specific provision for public hearings, class action suits and citizen involvement, in the attainment of established water quality standards. While some of the civil actions that have been brought may have been done to publicize the image of a given environmental group, I can not deny the fact that public support is an essential element in the attainment of appropriate level of water quality throughout the nation.

I would be the first to confess that my presentation to this point might be characterized as a trivial presentation on the subject assigned to me for discussion. I would be the first to admit that the critical goals established by the aforementioned amendments to the Water Pollution Control Act are meritorious. From the standpoint of this Department, the three critical goals are:

- (1) To meet applicable water quality standards by 1977 through application of best practicable control technology for private treatment works and secondary treatment by all public works.
- (2) To meet fishing and swimming water quality standards by 1983 where attainable, through the application of best available control technology for private treatment works and the best practicable control technology for public works.
- (3) The limiting of discharge of pollutants (zero discharge) into the navigable waters by 1984-- a goal still under study by the National Study Commission.

I am sure that no one in the audience would fault these objectives. The procedures being utilized by the Federal Environmental Protection Agency in the attainment of the goals leave room for considerable discussion. Time does not permit a complete exploration of the implications and ramifications of these procedures as it relates to my Department. For the purposes of this exercise, I would like to explore with you for a few moments the degree of involvement and the increase in needed resources by the Department to carry out certain identified responsibilities under the Act.

As you know, an essential element of the aforementioned Amendments is the "National Pollution Discharge Elimination System" which provides for the issuance of a permit for operation of point sources of pollution to municipalities and industries throughout the Nation. We have just received a preliminary draft of the discharge permit to be issued by the Environmental Protection Agency on the Blue Plains Sewage Treatment Plant. Let's look at the permit from the standpoint of the increased work load placed on the Department. The concept behind the permit system is excellent. We have too long built treatment plants designed to produce a certain quality of effluent and then immediately lost interest in them. Frequently, the plants have been turned over to untrained operators with little or no background and incapable of assuring that the treatment units would function to full capacity. Surveillance of effluent quality has been sporadic as looked at from a national basis. The necessary correlations between effluent quality and stream quality have in many cases been ignored. The permit system will provide the active mechanism whereby these shortcomings can be eliminated.

The permit to be issued to the Blue Plains Sewage Treatment Plant establishes specific requirements on flow and the quality of effluent within a time framework which recognizes the ongoing work in the upgrading of this facility. It is our sincere hope that the completed advanced waste treatment plant at Blue Plains will be on line by December, 1977. The time framework for which these criteria will apply cover the period from the present to December 31, 1975, January 1, 1976 until March 31, 1977, April 1, 1977 until December 31, 1977 and January 1, 1978 through December 31, 1978. The permit contains a construction schedule for the remaining elements of the plant and provides that written notices of compliance of action on the several elements will be submitted to the Environmental Protection Agency. In the event the schedule cannot be maintained for various reasons, it will be necessary for the Department to inform EPA as to the reasons for non-compliance. In view of the fact that 75% of the construction is being funded by- Federal funds, there is no real basis on which the Department could object to this procedure. The permit highlights the need for a continued high level of efficiency or operation, the employment of a trained and adequate staff coupled with

proper maintenance of the plant at all times.

The permit requires the submission of quarterly reports the Region 1.1 Office, EPA, on flows and the quality of effluents being discharged to *the* receiving stream. The quality parameters increase from a simple daily determination of BOD, suspended solids, and phosphorous to the daily levels of BOD, suspender solids, fecal coliform, *phosphorous*, nitrogen, and dissolved oxygen. Additional information on the presence of heavy metals is to be determined monthly. A specific requirement is included to the effect that there shall be no discharge of screenings sludge to surface waters. The difficulties associated with combined sewer system which serves some 35% of the District Columbia is also recognized in the permit. We shall be required to submit a plan of operation within the next three months to minimize the discharges from the combined sewer system and to fully utilize the storage capacity of the main interceptors - the treatment plant. The permit also establishes a requirement for the development of a long range plan for the solution of problem of combined sewer overflows to surface waters within District of Columbia.

A requirement has been included for the development of < industrial waste ordinance establishing levels of pre-treatment required for industrial wastes prior to discharge to the sewer system, as covered under section 307 of the aforementioned Federal legislation. Semi-annual reports must be submitted to the EPA covering those industrial facilities subject to the ordinance relative to their degree of compliance. Finally, quarterly reports to EPA shall also contain information on the extensions of the sewer system, connections, and other hook-ups over the duration of the permit.

There are a number of other general requirements contained in the permit. The one which gives me most concern is the reference to the civil or criminal action which might be taken by the Environmental Protection Agency in the event of any violations of the permit. Such penalties are provided for under Section 309 of the Federal legislation. Since I would probably be the District official who would be subject to such specific penalties may I inform you at this point in time that I prefer the Viceroy 100 cigarettes. The permit also deals with such subjects as character of the waste to be delivered to the treatment plant, authority for entry by State and Federal officials, all data shall be public information, there will be no diversion or by-pass of sewage flows around the treatment plant, requirement notification to EPA of any non-complying discharge, and the provision of emergency power facilities. Attachment "A" to 1 permit includes a listing of some 60 points of discharge from either the sewage treatment plant or the sewerage system to

receiving waters..

The carrying out of the constraints contained in the permit will require several wan-years labor and effort on the part the Department. The generation of paper-work will be tremendous. One must realize also that the generated material if it is to serve its purpose, must be subjected to continuing review by the Environmental Protection Agency. 'We all know the sewage treatment facility is not one which is going to work perfectly twenty-four hours a day, 36.5 days of the year. I have some fears that those instances of malfunction as reported may result in interminable discussions which may not lead to any productive results. I am of the opinion that some simpler mechanisms could be established in order to assure the required level of efficient operation of the treatment facility. Frankly, I do not feel that the Federal establishment should be in the position of reviewing the daily results of operation of sewage treatment plants throughout the country. I recognize that the permit system is designed for ultimate take-over by the respective states with the Environmental Protection Agency serving only in a surveillance capacity. Under these circumstances, it may be possible to reduce the paper flow in order to achieve only the transmission of essential information on levels of operation of plants.

An ancillary responsibility incident to the permit s the establishment of flow allocations between the several jurisdictions served by the Blue Plains Sewage Treatment Plant. Many of the difficulties which we have experienced recently in connection with the operation of the plant stems from the delivery of excessive flows by certain of the jurisdictions to the treatment plant in excess of both its hydraulic and treatment capacity. The situation progressed to the point where the District of Columbia, jointly with Fairfax County and with the support of the Environmental Protection Agency, found it necessary to proceed in the courts against the Washington Suburban Sanitary Commission in an attempt to secure agreement on flow allocations. Prior efforts of the Department, and others, had met with a notable lack of success. The legal action was instituted last fall. Following the anticipated cries of "foul", the involved agencies convened -a task group at the urging of the courts to develop a solution to the problem. Active work was initiated in December, 1973 and only recently consummated.

I was privileged to participate in the signing ceremony on June 13, 1973 of a document entitled, "Blue Plains Sewage Treatment Plant Agreement". The document was signed by representatives of the District of Columbia; the Washington Suburban Sanitary Commission; Montgomery County, Maryland; Prince Georges County, Maryland; the State of Maryland; Maryland Environmental Services;

Fairfax County, Virginia; State Rater Control Board, Commonwealth of Virginia; and the U. S. Environmental Protection Agency. Apologies are in order to any of you in the audience who might feel that they should have been included as signers to the Agreement.

The Agreement provides for the following:

- (1) Absolute definition of sewage flows.
- (2) A mechanism that will assure that allotted flows will not be exceeded.
- (3) Flow measuring and monitoring for all flows tributary to Blue Plains under the control of the Department of Environmental Services
- (4) Correction of raw sewage overflows.
- (5) Sludge management which provides that Fairfax County, Prince Georges County and Montgomery County will provide sludge disposal of their respective shares of sludge plus the respective shares of D. C. sludge.
- (6) Deals with a problem of combined sewage flows from the District of Columbia.
- (7) Provides for continuing quarterly conference procedures plus an annual meeting so that further problems can be settled forthwith.

A simple recitation of the major points of agreement might leave you with the impression that the document was a simple one to negotiate. May I disabuse you of any such feelings since hi level staff from the several agencies have labored heroically in the vineyards for a period of approximately seven months in hammering out the details of the agreement. The most critical issue as you may well imagine, was the one dealing with the disposal of sludge.

Failure to have reached agreement on this particular document would have negated many of the provisions in the discharge permit for the Blue Plains Treatment Plant. The permit will allow the immediate attainment of the desired level of BOD discharges to the Potomac of less than 100,000 lbs. per day during the inter period pending completion of the advanced waste treatment plan - I would call your attention to the economic impact of the agreement not only as it relates to the additional cost of interim treatment, but most particularly as it deals with the problems

sludge disposal. I am sure that you are familiar with the difficulties which we have encountered in attempting to dispose of both the digested and raw sludge produced at the sewage treatment plant. Through December, 1977, we anticipate the daily production of some 710 tons per day (201 dry solids) of which only 310 tons per day represent digested sludge. The problems will be magnified further with the completion of the advanced waste treatment plant when the daily production of sludge will be in excess of 2,000 tons per day. Our original plans for disposal provided for the incineration of sludge, coupled with the substantial increases in fuel costs for incineration, have led us to request our engineering consultants to explore alternative methods of disposal.

You may have heard of the activities of Organics Recycling, Inc. which has constructed a sludge drying facility on the end of the dock at the treatment plant, designed to convert some 210 tons of sludge per day to dried fertilizer. The promoters are proposing to package sludge for sale or to sell it in quantities at a price of approximately \$55 per ton. While prior attempts in this regard have had little success, the current shortage of agrochemicals, particularly fertilizers, which is developing nationally may create a market for the material which would help make up the deficit in fertilizer requirements and maintain levels of food production needed for this country as well as for foreign export.

Forgetting our biases for the moment, let's take a look at some of the economic factors involved. The upgrading of the sewage treatment plant represents a capital investment of approximately \$360 million of the taxpayer's money in order to meet the established levels of water quality. I have asked many of my professional colleagues what visible effect this is going to have on the quality of the waters in the Potomac River. The responses have been mixed. Some feel that the levels of phosphorous and nitrogen in the waters as they enter the District of Columbia are more than adequate to continue to support the growth of algae blooms downstream from the treatment plant. The insidious pollution being contributed by the present treatment plant is not readily apparent to the naked eye. Sediment loads carried by the Potomac during periods of rainfall upstream will continue to deny us the use of the Potomac River as a recreational facility for swimming and other body contact sports. Some indiscreet individual might be advised to argue that these dollars could better have been used to provide housing for some 63,000 persons by utilizing the funds for rehabilitation of sub-standard housing within the District of Columbia.

But that isn't the whole story. We anticipate that the current annual operation costs for the treatment plant will escalate

from approximately 6-1/2 million dollars a year to 30 million dollars a year when the advanced waste treatment plant comes on line. While the dollars may be found, certain of the chemicals required are in increasingly short supply, particularly chlorine. Also, many of the processes are energy intensive and a substantial increase in energy requirements will have to be met in spite of the energy crisis facing the country. It could well be argued that these needs can be met in order to serve the Nation's Capital and the surrounding jurisdictions, in light of the recognized preeminence of this Country, both in the field of environmental control as well as our standard of living. Nevertheless, the multiplication of these demands by all of the advanced waste sewage treatment plants being constructed throughout the country, I am convinced that the established goals provided for in the Federal legislation will need a reexamination and recasting in the light of these shortages.

I am also disturbed by the tendency at the Federal level to move too rapidly in the development of solutions to the problems. Probably, the best example was the furor created by the need to replace phosphates in our detergents with other materials in order to deal with the problem of algae growths in surface waters. You will recall that the substituted materials were found subsequently to have a greater degree of public health hazard than the phosphates. This finding was made only after the industry had made a substantial investment in the capital plant and product to comply with the Federal requirements.

I am not sure whether this is an implication or a ramification. The goals that we set are predicted in large measure in the water pollution control field on the availability of Federal funds. When such funds are impounded there is an automatic delay in the construction of any given facility. These delays can be traumatic because of the spectacular rise in construction costs which has faced the country over the past several years. The completion of the advanced waste treatment plant at Blue Plains has slipped by approximately three years as a result of delay in the obtaining of necessary Federal support funds. Finally, until we can solve the problems of combined sewer discharges to surface waters, the problems of water pollution will remain with us. Our present estimates of cost for solution of this particular problem range anywhere from \$550 million to \$1 billion dollars.

My presentation this morning represents only a cursory review of the many problems we face in dealing, not only with the Federal agencies, but in attempting to do a job at the metropolitan level. We are doing the best job that we can. We pledge our best efforts to the continuation of these efforts in attempting to attain the recognized desired standards of water quality. As responsive public officials, we are dedicated to carrying out our assigned responsibilities within the constraints under which we operate. Let us

hope that we can succeed in these endeavors and that with the passage of time the level of responsibility accorded to the State and local jurisdictions by the Federal establishment will be increased.

In conclusion, I am reminded of the simple parody which I believe simply sums up the predicament in which we find ourselves; namely,

"They said it couldn't be done
With a smile he went right
to it He tackled the thing

I have enjoyed the opportunity of discussing some of our problems with you and will be glad to answer any questions you may have on my presentation.

QUESTIONS AND DISCUSSIONS

QUESTION: I would like to preface my question by saying I wish many more representatives of the general public were here. This is what we always say. We would like to have the experts available to us and ask them questions. My question is this. In doing something about those pollutants from sanitary sewers and storm sewers, have you investigated the possibility of cleaning the streets so that not so much trash and junk falls into the sewage?

MR. McKINNEY: That trash is put there by people. It will take some kind of effort launched by somebody that is going to turn people around to start thinking about what problems they create by simply throwing beer cans and pop bottles which are carried into the catch basins and sewers. I don't have an answer. The best thing I can do is to arrange for a better job of cleaning the streets and to stop my men from committing the same mistake. I simply don't have the final answer to the problem.

QUESTION: One can stand and discuss philosophy with him the rest of the day. I am not too sure I appreciate a person telling me what to do who is not in the profession. I think my question goes back to the previous question.

You did not say anything about storm water treatment and the sanitary sewers, which is apparently going to be a problem. Do you have the capacity to treat all the storm water that falls in the region?

MR. McKINNEY: I preface my reply by telling you I not an engineer. We don't have the capacity at the plant to treat all storm water flow. We won't have it even with the expansion of the plant. Somehow, the problem has to be solved. The treatment plant expansion provides for an average flow of 309 mgd.

QUESTION: When we reach 309 mgd, what do you do?

MR. McKINNEY: I am leading into a plug for the Washington Technical Institute. I think it needs some kind of detention storage facility and treatment which should be in the planning stage now. I think the Washington Technical Institute can provide some of the answers to the manager of the treatment plant for these questions.

COMMENT: I agree with you. I wish Dr. Dennard was here to hear you.

MR. McKINNEY: We are looking at the problem. We had studies on storage. We are looking at that. Funds are mental for that kind of project. We don't see that kind of being available in the near future. We have not ignored the problem but are at a loss in attempting to find an economic solution.

MR. SACHS: Under the Federal financial assistance local government, every year a need study is prepared. One the items now included in that study is storm water. We have no idea as to how much money the Federal Government is going to make available for either treating or retaining sewage and water. We in Maryland are trying to put in as realistic a figure as we can. We are trying to pick out specific, critical areas where we know storm water is a major problem. Where we have water quality limited areas in which we can't currently meet standards, those areas are drained. We are trying to come with a figure as to what it would cost to treat storm water off. In the other areas of the State, we are trying to come up with a ballpark figure as to the cost of putting in system and for taking out sanitary waste. I am sure it will be an economical cost.

QUESTION: I think part of my question was answered the two commentaries. I would like to shift briefly to the sludge disposal methodology. In the New York, New Jersey they are about to release the study of what we do with sludge from our plants throughout the region. Are there any possibilities that in looking at the District's problem similar type of studies can be undertaken so you get a structure to the kinds of approaches available and how that fits in with the legal ramifications in places where the District, where they are going

ban incinerators? I think for any solution to the sludge problem where you are looking for a customer to take the residual, you have to have a backup. The only thing I see is burn it, reduce it and get it to a landfill. These are legal ramifications. You note some of the research needs.

MR. McKINNEY: I think you are advocating a system to deal with current problems rather than studying the problem to find viable alternatives. There are a couple of projects under way that may provide answers. One is the Beltsville project, The Agricultural Research Center and the Maryland Environmental Service in the District have been doing some work on the composting of sludge. The Organics, Inc. project is a private endeavor to try to thoroughly dehydrate the sludge and convert it to a fertilizer.

Incineration, obviously, is one of the best methods of volume reduction in terms of final disposal. However, air quality control programs make it socially unacceptable to pursue a course of incinerating sludge; The question raised is whether or not a jurisdiction is prepared to go to court and fight for the public health and live up to its responsibility regarding public health rather than succumbing to the fear of court actions against a particular process that we know is a viable and productive alternative. I would strongly support any kind of program that puts the political jurisdictions into a position to assess what we must do with 2,000 tons of sludge as of 1978. That is a real problem. Land application is .not the only way to get rid of that sludge. Sometimes we have to bite the bullet. The time to do that was yesterday. While you may have a mechanically viable alternative;-the market becomes the most important consideration. Can you get rid of it?

Is it a competitive product? These are the kinds of questions we have to take into consideration.

QUESTION: To what extent did you look at San Antonio, Texas, in disposing sludge?

MR. McKINNEY: I am not familiar with it. The staff may be. There are a number of projects going on across the country. The jurisdiction needs to know what is available technically speaking and what you can get public acceptance to.

COMMENT: We have a lot of bays. It might be possible to dam off the bays of the Potomac.



Walter A. Scheiber

WHAT'S AHEAD FOR METROPOLITAN AREA WATER RESOURCES MANAGEMENT

by

Walter A. Scheiber, Executive Director Metropolitan
Washington Council of Governments
Washington, D. C.

The question of how to manage our water resources brings to mind another crucial water question of many years ago. Will Rogers had a proposal for ending World War One and it involved the Atlantic Ocean.

He said, "Now I have this plan and I think it will work. The way I see it, this war is caused by all them German submarines sinking our ships out there in the Atlantic. My idea is just to heat up the Atlantic to the boiling point and it would be so hot for them subs under the water they'd have to come up for air. And when they came to the top, why we would just pick'em off one by one. This here war would be over in no time.

" 'Course, you might ask me how can we heat up the Atlantic Ocean to the boiling point. Well, I leave that to the technicians-- I'm a policy man myself."

Will Rogers would agree that developing a policy for cleaning up the Potomac River is also much easier than the questions which then will face us technicians. The policy is that the Potomac should be preserved, should be clean, should be our primary source of water supply and a pristine pure attraction for recreation.

However, the technical questions which must be answered if that general policy is to be achieved are staggering in both their enormity and their complexity (very person in this room knows all too well just how awesome the task is, and perhaps this knowledge, this realization constitutes both a hope and a threat.

Seven days ago in the offices of the Council of Governments, Mayor Washington, Governor Mandel of Maryland, Noman Cole, Chairman of the Virginia State Water Control Board, Russell Train, Administrator of the Environmental Protection Agency and others gathered to sign an historic agreement regulating sewage flows into the Blue Plains Treatment Plant, defining sewage flows, setting a basis for determining sludge disposal amounts for our cities and counties, and establishing new projects and mechanisms for restoring the quality of the Potomac.

That day and that signing marked an encouraging development in our attempts to deal successfully with the enormous problems of the Potomac River. What looked like an insurmountable problem only six months ago was confronted and hopefully solved through the work of our local officials under the leadership of Governor Mandel and James Gleason, the County Executive of Montgomery County, who led the effort to begin deliberations and negotiations on the subject.

This milestone takes us a long way on the road to a cleaner Potomac, but, again, the complexities of the problem remain. It is estimated that by 1992 the rapidly expanding technology in advanced wastewater treatment will generate six times as much sludge in Metropolitan Washington as is being generated today. Obviously, despite the beginning signified by that blue-ribbon signing ceremony, the question of protecting the Potomac River from the sludge we produce is still with us.

What will happen to this sludge? Many observers, including some in this room, are convinced that incineration is the best way to dispose of it, but support for this method is far short of unanimous. The Maryland Environmental Service, working with the District of Columbia Government, has been conducting and is seeking funds to continue their efforts toward a solution.

Then there is another problem. At the Council of Governments, simulations of the Potomac River Estuary for 1992 show that even minor storms, such as the one which gave us that very rainy weekend earlier this month, will wash so much filth off the roofs and streets of the area that water quality standards will be exceeded frequently. This is likely to be true even in the face of this improved technology for advanced wastewater treatment.

We know that the cost of stormwater treatment will be expensive, perhaps prohibitive. We know, too, that proposals for many storage reservoirs in the metropolitan area may be resisted when they are made because they would consume stream areas already set aside for preservation as recreational and open space areas. This is the case even today, and these competing pressures are expected to increase between now and the 1990's.

Other competing pressures are emerging in another segment of our vast and complicated water resource problem. Fresh water intakes are needed above Great Falls, according to the Washington Suburban Sanitary Commission and the Fairfax County Water Authority. However, at the same time that proposals for such intakes seem to be moving upstream, proposals for sewage treatment plants and their outfalls seem to be moving into the free-flowing portion of the Potomac above Great Falls. The need to

work together to prevent these two trends in water resource management from adversely affecting water supplies is as obvious as it is urgent.

On another pressing water supply question-- the officials of the Washington area soon will be discussing the need for additional reservoirs, beyond the two recently authorized for design by Congress at Sixes Bridge and Verona. Now discussions will concern the proposal for a reservoir on Catoctin Creek in Loudoun County suggested by the District of Columbia, the Fairfax County Water Authority and the Sanitary Commission, and the Corps of Engineers proposal to construct a prototype plant near Blue Plains to treat water from the estuary for re-use.

These proposals are likely to be controversial, if the history of such proposals is any indicator. But they represent attempts to deal with our problems in a vigorous and forthright way. At the same time, they also illustrate dramatically the need to coordinate all aspects of our water resources problems and all activities toward managing these resources successfully toward a clean Potomac.

What more can we do to preserve and even upgrade the water resources of Metropolitan Washington for ourselves and our children? What can we try that hasn't been tried before which offers reasonable hope for success?

For starters, we seem to be benefiting from the experience of planners in the air pollution control field. In recent years, planners in 'that field have moved away from chasing reports of heavy smokestack emissions to the practice-- the tactic-- of seeking to control the sources of air pollution itself. At the same time, they have worked to establish-- and implement-- proposals to mold the development of metropolitan areas in such a way as to minimize the tendency of modern society to create excessive amounts of waste.

Rather than seeking to plunge headlong toward the adoption of a super-control technology designed to cure all air pollution ills at once, environmental planners have moved to strategies to control air pollution at its source points. Emission control devices are being installed on automobiles. Strong efforts are underway to obtain more buses and establish priority bus lanes. More hydrocarbons will be removed from the air through the new requirement that dry cleaners switch to synthetic solvents and that gasoline stations modify their pumps to prevent gasoline fumes from escaping into the air. The air pollution planners are devoting more of their time and effort now in working through other fields such as transportation planning and planning for aviation.

Planners in water resource management should be employing the same technique, pursuing and perfecting the most promising and the most attainable, rather than spending more years and more manpower and more money toward a grand design which may not work, while the problems continue to worsen.

The agreement of last week on disposal of sludge from B Plains is a fitting example of the new approach, zeroing in a problem of today with the means of today to achieve a better tomorrow. There is another example in the water shortage emergency plan developed through COG which would operate in a manner similar to air pollution emergencies. There is a third example as well, and that is the start made last year at COG with the introduction of a proposal to modify plumbing codes throughout the Washington area to require the installation of fixtures using less water.

All three of these examples are here-and-now actions against the here-and-now problem of managing our water resources better. Yet, while all this has been taking place, we have not relaxed our efforts toward mounting an attack against these problems in an organized way, in what planners like to call a comprehensive approach. Under Section 208 of the Federal Water Pollution Control Act of 1972, local, regional and state agencies are in the process of establishing an area wide wastewater treatment planning program for Metropolitan Washington.

After a series of public meetings co-sponsored by COG at the Interstate Commission on the Potomac River Basin and dimensions by the area's major local governments, the COG Board of Directors is considering the establishment of a Water Resources Planning Board for the metropolitan area. This Board would be responsible for the development of policies, programs and other actions required for effective water quality management. The Board would also serve as COG's water resources policy committee and would be responsible for areawide wastewater treatment

Ten local governments and the Northern Virginia Planning District Commission have endorsed COG's proposal for the creation of such a board to carry out waste treatment planning in the metropolitan area under the new Federal law. This could permit the expansion of water resources planning in the area to a degree never before achieved; and the coordination of all water resources programs beyond any coordination of all water resources programs beyond any coordination which has ever been possible before in the Washington area.

And there is yet another hopeful sign. Establishment of such a Water Resources Planning Board in COG would also make it possible to relate decisions concerning wastewater treatment

facilities to COG's comprehensive development planning. Under this arrangement, land use data could serve as the basis for water resource management planning, including the population and employment projections and estimates developed and maintained by COG for use in both its regional land use and transportation planning programs.

COG's Directors have been wrestling with various proposals over the past several months, in cooperation with the local, state and Federal agencies concerned. The COG Board of Directors has scheduled a final work session on the subject for next week and is expected to take final action at its regular monthly meeting on July 10.

If it decides at that meeting to establish a Water Resources Planning Board for the metropolitan area, the Board would develop a program to prepare and annually update a wastewater management plan for submission to the states and to the Environmental Protection Agency. The ultimate responsibility for developing the plan, as well as reviewing it and commenting on it, would rest with the local governments of this metropolitan area.

Public participation in the board's work would be encouraged. Citizen and technical advisory committees would be established to provide continuing advice to the Board. Public hearings, meetings or workshops would also be conducted by the water resources board.

Through this promising new approach, and through others like it, we are beginning to manage our water resources with a systematic design and with more reason for hope. There is the tendency-- and it's an understandable one-- to view the problems of Urban America as almost beyond solution and simply too big to cope with. Yet, those same reasons are why we must cope with them. Through it all, we can find comfort in the observation by President Kennedy that most of our problems are man-made and are therefore, capable of solution by man.

The comic strip character Pogo gave us what has become a popular slogan in the field of natural resources when he said, "We have met the enemy, and he is us." If this is so—and most of us will agree it is-- then it is also true that it is within our power to say one day, "We have met the victor, and he is us."

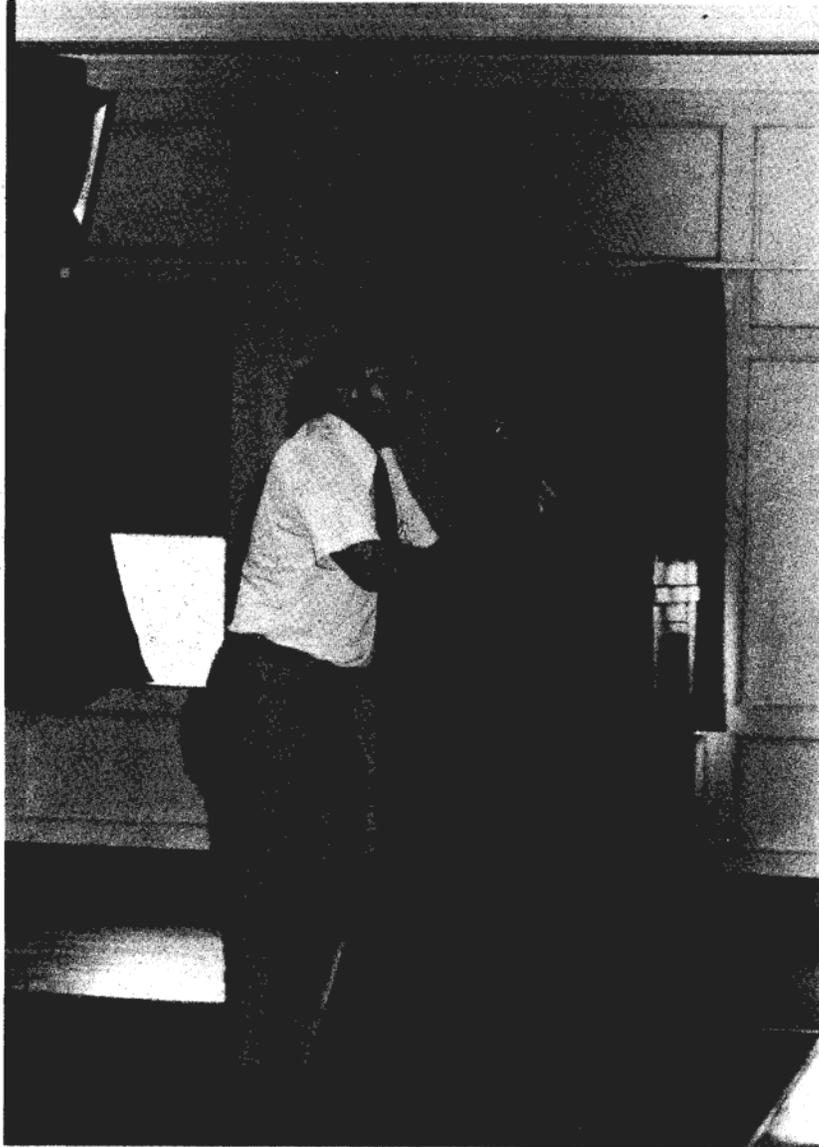
The battle to restore the Potomac to the state of purity viewed by Captain John Smith and described so eloquently by him is one which we simply must wage and win, because not to do so would leave us with no alternative except a disastrous loss, and that is no alternative at all.

And so we continue the effort, and move it into a higher gear with these promising new approaches. As we do so, perhaps a little-known incident of a quarter of a century ago hold some meaning for us.

In the late 1940's, President Harry Truman was touring Southwest. During the tour he visited an old frontier graveyard filled with the graves of the pioneers in Arizona and New Mexico. Suddenly he stopped and read the epitaph on one particular tombstone. Then he told the people with him that he hoped history would be able to say the same thing about him as what was written on that tombstone in front of him. It said:

“Here lies Jack Bennett. He done his damnest”

When it writes the story of the Potomac River, let history say the same of us.



Dr. Yoram Gordon Moderator, Afternoon Session



Colonel Robert S. McGarry

THE CORPS OF ENGINEERS WATER RESOURCES
PLAN FOR THE CAPITAL REGION

by

Colonel Robert S. McGarry
District Engineer, Baltimore District
U. S. Corps of Engineers
Baltimore, Maryland

This seems to be the day for good news and bad news. Like others, I have good news and bad news. We are getting into a bad water supply situation. The good news is that things are getting so bad, we are going to drink our own effluent. The bad news is there won't be enough of that to go around. While several of the previous speakers gave parts of my speech, I'll bring you up to where we are today. In 1859 the Corps of Engineers was given authority to construct and operate a water supply system for the Capital. This authority was later extended to authorize us to provide water from our system to Falls Church and Arlington. We are proud of our Washington Aqueduct Division and our facilities. We are proud of the quality of our water and the efficiency with which the plants are run. Because we operate that facility, we can take the attitude of a water supplier, and at the same time we take the attitudes of resources planners. The Baltimore District Corps of Engineers made a comprehensive study of the Potomac in 1963 and reported to Congress. This report recommended 16 reservoirs on the Potomac. These were not all for water supply. Flood control, recreation, low flow augmentation and water quality were also addressed in this study.

One of these 16 dams, the Bloomington Reservoir, was authorized for construction and I am happy to report it is well on the way to completion. Located on the Maryland-West Virginia border of Bloomington, Maryland the construction is on schedule. The project should be completed by '77. To date our major construction effort has been relocation of the Western Maryland Railroad from the West Virginia side to higher ground on the Maryland side. The relocation is being accomplished under three contracts. The first is 90 percent complete, the second 50 percent complete and the third, the freight handling facilities was awarded this spring. These projects will move the railroad out of the reservoir. Construction of the reservoir itself, has also started. The diversion tunnel has been drilled and we are in the process of lining it. Contracts for the rock filled dam, towers, etc. are scheduled for award in the spring of 1975. Completion of Bloomington Reservoir in 1977 will provide 135 million gallons per day additional water supply to the Washington area. In addition to water supply for Washington, this project will provide flood protection and water supply for other communities.

In '70, the Chief of Engineers recommended construction two more of the 16 reservoirs in the 1963 report, the Verona and Sixes Bridge projects. These two projects were considered by the Congress in '70 and '72. At that time, both of projects were partially justified for low flow augmented water quality. Since low flow augmentation for water is no longer authorized, the studies were returned to the District to reformulate them and determine if they still valid without low flow for water quality. We report by June, 1973 that these two reservoirs meet all the criteria and are an essential first step for providing water to the region.

In the public hearings on those projects and as the authorization for these two reservoirs was being considered we have been criticized for not considering all the all means of water supply other than large reservoirs. This is possibly a valid criticism. However, the alternatives were considered in a '63 study and when the study was returned to us, we were asked (and authorized) to reformulate them and report back in one year. We were following orders.

The Omnibus Bill that was passed this spring and the President contains three major projects for the Washington water problem. First, the authorization to do initial design on the Sixes Bridge and Verona reservoir projects. We are authorized to make our initial design and then report back to the Congress. Second, the bill contains authorization to build a prototype water treatment plant on the Potomac Estuary so that estuary water can be used for drinking purposes. a prototype plant, not a water supply plant. The Prototype plant will never be used. We will draw the water from study the various methods and techniques of treating the estuary water and in conjunction with the Environmental Protection Agency demonstrate once and for all whether the estuary is a source of water. The third authorization in the Omnibus Bill is a study of the future water requirements for the Washington area. This is authority to go back and consider those alternatives that we did not consider in the reformulation of the Sixes Verona projects.

I would like to point out that these three projects: the initial design of Sixes Bridge and Verona, the Prototype Estuary Plant, and the Washington Metro water supply have only been authorized. We do not have money to start any of them at the present time. They were not included in the President's Fiscal 1975 budget because they were authorized after the 1975 budget was passed to the Congress. There has been an indication Congress might provide funds to start one or more of these projects Fiscal Year (1975).

They have asked us for our capabilities to get started this year. If Congress does not add funds, it will be 1976 before we can start.

I would like to back up a bit and talk about the Northeastern Water Supply Study, the NEWS Study. This project, authorized in 1965, is a study of the water supply problem for the Northeastern part of the United States. The study is being conducted by the North Atlantic Division, U. S. Army Corps of Engineers. The study has identified three major metropolitan areas where the water supply problem is critical. Boston, New York City and Washington, D. C. For the Washington area, a draft formulation plan has been completed and is being presented to the public, to community officials, to water supply agencies and to other interested agencies in a series of meetings.

Two concerns have become apparent from these meetings. The first concern is in the area of program formulation. There is a consensus of opinion that any water resource program that is formulated should provide sufficient water to guarantee against a water shortage of 30 day duration in Washington. The groups were split, however, on whether we should provide sufficient water to avoid the situation where the peak demand exceeds the low flow for only one day or for seven days.

Let me examine the implications of this split in opinion. Our study indicates a deficit of thirty days duration would not occur until late 1980 or early 1990. However, a deficit of one day or of seven days could occur prior to 1980. If we accept the risk of a 1 day or 7 day shortage we can postpone a decision on how to meet the 30 day shortage for a few years. If we do not accept the risk of a water shortage (peak demand exceeds low flow) for 1 day or 7 days than we must start work now and use means that have been proven rather than rely on technologies that are in the developmental stage such as the estuary plan. Proven projects such as interconnecting existing water resources, large reservoirs (Bloomington, Verona, Sixes Bridge), water demand reduction thru restrictions or building code modifications and small reservoirs such as the one in Loudon County are typical proven techniques that should start soon if we are to avoid a one day or seven day shortage.

The second concern is that there is a consensus that the most advanced techniques should be considered as alternatives as well as proven techniques such as reservoirs in the formulation of a plan to meet the-30 day shortage. Advanced waste water treatment, use of the Potomac Estuary, and wells are typical advanced technologies that are now in various stages of development but are not yet proven. Again, this consensus creates a need for an early decision. If we are to have advanced techniques

ready by 1990., we should start the necessary testing type construction now to either prove or disprove their feasibility for 1990.

We are at the decision point now. The decision soon make two decisions that are of utmost importance accept the risk of water shortage caused by the one to seven day peaking problem or act now to solve the problem using proven techniques. The decision makers must also initiate action unproven technologies if they wish to have advanced techniques as alternatives to consider to meet the long-range water in 1990. We need authority now to go to prototype testing.

I do not believe that it would be a wise decision to accept the shortage caused by a one or seven day peaking situation and live with such shortages. As a water supplier, I am concerned by the idea that I could not meet the demand for even one day. While the problems of drinking and washing for the citizens of the community or the lack of water for industrial purposes is serious, the problems and dangers that would occur if we lost pressure in a water main and were unable to provide water for fire fighting are more serious. A large fire during the period of drought when we were unable to provide full water pressure would be a disaster. It should be remembered that once a portion of the distribution system is shut off, refilling it could take hours or days.

I would like to describe our concept of the prototype estuary plant. The purpose of the prototype plant is to convince the scientific community as well as the public that the estuary is a safe source of water. The prototype plant will be located next to the Blue Plains treatment plant so that all qualities of water from the worst to the best, depending on the flow of the river, can be treated and tested. The public will be encouraged to visit the plant and to learn about the process. It will be constructed so that visitors can observe and understand the water intend to make it as pleasing looking as possible. The public will be encouraged and welcomed to come. Each treatment facility will be labeled and explained. A modern laboratory with ample provisions for showing visitors around and explaining what is going on is provided. Based on other public meetings a concern by the general public whether the treatment estuary is a safe process. For this reason we will e public explanation as well as scientific study.

As I stated in the beginning, I have the viewpoint of a water supplier as well as a water resources planner. I feel very strongly that decision time is upon us now. Decisions must be made to meeting the pending shortage that almost every we read indicates is coming. First, we must decide now, to live

with a short term shortage or to select one or more alternatives from those proven techniques now available.

The second, in order to give planners and decision makers a wide range of alternatives for the long range, approval and funding is needed now to test and develop some advanced techniques. The Potomac estuary plant, which is authorized but not funded, would be a step towards achieving the second goal.

QUESTIONS AND DISCUSSIONS

MODERATOR GORDON: Thank you. We have some time for questions, if any. I realize there may be quite a few.

QUESTION: Is the one day and seven day peak based on scientific information?

COLONEL McGARRY: We have developed a range of projections for the key elements that predict a shortage such as population growth, per capita consumption, river flow, etc. Each projection is as scientific as possible but still a projection. That is why I said a 1 day or 7 day shortage could-- not would-occur prior to 1980.

QUESTION: In what way are you going to use the NEWS Study in the study you will make?

COLONEL McGARRY: If it all works out as I hope, the NEWS Study will give us the starting point. The NEWS Study will study all the alternatives and recommend the best alternatives. Our study will refine the recommended alternatives, develop detailed cost data, and recommend a specific construction program.

The NEWS Study, for example, might say the best short term solution would be one large reservoir and four smaller ones in the vicinity of Washington. We would pick it up from there and decide where are the best sites. If it goes as planned, it will dovetail in.

QUESTION: The other question has to do with the Bloomington Dam which is to augment the flow by 135 million gallons a day. We don't care where you put 135 million gallons a day most

of the time. But sometimes we may want twice as much. He you going to decide when to let the 135 million gallons out or when would you decide to let twice as much out?

COLONEL McGARRY: My Engineering Division will continuously study the entire "drainage basin" and insure that sufficient water is retained in the reservoir to be able to release enough to augment the flow by 135 million gallons a day. We had a great deal of experience in this type of operation. My headquarters in Baltimore is in radio contact with all out day and night. Based on experience, judgement, long range weather forecasts, snow cover, reservoir capacity, season of the year and other factors they regulate the pool level to accomplish the mission of the dam.

QUESTION: To what extent do you consider off-stream storage sites?

COLONEL McGARRY: Those are very active alternatives being looked at. A very attractive solution is pump storage small reservoirs. Our study will definitely address this alternative.

QUESTION: One of the points you made was that the short-term urgency, we should go to proven technologies did not include in that ground water storage. There is a speculation or commentary on that. People tend to avoid fields when they report what they would like to do. One fastest ways to get water and perhaps a least expensive w to go to the ground water. It does not take long to decide the kind of yield you can expect. It is not twenty years. Put it in the well field. You have observation wells and you de and design the system on this. Why is this not used or is it all politics?

COLONEL McGARRY: It is not politics. Mr. Sachs the State of Maryland did not feel they had sufficient information on that.

COMMENT: My point is getting that information a real difficult task.

COLONEL McGARRY: You are saying instead of being a long-range technology, it is a proven technology that ought to be applied?

COMMENT: Yes. According to the "Post" or the "Star" the U.S.G.S. says we believe we can find enough water in coastal sands or in the Piedmont area that will make it unnecessary to build any of these dams. I believe you are going to need all of these but I don't believe I hear the Corps talking about the ground water. I don't know the reason for that.

COLONEL McGARRY: I don't know if I mentioned it but we consider it as a solution to the long-term problem.

JOHN FROST: (Project Manager, NEWS Study). We are considering wells for water supply. I think the staff report we put out was unclear as to how we are considering the ground water. I think that it has to be proven in field testing. It could be one of our recommendations. I say "could" because we have not gotten it confirmed.

MODERATOR GORDON: I would like to add a couple of things. In my previous position (with the Interstate Commission on the Potomac River Basin) we tried to look into the groundwater aspect. We had quite a few meetings and we looked at the new study. I would like to mention first they do not know the extent of the yield. They say between 100 and 400 mgd. That is a very, very wide range. In order to find the amount of water available, they needed something in the vicinity of five million dollars for testing which they did not have. The state could not supply it, neither could the Corps of Engineers even though Mr. McDonald attended the NEWS Study meeting and said they might consider it for the future.

Furthermore, Mr. Sachs knows better than we, it is political even within the State of Maryland. The State, a year ago, came out with an administrative order that no ground water can be transferred from one basin to another. If one county has the water, it is considered to belong to that county. For all practical purposes the executive order, if it stands, this water will not be available to the entire basin. This is really not the case.

COMMENT: I would like to add that we would h very careful We have been taking ground water and the has been sinking. In that area there is a lot of research that needs to be done.

COLONEL McGARRY: That is right. This could be put on the borderline as to whether it is a proven technique or future technology. There have been problems because Houston, Texas is sinking into the ocean and they have asked the Corps to pump it back up.

COMMENT: That raises a very important point which I think many of our discussions tend to keep separate. Again, technology is there. We think of water supply and then about waste water disposal. Until you think of the tot in terms of supply and putting back what you use and using profitably that which you take out, you are not going to do this. Again, I go back to the institutional kinds of arrangements. If you are going to have jurisdiction, saying we are going to use yours but you are not going to use mine and we still have a total basin to supply, you have a problem. It is political and institutional. We have to look at the whole ball of wax if we are going to find a solution. Why does not the Corps stay away from it? I know what the answer is. It has to be out in the open. People have to talk about it. These solutions require the kind of total commitment to the regional basin problem that we have and not just an approach to the solution.

COLONEL McGARRY: I think there is one thing overlook. We have a short-term, one day or seven day, situation that is facing us in the near future, 1980. This is very close. If there is any question on ground water as a source, I would not recommend this solution. I would recommend something else I know works. It may not be the large dam. Maybe the small dam will get us through.

COMMENT: One-hundred mgd short-term is not just a minor solution. You cannot afford to overlook wells which I tend to think we do because of the political constraints or otherwise that we have.

COLONEL McGARRY: That is true. You also have to consider who pays for a solution. A small local community who may not be able to afford a well field.

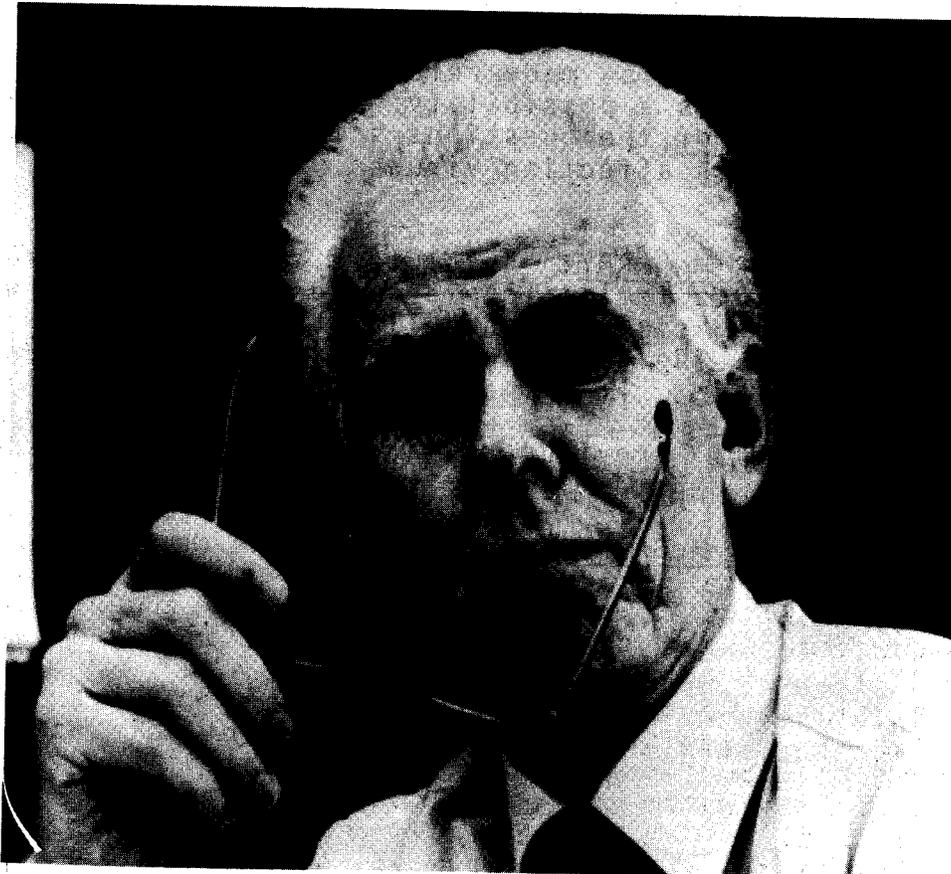
COMMENT: Not if you look at it on a total basin problem. The Potomac river basin is the problem of all of us. It is Maryland, Virginia, and the District's and the solution has to be shared by all of us.

QUESTION: You made reference to the fact that use of the, estuary ater is a possibility. You described it as a viable possibility: One of the questions scientists have raised is the uncertainty of this affecting viruses.

COLONEL McGARRY: Absolutely. That is why we have a prototype test. We fee it could be done.; The Corps would not recommend spending six million dollars for a prototype that we felt would fail. The key issue is to prove that can be done.

COMMENT: Previous research has shown it as feasible.

COLONEL McGARRY: Yes, and now we want to test a prototype.



Eugene T. Jensen

TECHNICAL CONSIDERATIONS IN ACHIEVING WATER QUALITY GOALS

by

Eugene T. Jensen
Executive Secretary
State Water Control Board
Richmond, Virginia

Perhaps most of you know I have had the pleasure of living in the Washington Metropolitan area off and on for over twenty years. I now live in Richmond, which is in the James River Basin. The city has an excellent water system and we are not seeing a mass of viral and other diseases, despite up-stream communities discharging treated wastes into the river. To the best of my knowledge, there have been no massive problems with viruses in the Washington area either:

Who are the decision-makers? In the Potomac Basin there are two groups of people. There are those who live in Washington and those who don't live in Washington. These two groups of people look at the same problem and arrive at quite different answers.

In Virginia, we talk about the Verona Dam. Strangely enough, many people who live in the Verona area do not hold Washington in high regard. Some suggest one of the best things to do would be to cut off the water supply to the Washington area, and hope that the Federal Government would become smaller. There have been letters to that effect written to our Governor. He responded by saying that those who live in the Northern part of Virginia are Virginians, just as much as those who live in the Shenandoah Valley. The Governor supports the Verona Dam. He looks to it as a major water source for the Washington Metropolitan area.

We recognize that the Potomac River is not entirely a Maryland river. It merely happens to be a Maryland river in this area. But Virginia is a riparian owner. So, at present, the rights of Virginia to the river are equal to Maryland's although this has yet to be tested in the courts.

WATER QUALITY GOALS

In establishing water quality goals and standards and determining the technical problems barring their achievement, it is

essential that the goals be defined. Currently, they are less than clear. We are working with two sets of goals, neither of which is expressed in very precise language.

The first set of goals are encompassed in the water quality standards adopted under the pre-1972 Federal Water Pollution Control Act. They speak of specific amounts of oxygen and of certain pollutants. When addressing complex toxic materials, however language becomes vague, particularly in terms of nutrients where are a major problem in the Potomac estuary.

The Federal Water Pollution Control Act Amendments of 1972 (PL 92-500), the most recent work of Congress in the water quality field, does set absolute goals, but they are certainly not going to be met. Water that is swimmable and acceptable to fish and wildlife is called for by 1983; then for 1985, they set another type of goal. Nevertheless, we are working towards the general goal of a clean Potomac, if not total exclusion of all pollutants.

What do we mean when we talk about the Potomac River? How real is it to us? This depends on where you live. If you live in the Shenandoah Basin, the Potomac is somewhere else. Very few people in the Shenandoah really associate themselves with the Potomac. The Washington estuary is something else again. In the minds of some people the estuary and the Potomac River are entirely independent. It turns out that politically and socially they are different, each one dealing with totally different problems.

If we do set goals, we really are setting three separate sets of goals, and perhaps even thirty or forty different ones. One set is for the estuary, where the river and the ocean collide; another is for the main stem of the river; and finally there is a set of goals for a series of tributaries. Some of these tributaries are very large and are being developed. Some, such as the Shenandoah, are becoming rapidly industrialized and in ten years could well be among Virginia's major industrial areas.

One looks to these rivers and begins to associate them water quality goals. Thus, we are dealing with three different hydrographic systems: the estuary; the main stem of the Potomac and finally, the tributaries. We have three independent groups of problems in attempting to associate sources of pollution with a set of nebulous goals.

POLLUTION SOURCES

Public Law 92-500 is rather unique. For the first time recognized that not all pollutants come out of pipes. There

a variety of sources, and the final water quality attained is dependent upon the cumulative effects and degree of control over all these sources.

The several pollutant sources and effects you know. Nevertheless, I will list a few:

- (1) Municipal sources - Blue Plains and Alexandria, and all the little and big towns, whose waste is mostly municipal, although in a few places we do get substantial industrial loads into the system.
- (2) We have a great number of industrial plants in the Potomac Basin, with products ranging from paper to pharmaceuticals. All of them have a real potential for adding a great many different types of waste materials.
- (3) Apparently, we have almost everything in the area of agriculture. We have turkey farms and forests and sediments. There are also pesticides and nutrients that have their own effect on the main stem of the river and on the estuary.
- (4) We have a substantial number of coal mines, and we may have mines producing heavy metals. The most difficult problems are those resulting from acid mine drainage.
- (5) Petroleum and heavy metals spills are -important. When this happens, people know about it and somebody gets stuck with a clean up job.
- (6) Hydrographic modifications, such as dams, have good and bad effects. Navigation presents problems because of the required channelling and resulting flow modification. A related problem is that of disposal of dredged materials. All of these interact.
- (7) Urban run-off is of concern;. The dimensions of this problem are totally unknown. We are trying to understand what is there, but who really knows its components? Asbestos? Tetraethyl lead? You can take your pick. Whether it can be handled best by treatment of the flow in the sewers, or by street cleaning, or whether there is no problem at all remains to be determined.

(8) Solid wastes are of concern. What do you do with them? Where do you put them? Sanitary land fills have been used. But a large flog may send a major part of that land fill down the river.

We are going to have to deal with each pollution source simultaneously-- in the same time frame. If we take them one at a time, we can spend a lot of money and not see much in gains.

Related to dealing with these sources is the mat matron feedback so that we can measure progress. What is accomplished? What else needs to be done? How do we set up a monitoring program? What kind of information do we get? How do we feed it back to all of the decision-makers?

TECHNICAL PROBLEMS

What are the technical problems? I don't know that we can talk about them separately, without consideration of the legal and financial aspects. If we wanted to build a water storage area, why put it in Loudon County? From a strictly technical standpoint, the sensible thing could be to build a dam in Rock Creek. There are few people there, and only a few trees. So, it is a beautiful technical solution, but there is no telling what legal and political barriers this would encounter. It is all right to talk about these technical solutions, but we have to keep in mind that we also have the problems of legality, of State or Federal laws and local regulations. We have the problems of practical politics in the area; the balance of the basin may not have the same view as those who live in the affected area.

Finally, there is a question of financing. If someone said the cost of water would be too high and local government did not want to dig wells, for example, it would depend on how badly the people wanted the water. In most cases, the cost of water probably would be less than the price of color television.

With that as a caution, in talking about some of the real concerns we have in attaining established goals, the problem is in continuously assuring that these goals are adequate. Assuming that this can be done, the next significant problem is the matter of having mathematical capability to model the estuary, the main stem and the major tributaries. A mathematical technique to examine the progress we make, which hopefully will guide us in making future decisions, is needed. Decisions must be influenced by legal, political and financial

technical considerations.

The problems in dealing with industrial and municipal wastes are not really so awesome. We do have some problems when we deal with various parameters and measurements, such as:

Microbiology - the question is whether the water treatment system will or will not remove viruses.

Toxic materials - in Virginia, we have had recent experience with chlorine producing some of the largest fish kills ever reported in the United States. We are well convinced that chlorine in a large quantity, does produce bad effects in an estuary system.

Pesticides - I don't know what the nature of that problem is. We have had small investigations going on in sub-basins in Virginia, and are certain that there are pesticides in the waters.

Treatment technology - the one which troubles us most is disposal. It makes no difference how much technology there is, if something prevents the application of that technology, legally or politically, the technology is useless.

Nitrogen removal - how are we going to remove it in a way that will not produce conditions in our rivers and estuaries which are worse than before?

Disinfection - do we use ultra-violet, or other techniques

Combined sewers - these were mentioned this morning. They are a major concern for any metropolitan area, and are closely related to urban run-off. We need to undertake a substantial study of the whole urban runoff problem, in order to determine its dimensions. In Virginia we think we have the same questions for every one of our metropolitan areas. Do we have a problem? If so, what technology do we use in solving it?

Reliability - it does no good to put money into a waste treatment system and have it fail on us periodically. The same is true of water supply systems. Recommendations have been made for tying water systems together. But, how can these systems be interconnected and at the same time assure that their integrity will be maintained?

Operation and maintenance - sewage treatment and water treatment plants are going to be no better than the people that stay with the job and who can and will run plants the way they were designed to be run.

Sediment control - whether this is a natural condition or not, don't think any of us really knows. We have only made half-hearted efforts to really find out. Sediment control is an up-stream problem to a considerable extent. But the question is what does one do with sediment down-stream, when there are no up-stream controls?

Planning - I think 208 planning (under PL 92-500) is probably going to be the real hope for the Washington Metropolitan area. It will provide the political and legal mechanism for identifying the problems and deciding publicly what can be done about them.

In summary, then, I have attempted to point out for you technical problems and considerations which bear upon the achievement of water quality goals. The solutions to these problems are not simple, and must consider a number of other aspects. Defining and setting goals, identifying all pollution sources, and social and political factors are among the more important of these aspects.

QUESTIONS AND COMMENTS

QUESTION: You mentioned the problem of viruses being a concern in the Washington area. Would you say the only reason it is not a concern in the other areas is partly because of the broad conclusion you can draw from the absence of decision-making but mostly because people don't know the quality of the water they are treating, or where the water treatment is really coming from? Here in the District we are literally going to try to see how much of the effluent we can blend to make it safe. The public will take a different view towards this.

MR. JENSEN: You may be right and you may not be right. It depends on our techniques in this country. They have been successful in uncovering a lot of illnesses. With virus diseases in the United States, they would be largely identified by the time. Certainly your history of diseases in this country does not have outstanding differences from foreign countries. You can look at a few communities, New Orleans for example, which is a stream. I don't think in that community there is an epidemiological

evidence that points strongly towards the killing of viruses. You are looking at a guy who used to be in the milk business. They found out ways they could kill most of the bacteria and a good share of the viruses. There is little evidence that indicates we have a massive failure in our system.

COMMENT: We don't mind drinking somebody else's. It is our own. It s a public problem in terms of failure to understand what is going on during the treatment process.

MR. JENSEN: I don't know how much of a public problem it is.

QUESTION: All of these problems you talk about require research development. Do you think the government is under-funding?

MR. JENSEN: My tendency is to say no. You can't make the world stop while you do research. It is all right to do the research, but don't stop the whole world while you do it.

QUESTION: Would you outline what studies have been made in the estuary areas to absorb pollutants? Taxpayers pay a lot to plumbers.

MR. JENSEN: How much can the Potomac estuary area absorb? I think Congress largely discarded that particular concept as being bankrupt.. Instead of seeing how much you can get into it, let's see how much we can keep out of it. I think we ought to approach the problem from the use of our technology rather than make a dam. It is reflected in what Congress did. Where do you find information? Where do you learn about studies conducted? The Interstate Commission on the Potomac River Basin has a complete library on this. You will find that people have conducted mathematical studies on the estuary. They have studies going back about eight years. The Corps has studied it. There have been a great number of studies. Maryland has sponsored studies, by Hydro-Science, a year ago.

MODERATOR GORDON: The Interstate Commission has a record' of all known studies. It should be out in a couple of months.

QUESTION: Who is responsible to decide the mines will be eliminated or what other action must be taken?

MR.JENSEN: I think most of the mining problems are in Virginia. The responsibility goes back to that state.

COL. McGARRY: We have two mine acid studies underway, one in Pennsylvania and one for the Potomac Basin. Our mission

is to identify where the acid is coming from, study and select solutions to prevent or mitigate the acid and to recommend should correct it.

QUESTION: Would you take the responsibility to correct it?

COL. McGARRY: That is one of the major issues—who should correct the situations.

MR. JENSEN: The problem is not with the active mining operation. They are subject to the requirements of the regulation system. The problems are with mines worked many years that have been abandoned. They continue to drain acid mate into the water. The question is who is going to pay for correction and maintain the corrective measures.

COL. McGARRY: We feel strongly that Bloomington Lake will be of limited recreational value because of the acid nature of the water. We hope there will be enough funds to complete the studies to make a recommendation and to be well on the way correcting the problem prior to 1977. There are other ways to enjoy a lake other than getting in the water, but they are

MR. JENSEN: You don't expect the 135 M.G.D to be acid?

COL. McGARRY: No. The Bloomington Reservoir will prevent large slugs of acids from coming down the river. The reservoir will help dilute the acid water from abandoned refuse After a storm, the acid forms and comes down the river as a “slug”. We will help eliminate this problem by mixing in the reservoir.

MR. JENSEN: The correction of this problem could have been incorporate in the cost of the project. It is too late do that over again.



MANAGING URBAN RUNOFF

By

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INTRODUCTION

Sedimentation has long been a major problem of the Potomac River. Many of Maryland's colonial deep water ports are now several miles upstream from navigable waters. Much of the sediments causing this loss of navigable water was derived from colonial agricultural practices. However, evidence indicates that similar heavy sediment loads are entering the estuary from urbanizing watersheds within the Washington Metropolitan area. Much of this sediment originates from areas undergoing development while a major portion of the sediment originates from the streams themselves as they enlarge through channel erosion as a result of hydrologic changes associated with urbanization. My presentation will discuss the magnitude of the sediment problem, the causes of the problem and what Montgomery County, Maryland, has done, is presently doing, and plans to do in the future to solve the problem of excessive sedimentation.

Erosion and sedimentation is a geologic phenomenon; it has been taking place since the beginning of earth itself. One only needs to stand on the rim of the Grand Canyon to recognize that erosion and sedimentation have been taking place a long time. Not only has the Colorado River cut a gorge nearly a mile deep, but it has cut this gorge through primarily sedimentary rock which was at an' earlier era deposited by water having been washed off from some distant area and deposited in that location. Geologic erosion and sedimentation is older than man. However, my discussion today is not concerned with geologic erosion, but with man induced erosion and associated sedimentation.

Sediment pollution is a most serious problem that must and can be controlled. Natural watercourses can be maintained as valuable environmental' assets through a firm public commitment, application of present technology and research to develop new and needed 'technology. Sedimentation is not a new problem. The ancient Chinese had a proverb that stated, "To rule the mountain is to rule the river". No doubt this proverb was rooted

in centuries of Chinese experiences, but they did little it. Vast mountain areas in China are now a total waste and rivers are choked with sediment caused by the destructive forces of water within the watersheds.

More recently, 400 B.C., Plato, speaking about the effects of denuding the mountains of Attica of trees, had the following observation, "The annual supply of rainfall was not lost as it is at present through being allowed to flow over a denuded surface to the sea, but was received by the land, stored in the earth and so was able to discharge the drainage of the heights into the hollows in the form of springs and rivers with abundant volume and wide territorial distribution. The shrines that have survived to the present day on the sites of extinct water supplies are evidence of my hypotheses."

The great Tigris and Euphrates valley civilization at its height reached 40 million people living in comparative prosperity. The area will now support less than 5 million people. Many experts feel that the decline of this civilization is primarily due to unwise land use which caused the sedimentation of extensive irrigation systems upon which their food production depended.

To give you a picture of what has happened closer to home and closer to our own time, we need only consider that many of the early colonial seaports that were once deep water are now several miles upstream from navigable waters. Upper Marlboro in Prince George's County, Maryland, which was a colonial tobacco port, is now approximately 40 miles upstream on the Patuxent River from navigable waters. Bladensburg, also in Prince George's County, was a major port for tobacco export. Due to heavy sedimentation over the last 200 years, ships can no longer get any closer than several miles from Bladensburg. To give a magnitude of the amount of dredging that has taken place over the past several decades to maintain a navigable channel in the Potomac, the Haines Point Park and National Airport are built upon landfills resulting from the dredging of sediments from the shipping channel.

What activities have caused this heavy sedimentation over the last 200 years? In colonial days, agricultural was industry of the colonies. Tobacco and cotton were major exports to England. In early days, a farmer's ability was often judged by how many farms he could "wear out" in a lifetime. Land was cheap. Erosion resulting from intensive, short term agriculture was the major cause of the filling-in of the old harbors in Maryland with sediment.

Modern Sediment Problems

In 1963, the Interstate Commission on the Potomac River Basin published a technical bulletin which summarized many of the findings of U. S. Geological Survey studies. This bulletin reported the sources of sediment in the Potomac River Basin. Quoting from this report, the forested tributary watersheds of the upper Potomac yielded from approximately 21 tons to 107 tons per square mile per year while the agricultural watersheds of the Potomac yielded from 120 to 420 tons per square mile per year. The urbanizing watersheds around Washington, D. C. were measured to yield from 1,000 to 2,300 tons per square mile per year. While none of these urbanizing watersheds would have more than two or three percent of the land denuded at one time, the yields were ten times the yields of the agricultural watersheds. Dr. Gordon Wolman of Johns Hopkins University, in a report developed for the State of Maryland, reported that from one construction site sediment was discharged at the rate of 80,000+ tons/square mile/year!

These quoted studies and many other studies as well as observations of several professionals in the field thoroughly document that sediment derived from urban construction is a major source of sediment reaching the creeks, rivers, harbors and estuaries during modern times.

Luna Leopold of the U. S. Geological Survey observed in his Urban Hydrology Handbook for Planners that runoff from urban areas resulting from a two year frequency storm increases as much as four to eight fold on a one square mile drainage area as a result of increased impervious areas in combination with high speed storm drainage systems. He also noted that natural channels tend to enlarge themselves to a degree that they can accommodate, within bank, a storm runoff equivalent to a two year frequency` rainfall. Thus, channels enlarge due to increased runoff associated with urbanization. Such channel enlargement is another major source of sedimentation.

There are several Ode effects as a result of this heavy sedimentation. Sediment damages the ecological balance of streams, rivers, and estuaries by the reduction of light transmission through muddy water and alteration of the bottom fauna. The association of organic materials and silts created poor environmental conditions for aquatic life and contribute to anaerobic conditions less favorable to assimilation of organic wastes. Sediment is also a carrier of` heavy metals, pesticides and other pollutants. This has been documented by studies of the oyster beds in the Potomac and Chesapeake Bay. You will recall that several of these' oyster beds have, from time to time, been declared unusable for human consumption.

Yes, man induced sedimentation is a serious problem. Much technology is presently available to control this problem. The problem can and must be controlled. In order to control man induced sedimentation, there must be a firm public commits backed up with adequate financing and enforceable legislation.

SOLUTIONS

Sediment Control Program

In 1965, Montgomery County took its first step toward solving the problems of sedimentation caused by construction activities. The County Council adopted a sediment control program which called for voluntary erosion controls on all land undergoing development. In cooperation with the Montgomery Soil Conservation District and the U. S. Soil Conservation Service, standards and specifications were developed for erosion control practices to be installed by developers. In a field review of the program in 1967, it was determined that less than 50% of the land undergoing development had adequate erosion control implemented. As a result, the County Council amended the subdivision regulations to provide for mandate erosion control on all construction sites. Using the Montgomery County program as a pattern, the State of Maryland adopted a state-wide sediment control law in 1970. Montgomery County in 1971 adopted a Grading and Sediment Control Ordinance further strengthens the sediment control program in Montgomery County. This ordinance established for the first time a sediment control enforcement unit within the Department of Environmental Protection. This unit, the Sediment Control Section, had as their primary function the enforcement of sediment control plans approved by the Montgomery Soil Conservation District, using sediment control standards and specifications developed by modifying time proven agricultural conservations practices for use in urban construction activities. As more experience has been gained, these standards and specifications have been improved and today we feel that the sediment derived from construction activities in Montgomery County has been reduced considerably below what it was ten years ago, and is continually being reduced as the enforcement program gains experience.

Sediment control on construction sites alone is only of the problem. As a result of increased storm runoff as with urbanization, approximately 200 miles of Montgomery County's 1,000 miles of streams have suffered deterioration in the of increased flooding, accelerated channel erosion, reduced water quality and sedimentation. An estimated eight to twelve miles are similarly affected each year as from 2,500 to 3,000 acres of land are converted from agricultural uses to urban uses.

Sligo Creek watershed is typical of the urbanized watersheds of Montgomery County. Development started in earnest following World War II in the lower reaches of this watershed. As the sewers were extended outward from the central city into the headwaters, the supply of easily sewered land became critical. As a result, land values increased to the point that high density development was encouraged. Wheaton Plaza, the first major regional shopping center of the Washington metropolitan area, was constructed at the headwaters of Sligo Creek in the late fifties. Following the development of the Wheaton Plaza, other commercial developments and intensive residential communities were constructed in the vicinity. The open streams into which these high density areas drained began to experience drastic changes including accelerated channel erosion, increased flooding and reduced water quality. The residents of the communities through which these streams course demanded that the County government do something about this devastation. The most acceptable solution to the complaining neighborhoods was enclosure or channelization of the deteriorating reaches of streams. This solution solved the local problem by treating the symptoms of flooding and channel erosion without reducing the cause; the problem was not only moved downstream to the lower terminus of the reach improved by enclosure or channelization, but also was increased in magnitude by increasing the velocity of the runoff by such improvements.

On-Site Storm Water Management Program

In January of 1970, the problems along Sligo Creek were brought forcibly to the attention of local government by a group of local citizens. They organized a tour to show public officials the problems along Sligo Creek. Damages to highway bridges and park facilities as well as a generally unsightly condition along the stream were pointed out to the eighty county, regional, state and federal officials in attendance.

Shortly thereafter, the County government adopted a resolution enunciating a policy to "Encourage and assist in the further planned management of water resources of the County, including improved storm drainage management, on a watershed basis" and to "Promote and encourage planning for retention on and in the soil of the greatest possible percentage of the annual precipitation through innovative water retention techniques". In essence, the County Council by adopting this resolution assured the concerned citizens that county staff would study the situation and develop new solutions to old problems with renewed

Passage of the Maryland Sediment Control Act of 1970 (Article 96A Section 105-110 Maryland Annotated Code) and the subsequent Montgomery County Grading Law in 1971 entitled "Excavation, Stripping, Grading and Fills" (Chapter 83A Montgomery County Code of 1965 as amended) provided a significant break through in storm water management. In addition to reducing potential erosion and sedimentation damages by stricter regulation of grading activities in conjunction with land development, a legal interpretation of the cited State law gave the Montgomery Soil Conservation District (MSCD) the authority to require the developer to construct appropriate on-site storm water management controls as part of this overall development. This was the first step toward development of an enforceable storm water management program. The MSCD has followed up this interpretation with the establishment of interim criteria which require that land developers release storm runoff from the development site at a rate equivalent to that experience if the land were in an undeveloped condition during a two storm. To meet this criteria, a majority of developers, have to date, relied on storm water detention ponds as the simple and least expensive solution.

In addition to the activities of developers regarding site detention, the County Government has promoted on-site detention as part of its architectural requirements for al new County buildings designed since 1971. Also the local authority now incorporates on-site detention or retention facilities in construction of parks, park buildings and park facilities.

The activities of the MSCD in requiring on-site detention facility installation in conjunction with new development has been a significant step forward in the quest to achieve better controls of storm runoff at or near its origin. Requiring developers to plan for storm water detention, when feasible, recognizes public responsibilities to regulate allowable runoff associated with land development. However, continued reliance on this approach to achieve storm water management must continue to be viewed as a "stop gap" measure for the following reasons:

- (1) In many instances, individual development proposals have site conditions which preclude the installation of truly effective on-site controls. However, no mechanism presently exists to permit a developer to contribute, as an alternate solution, to more strategically located downstream public facility, that would provide much greater storm water control.

- (2) In some instances, greater storm water control is desirable at particular locations than can be required under existing MSCD criteria.
- (3) A lack of adequate and reliable construction standards accompany present requirements for private installations of on-site facilities.
- (4) While certain types of control structures are effective in meeting present MSCD requirements for on-site controls, they may be highly undesirable from other standpoints such as public safety or aesthetic impact.
- (5) By themselves, present on-site control requirements are incapable of handling runoff volumes and velocities-accompanying storms of greater intensity than the two year frequency storm.
- (6) Installation of on-site facilities, without considering the effects on the total watershed, may actually increase rather than decrease storm run-off peaks.

Comprehensive Storm Water Management

In recognition of the growing problems created by uncontrolled urban storm runoff and the limitations of the continuing program of on-site detention of the two year frequency storm in all new developments, the County has embarked upon an aggressive program to provide protection to selected streams in Montgomery County in both developed areas and those undergoing development. In May, 1971, the Storm Water Management Section, was established within the Montgomery County Department of Environmental Protection to develop and implement a county-wide storm water management program. This program consists of two major thrusts: first, planning and implementation of remedial projects, and second, the development of preventive storm water management programs.

The remedial focus of the County's storm water management program includes projects to correct existing problems caused by uncontrolled runoff from and through previously developed

areas. These projects are designed to help return damaged water courses to their pre-development natural state whenever possible and to stabilize deteriorating conditions in critical stream reaches. In situations where these types of corrective solutions are not economically practical or technically feasible, storm drainage projects are considered.

One such remedial project is in the design stage for Sligo Creek. This project is designed to reduce channel erosion and flooding by construction of a dry impoundment to control runoff from an 896 acre headwater drainage area which includes 160 acres of commercial and apartment development, and 700 acres of high density residential development. A summary of the anticipated reduction in storm runoff flows is shown in the following Table.

TABLE I
ESTIMATED STREAM FLOWS DOWNSTREAM OF THE
PROPOSED DRY IMPOUNDMENT STRUCTURE
ON WHEATON BRANCH OF SLIGO CREEK

Frequency Storm	Pre-Development	Post-Development	
		Without Structure	With Structure
2 year Storm	250 cfs	835 cfs	467 cfs
10 year Storm	600 cf s	1683 cfs	800 cfs
100 year Storm	1050 cfs	2692 cfs	1450 cfs

While the remedial efforts outlined above serve to control or eliminate existing problems, they do little to fulfill the need for comprehensive, long-range storm water management planning. Experience has taught us that controls for storm runoff, as valid public facilities, will never realize the optimum potential until we can devise way to accurately predict the effects that proposed land use changes will have on the quantity and quality of storm runoff flows, and develop means of treating these effects that will take advantage of reduced, pre-development land costs. In an effort to achieve this goal, Montgomery County has recently embarked upon an ambitious program of watershed storm water management planning, of which the Watts Branch Storm Water Management Plan is the prototype.

Watts Branch Project

The problems of uncontrolled storm water runoff in the 21-square mile Watts Branch watershed can best be understood if they are compared to the existing conditions on Sligo Creek. Watts Branch reflects the classic patterns of hydrologic deterioration that resulted in devastation of private and public lands adjacent to Sligo Creek. Indeed, the conditions on Watts Branch are, in many ways, identical to the conditions that existed on Sligo Creek during the mid 1950's prior to the high-density development of the headwater areas. Downstream properties are developing in relatively low-density, residential land uses. As time and economic pressures dictate, more intense, higher density land uses can be expected. This trend is reflected in the master plans (zoning) for the headwater areas. The effects of this intense, upstream development on the remainder of the watershed will closely parallel existing conditions on Sligo Creek if no systematic, basinwide program of storm water management is implemented prior to headwater area development. It is the purpose of the Watts Branch Storm Water Management Project to provide the solution to learn from the example of Sligo Creek.

The Watts Branch watershed was selected as the pilot basin for a number of reasons. As noted above, the Watts Branch watershed is in a stage of urbanization roughly comparable to Sligo Creek twenty years ago. There is substantial evidence to support the contention that the Watts Branch watershed will absorb a major portion of the next "wave" of urban growth which is expected to occur as soon as sewerage and other vital public facilities become available. As such, the Watts Branch watershed reflects the most pressing need for comprehensive storm water management implementation'.

In early 1973, a consulting engineering firm was retained to make an in depth study of the Watts Branch watershed to determine the existing and potential problems associated with storm runoff from urbanizing areas. The objectives of this study can be summarized as follows:

- (1) To develop a comprehensive storm water management plan which, when implemented, will be effective in controlling current and future, stream bank erosion, undesirable sedimentation, water pollution from storm runoff and undesirable flooding.
- (2) To provide a mathematical model, compatible with existing County computer facilities, whereby proposed development or control practices can be tested to determine their effect on storm flow rates, velocities and pollution loads.

The consultant study, which is scheduled for completion in late 1974, includes:

- (1) Collection and analysis of hydrologic and hydraulic data;
- (2) Selection and modification of suitable mathematical models for predicting the effects of alternative land use and hydraulic and water quality control systems;
- (3) Detailed analysis of selected alternative hydraulic and water quality control systems;
- (4) Development of a proposed plan for storm water management;
- (5) Preparation of proposed legislation and regulatory arrangements required for implementation of the plan;
- (6) Preparation of designs for selected key control facilities;
- (7) Preparation of proposed methods to fund implementation of the plan.

The consultants have selected to use the U. S. Soil Conservation Service (SCS) hydrologic analysis model (TR-20) as the basic model. In combination with the TR-20 model, they have selected the pipe flow features of the Cincinnati Model to simulate flows from storm sewered areas of the watershed. The SCS water surface profile model (WSP-2) was also combined with the TR-20 for routing of simulated flows through the stream channel and flood plain. For purposes of simulating flows, the 21 square mile Watts Branch watershed was divided into 1200 homogeneous hydrologic sub-areas. Hydrologic characteristics have been determined for each of these sub-areas. This data has been filed in the County's IBM 360/145 computer and is available for use as the need arises.

Through use of the combined storm water management models, the consultant has delineated fifty year flood levels at present land use and existing hydraulic conditions and is in the process of testing various alternative approaches to solving the environmental problems of the Watts Branch stream valley.

The County Executive appointed a Citizen Advisory Committee to provide liaison with the various neighborhoods and communities as well as with the development industry. This Committee provides the County staff and consultant with feedback from the affected communities, as well as informing their respective constituents of progress in developing the project. By close coordination with the Citizen Advisory Committee, we expect to develop a project that will draw the active support of the residents of Watts Branch Watershed.

In the field of water quality, we have several problems for which we do not have readily available answers. We feel that if we utilize impoundments to control peak flows and design these impoundments with permanent pools, we can contain settleable solids and floating materials within the impoundment. However, we don't know, either quantitatively or qualitatively, what the water quality impacts of such retention will be. There appears to be little or no research data to document the effects of a permanent impoundment within an urban drainage system on water quality both within the impoundment and downstream from the impoundment. If any of you are aware of such information or have the opportunity to develop such data, we would be eternally grateful to you.

SUMMARY

In summary, man's activities have caused and continue to cause, serious deterioration of nature's watercourses through erosion and sedimentation, especially in urban areas. All too often in his attempts to resolve local problems, he has added to already serious problems by simply treating symptoms rather than removing or correcting causes. The end results include loss of navigation, changes in ecological balances, hazards to health, loss of sport and food fisheries, and loss of valuable environmentally pleasing recreation resources.

In Maryland, and more especially in Montgomery County, efforts are being made to reverse the trend of ever increasing sediment discharge into streams and rivers. These efforts include enforcement of sediment controls on land undergoing development and the development of a program to manage storm runoff from urban areas in a manner to preserve and enhance the environmental amenities of our streams and valleys through employing modern computer technology to analyze proposed changes inland use and to predict the environmental effects prior to making such decisions.

We have need for additional research information. One such need is in the area of water quality management. We need to know what happens to all sorts of urban pollutants when held within permanent pool impoundments. We know that settleable solids and floating pollutants can be contained within such impoundments, however, we don't know what the effects of various pollutants will be on the aquatic life of the impoundment nor what happens to the pollutants with time. Research to find the answers to these specific questions is probably our most pressing research need.

We feel that we are well on the way to guiding future urban development in Montgomery County toward our long range goal of environmental quality compatible with nature and consistent with the needs of our citizens.



Ralph C. Palange

SUMMATION

by

Ralph C. Palange, Director
Water Resources Research Center
Washington Technical Institute
Washington, D. C.

The Symposium has, hopefully, opened up new avenues of thought for those in attendance. For the Center, new guidelines and directions have been provided for establishing future projects which will be responsive to the needs of the area.

Mr. Conrad, in keynoting the Symposium, traced the history of the District of Columbia's water supply, and pointed out the urgent need for action. He noted that there has been all too much talk and all too little else. Further, he emphasized that our major needs are related to effective institutional arrangements. The organizational separation of water and wastewater management generally has hindered rather than helped in finding solutions. He strongly recommends the formation of a single agency, through combining the forces of each of the jurisdictions in the Metropolitan Area concerned with water resources. To be effective such an agency must have the authority, staff, and funding to implement the measures necessary for effectively managing these resources.

Mr. Sacks stressed the relationship between planning and implementation, and provided some concrete examples based on Maryland's experience. Our existing planning tools are simply not adequate to do an effective job. For example, there is a lack of suitable standards and criteria for defining and determining needs. Criteria must be much more substantive and must have greater public acceptance in order to increase their effectiveness. He further stated that institutional arrangements are not as important as convincing the proper authorities to provide the funding support required to do the job.

The achievement of quality levels, which will provide waters suitable for many uses, is of prime importance in a water resources program. Legal complications are among the barriers which exist in trying to reach these goals. Mr. McKinney pointed out that the legal tools are relatively new upon the scene. In the past, public agencies depended upon a combination of education and persuasion for cleaning up our waters. In illustrating the enforcement techniques presently being utilized, he discussed the legal aspects affecting the District's program, with particular reference to sludge disposal and the total operation of the Blue Plains

Wastewater Treatment Plant. The importance of public awareness in these situations was emphasized. He also stressed the need to have backup solutions or actions ready in case original long term commitments cannot be realized.

In his presentation Mr. Schieber focused upon the progress that has been made by area jurisdictions in working together for a common purpose. The recent agreement between the District of Columbia, Maryland, and Virginia relating to the disposal of sludge from the Blue Plains Facility was stressed as a good example of the cooperative effort that is needed. The Council of Governments is considering the formation of a Water Resource Planning Board, whose concerns will include the integration of the area's water resources needs with the total planning and needs of Metropolitan Washington.

The technical considerations in achieving water quality goals are equally as important as the legal aspects. Mr. Jensen first emphasized that the technical considerations cannot stand alone, even though they frequently offer the simplest solutions. The decision-making process must combine the political, legal, economic, and other elements with the technical aspects; There is little evidence to indicate any massive failures in our water supply treatment systems. Apparently the bulk of the viruses, for example, are being destroyed as evidenced by available epidemiological data. He presented a thorough review of the technical considerations, and where we stand in their development and application.

Colonel McGarry provided a good rundown on the planning underway by the Corps of Engineers for filling the water needs of the District and of this region, in general. Multiple solutions will most likely be required. His point that we may soon be drinking our own effluents, and that there may still not be enough to go around, is well taken. Such an observation highlights the seriousness and urgency of our problems. He brought us up to date on the status of the Northeast Water Supply Study and the conclusions which are emerging, as they relate to the region. The Study strongly supports the fact that the Metropolitan Washington Area does have critical water supply problems.

Urban runoff, particularly that portion normally receiving little or no treatment and control, has been given all too little attention in the past. Mr. Williams, calling upon his experiences in Montgomery County and other locations, has pointed out the major concerns. He traced for us the history of this region erosion problems and summarized the current situation, pointing out that many of the ports and other navigation facilities of the Colonial and later eras are no longer usable because of uncontrolled siltation. While the problems at one time resulted from natural

causes, the latter-day problems and effects have resulted from changing land use patterns, construction activities, and other modern-day effects.

The most urgent program needs relate to sediment control, on-site storm water management, and comprehensive run-off management. Our past attempts to solve local problems have caused the situation to become worse, because we have concentrated on treating the symptoms rather than on removing or correcting the causes.

The presentations more than adequately defined many of our specific problems and needed solutions. The major common problem which emerges from all of this, however, is basically that of people-- getting people to agree on what must be done and then getting these same people to combine their talents and resources in implementing these agreements. In the scale of priorities, therefore, this is the problem believed worthy of the first priority.

A number of broad research areas and needs emerge from these presentations-- some by direct reference and others by inference. These include:

- (1) Criteria for establishing the role of member political jurisdictions in a multi-government situation. Such criteria should cover the planning, financing, and construction of water resources projects, and should apply to both surface and ground waters.
- (2) Solutions for resolving interstate issues, which will remain valid despite political changes in any given situation. This could include new and improved regulatory approaches and techniques for enforcement of required measures, given the existing political jurisdictions and situations. Methodology for assuring adherence to established regional plans and priorities should also be developed.
- (3) New standards and criteria for determining water resources needs, directed toward strengthening existing project justification processes.
- (4) Criteria and methods for providing more substantive and effective citizen involvement in the decision-making process.
- (5) New or modified measures for meeting shortterm deficits in water needs, covering the legal, technical, and economic factors.

- (6) Evaluation of ground waters and estuaries as potential sources for augmenting existing supplies. This should include potential health hazards (viruses, pesticides, etc.), dependable yields, and related aspects as applicable.
- (7) Investigation of methods for reducing total water consumption.
- (8) Effects of social, political, and economic mechanisms and factors on water quality standards.
- (9) Improved methodology for operation and maintenance of water supply and wastewater disposal systems-- including sludge disposal, land application, and storm water runoff.
- (10) Application of computer technology to analyze proposed changes in land use and to predict the environmental effects of such changes.
- (11) New approaches and methods for control of erosion, siltation and urban runoff. These could include, but not be limited to, the following:
 - Dimensions of the problem and the basic causes.
 - Effect of sediments on stream quality.
 - Soil erosion control at urban construction sites and land undergoing development:
 - Control measures, such as on-site detention, applicable to the point of origin. Fate of urban pollutants subjected to impoundment.
- (12) Monitoring and information feedback procedures designed to be more responsive to the specific needs of the decision-maker.

These are broad categories that reflect the concerns express

by the speakers at the Symposium. They are not intended to exclude other research needs which are known to exist. In addition, each of these items lends itself readily to a number of sub-items suitable for individual attention. Of major consideration is the fact that these categories are of importance to the Region's agencies and organizations most intimately involved in the management of the water resources.



SYMPOSIUM PROGRAM

8:00 A.M. REGISTRATION

Building 2, 4th Floor
Washington Technical Institute

9:00 A.M. CALL TO ORDER

Dr. B. H. Alexander, *Moderator*
D. C. Federation of Civic
Associations, Inc.

WELCOME

Dr. C. L. Dennard
President
Washington Technical Institute

9:30 A.M. KEYNOTE ADDRESS

Mr. Charles H. Conrad
Executive Director
National Capital Planning Commission

**10:00 A.M. DEVELOPMENT OF A STATE WATER
RESOURCES PLANNING PROGRAM --
THE MARYLAND EXAMPLE**

Mr. Herbert M. Sachs
Director
Water Resources Administration,
Maryland Department of Natural
Resources

10:45 A.M. COFFEE BREAK

**11:00 A.M. LEGAL IMPLICATIONS AND
RAMIFICATIONS OF ACHIEVING
WATER QUALITIES**

Mr. W. C. McKinney
Director
Department of Environmental Services
District of Columbia

11:45 A.M. LUNCHEON

12:45 P.M. SPEAKER:

Mr. Walter A. Scheiber
Executive Director
Metropolitan Washington
Council of Governments

**Topic: WHAT'S AHEAD FOR
METROPOLITAN AREA
WATER RESOURCES
MANAGEMENT**

1:45 P.M. CALL TO ORDER

Dr. Yoram Gordon, *Moderator*
President
Resources International, Inc.
Reston, Virginia

**2:00 P.M. THE CORPS OF ENGINEERS WATER
RESOURCES PLAN FOR THE CAPITAL
REGION**

Colonel R. S. McGarry
District Engineer, Baltimore District
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**2:45 P.M. TECHNICAL CONSIDERATIONS IN
ACHIEVING WATER QUALITY GOALS**

Mr. E. T. Jensen
Executive Secretary
Virginia State Water Control Board

3:30 P.M. COFFEE BREAK

3:45 P.M. MANAGING URBAN RUNOFF

Mr. L. H. Williams
Chief
Storm Water Management Section,
Montgomery County (Md.)
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Protection

4:30 P.M. SUMMATION

Mr. R. C. Palange
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4:45 P.M. ADJOURN

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