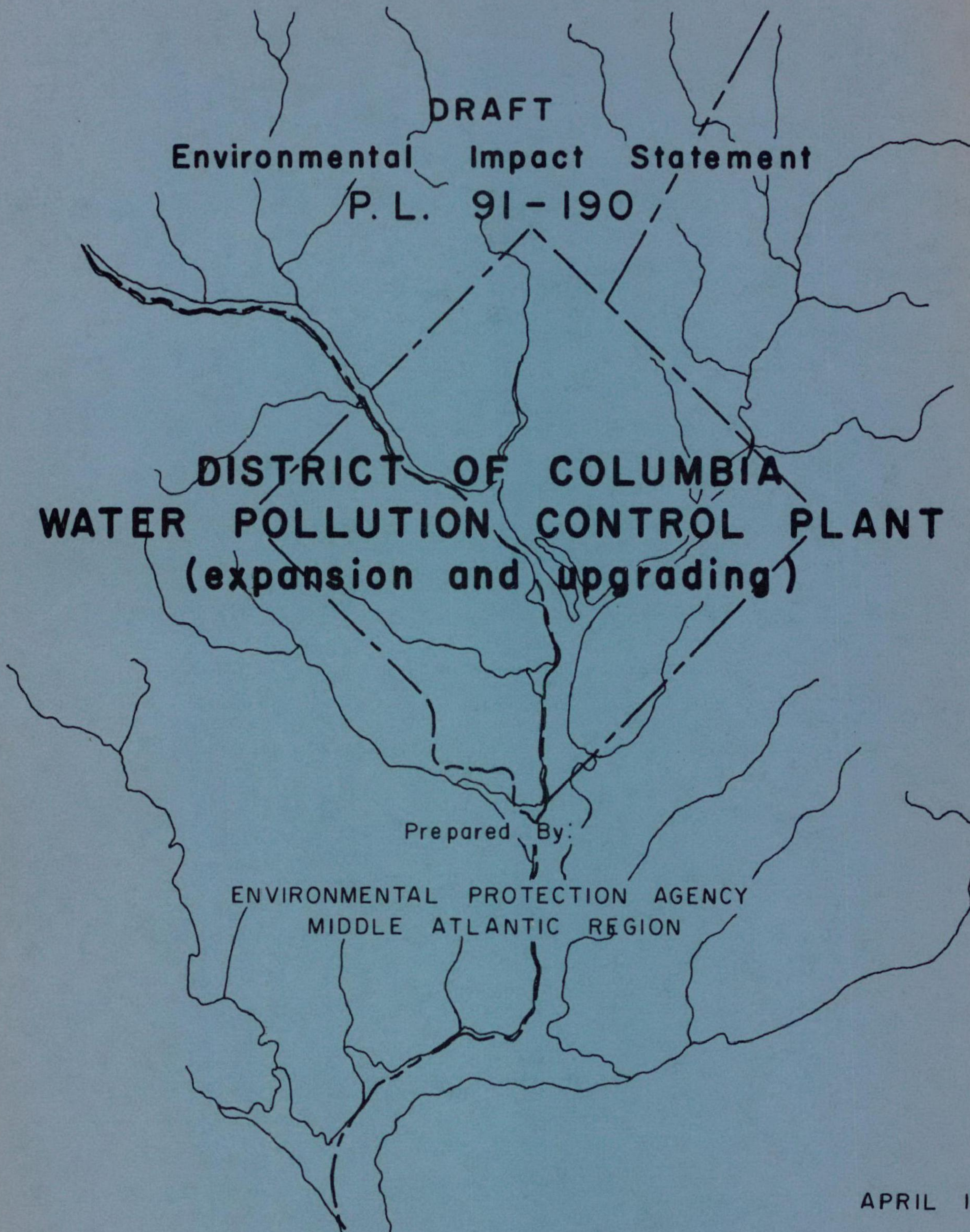
DRAFT

Environmental Impact Statement

P.L. 91-190

DISTRICT OF COLUMBIA WATER POLLUTION CONTROL PLANT (expansion and upgrading)



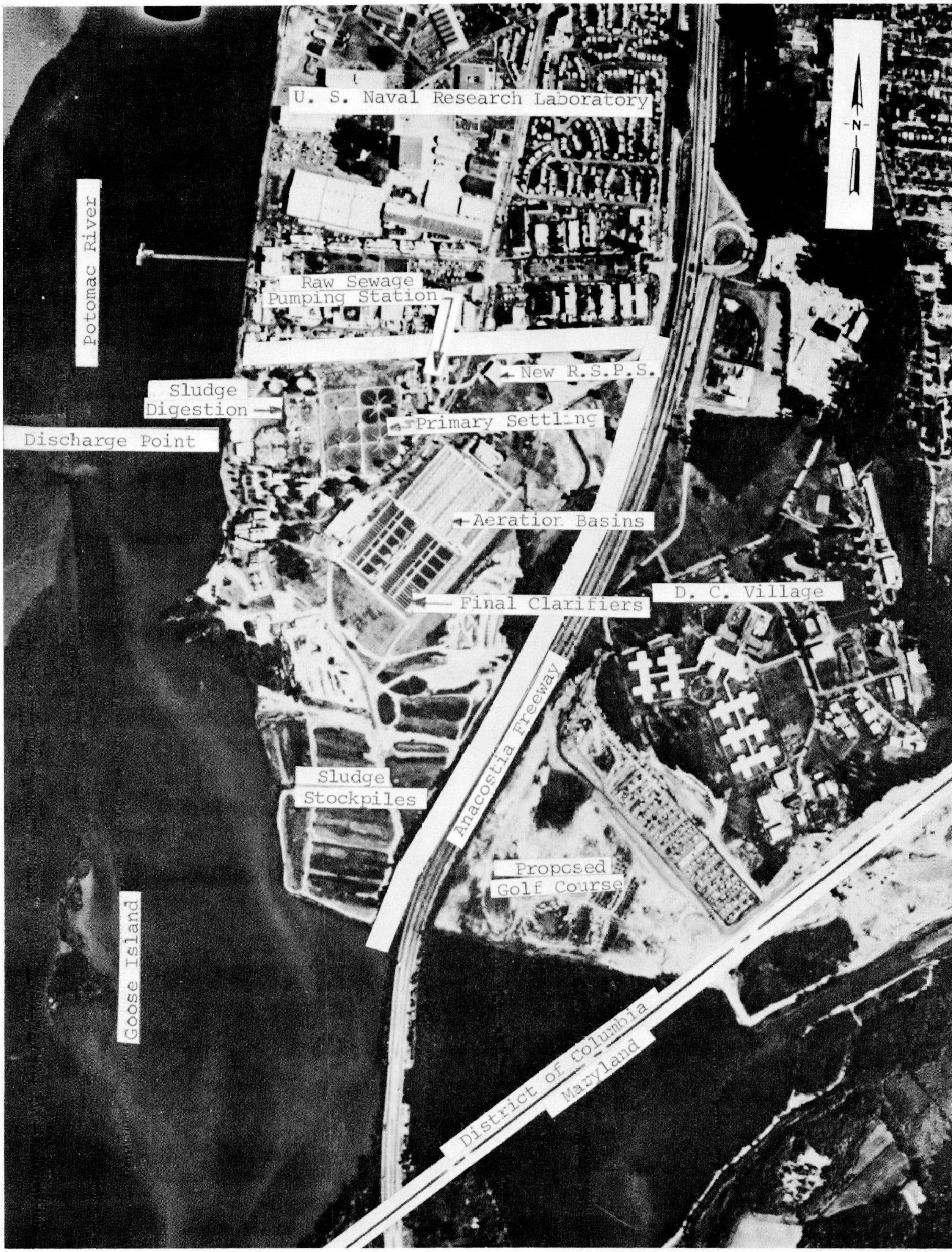
Prepared By:

ENVIRONMENTAL PROTECTION AGENCY
MIDDLE ATLANTIC REGION

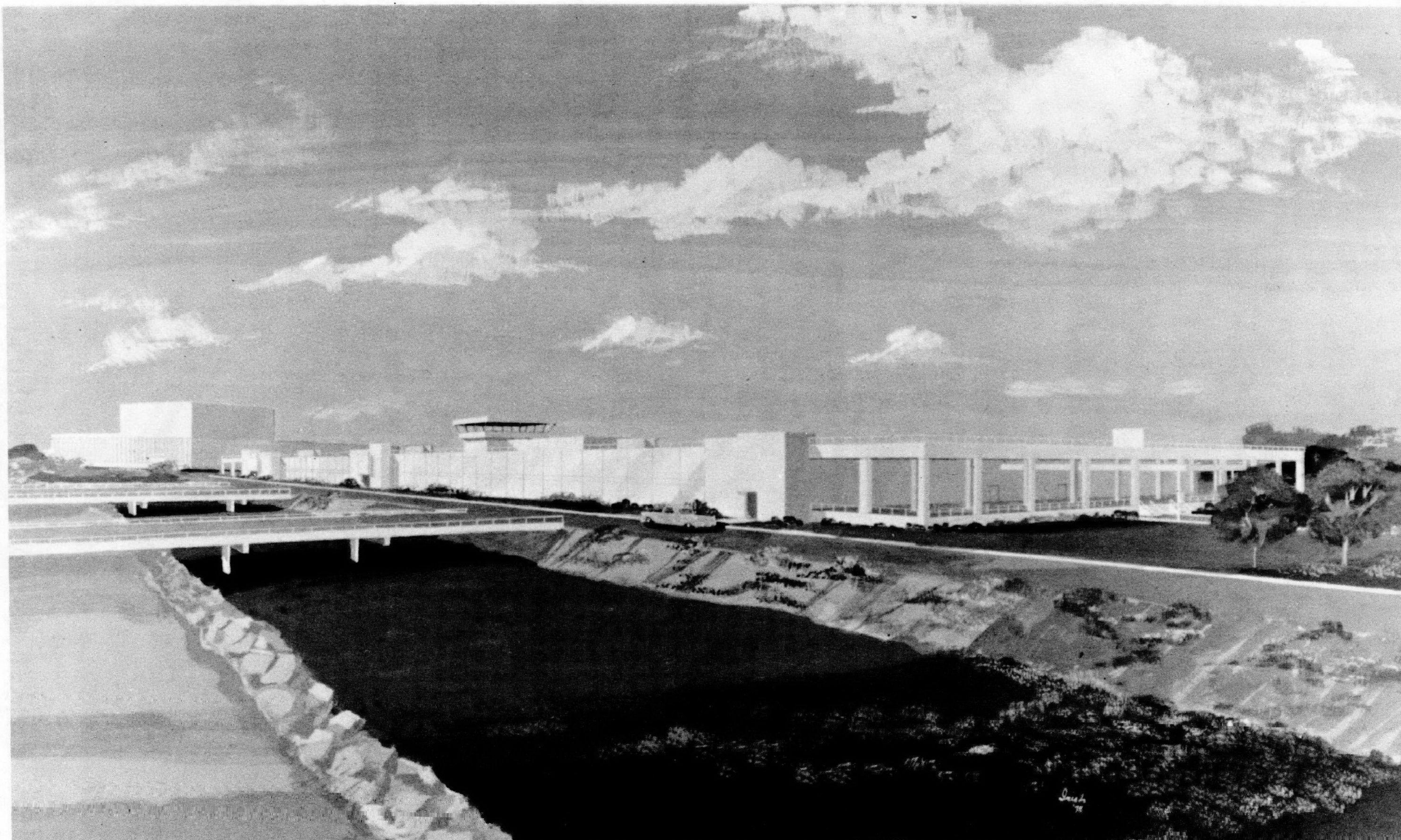
APRIL 1972

Re: 3MGS-IS-DC-1

FRONTISPIECE



EXISTING WATER POLLUTION CONTROL
FACILITIES, DISTRICT OF COLUMBIA



Multi-Media Filter Facilities Washington, D.C. Metcalf & Eddy | Engineers

DRAFT ENVIRONMENTAL IMPACT STATEMENT
DISTRICT OF COLUMBIA WATER POLLUTION CONTROL PLANT
(Expansion and Upgrading)

Prepared Pursuant to Section 102(2)(c)
of the National Environmental Policy Act of 1969

ENVIRONMENTAL PROTECTION AGENCY
REGION III
Philadelphia, Pennsylvania
April, 1972

Approved by:

Edward W. Furia
Regional Administrator

SUMMARY SHEET
District of Columbia Water Pollution Control Plant
(Expansion and Upgrading)

(X) Draft ( ) Final Environmental Impact Statement

ENVIRONMENTAL PROTECTION AGENCY
REGION III
Philadelphia, Pennsylvania

1. Type of action: (X) Administrative ( ) Legislative

2. Description of action: The proposal would expand from 240 mgd to 309 mgd and upgrade (from secondary to tertiary treatment) the existing District of Columbia Water Pollution Control Facilities. Outside disposal of undigested plant sludge by incineration is planned, with the ash residue transported to approved sanitary landfills for ultimate disposal. The areas to be serviced by these facilities include Washington, D. C. proper and suburban portions of Maryland and Virginia.

3a. Beneficial Environmental Impacts:

(1) Significant water quality effects on downstream reaches of the Potomac Estuary.

(2) Long-term enhancement of Dyke Marsh once the restoration project is completed by NPS.

(3) Minimization of plant odor problems.

(4) Reduction in the probability of pathogenic organisms escaping into the environment.

(5) Permanent removal of sludge stockpiles which presently produce runoff problems, odors, and general unhealthy conditions.

3b. Adverse Environmental Effects:

(1) Negligible effects on ambient air quality.

(2) Potential for spillage during fuel transfer and other unloading operations.

(3) Minor long-term effects produced by the project include noise generation, aesthetic intrusion, and land use changes.

(4) Short-term effects during construction activities include:

(a) Increased turbidities during dredging and spoiling operations.

(b) Fugitive dust emissions.

(c) Erosion and siltation caused by disturbed areas at the site.

(d) Increased noise levels.

(e) Inconvenience to the surrounding communities.

4. Alternatives Considered.

a. Treatment

(1) No action.

(2) Retain capacity at 240 mgd but upgrade plant.

(3) Various combinations of (a) independent physical-chemical; (b) biological treatment systems.

(4) South Tahoe Design

(5) Spray Irrigation (Muskegon Plan)

b. Sludge Disposal

(1) Ocean Disposal

(2) Land Disposal

(i) Pumping digested sludge to dry beds.
(ii) Pumping digested sludge to farmland for irrigation and fertilizing
(iii) Disposal of digested sludge in lagoons.
(iv) Disposal of partially dewatered digested sludge as a soil conditioner or to a landfill.
(v) Disposal of flash-dried digested sludge as a soil conditioner.
(vi) Pyrolysis

c. Transportation of Equipment and Materials

(1) Highway

(2) Rail

5. Review and Comment requests.

Comments have been solicited from Federal, State and local agencies, private organizations, and individuals. A complete distribution list is attached for ready-reference.

6. Date draft statement made available to CEQ and public: April 20, 1972

LIST OF FEDERAL, STATE AND LOCAL AGENCIES, PRIVATE ORGANIZATIONS AND INDIVIDUALS

Blue Plains Sewage Treatment Plant, District of Columbia

FEDERAL

Mr. Philip Handler
President
National Academy of Sciences
2101 Consituttion Avenue, N. W.
Washington, D. C. 20418 (2)

D. B. Charter, Jr.
Commander
U. S. Coast Guard
Chief, Environmental
Coordination Branch
400 Seventh Street, S. W.
Washington, D. C. 20591 (2)

Office of Communications
U. S. Department of the Interior
Room 7214
Washington, D. C. 20240 (2)

Mr. Mark Abelson
Regional Coordinator, Northeast Region
U. S. Department of the Interior
J. F. K. Federal Building
Room 2003 J & K
Boston, Massachusetts 02203 (2)

Assistant Secretary for Programs
ATTN: Director, Office of Environmental
Project Review
Department of the Interior
Washington, D. C. 20240 (2)

Dr. T. C. Byerly
Office of the Secretary
U. S. Department of Agriculture
Washington, D. C. 20250 (2)

Dr. Sidney Galler
Deputy Assistant Secretary
for Environmental Affairs
U. S. Department of Commerce
Washington, D. C. 20235 (2)

Director
Bureau of Sport Fisheries & Wildlife
U. S. Department of the Interior
Washington, D. C. 20240 (2)

Director
National Park Service
U. S. Department of the Interior
Washington, D. C. 20240 (2)

Director
Geological Survey
U. S. Department of the Interior
Washington, D. C. 20240 (2)

Director
National Marine Fisheries Service
U. S. Department of Commerce
Washington, D. C. 20240 (2)

Richard H. Broun
Director, Environmental & Land-Use
Planning Division
Department of Housing and Urban
Development
Washington, D. C. 20410 (2)

Mr. Theodore R. Robb
Regional Administrator
Department of Housing and Urban
Development
Curtis Building
6th & Walnut Streets
Philadelphia, Pennsylvania 19106 (2)

Colonel Louis W. Prentiss, Jr.
District Engineer
Baltimore District
Corps of Engineers
P. O. Box 1715
Baltimore, Maryland 21203 (2)

Russell E. Train, Chairman
Council on Environmental Quality
722 Jackson Place, N. W.
Washington, D. C. 20006 (10)

FEDERAL (CONT'D)

George A. Cunney, Jr.
Acting Chief, Environmental Office
Directorate of Installations
Office of the Deputy Chief of Staff
for Logistics
Department of the Army
Washington, D. C. 20310 (2)

Mr. Edward Jon Guss
Coordinator
Department of Health, Education & Welfare
401 North Broad Street
Philadelphia, Pennsylvania 19108 (2)

Frederick H. Warren
Advisor on Environmental Quality
Federal Power Commission
441 "G" Street, N. W.
Washington, D. C. 20230 (2)

Martin Convisser
Director, Office of Program Co-Ordination
U. S. Department of Transportation
400 7th Street, S. W.
Washington, D. C. 20591 (2)

W. Don Maughan
Director of U. S. Water Resources Council
2120 L Street, N. W.
8th Floor
Washington, D. C. 20037 (2)

Director
Naval Research Laboratory
Washington, D. C. 20390 (2)

Mr. August Schofer
Regional Administrator
Region 3
Federal Housing Administration
U. S. Department of Transportation
Room 1633
George H. Fallon Federal Office Bldg. (2)
31 Hopkins Plaza
Baltimore, Maryland 21201

U. S. Forest Service
Northeastern Area
Department of Agriculture
6816 Market Street
Upper Darby, Pennsylvania 19082 (2)

Rod Kreger
Deputy Administrator
General Services Administration -AD
Washington, D. C. 20405 (2)

S. N. Carvos
Director, Utilities Division
Department of the Navy
Chesapeake Division
Naval Facilities Engineering Command
Building 57
Washington Navy Yard
Washington, D. C. 20390 (2)

STATE AND LOCAL AGENCIES

Mr. Howard E. Chaney, Director
Environmental Health Services
Maryland Department of Health & Mental Hygiene
610 North Howard Street
Baltimore, Maryland 21401 (2)

Noman M. Cole, Jr.
Chairman
Virginia State Water Control Board
5917 River Drive
Lorton, Virginia 22079 (2)

STATE AND LOCAL AGENCIES (CONT'D)

Mr. Thomas D. McKewen, Director
Maryland Environmental Services
State Office Building
Annapolis, Maryland 21401 (2)

Mr. A. H. Paessler
Executive Secretary
State Water Control Board
P. O. Box 1143
Richmond, Virginia 23230 (2)

Mr. Robert J. McLeod
General Manager & Chief Engineer
Washington Suburban Sanitary Commission
4017 Hamilton Street
Hyattsville, Maryland 20781 (2)

Mr. C. Richard Foote, City Manager
City of Rockville
1115 Perry Street
Rockville, Maryland 20850 (2)

Mr. Samuel W. Shafer
Engineer - Director
Alexandria Sanitation Authority
835 S. Payne Street
Alexandria, Virginia 22314 (2)

Mr. Bert W. Johnson, County Manager
Arlington County
1400 N. Court House Road
Arlington, Virginia 22201 (2)

Mr. George J. Kelley, Jr.
County Executive
County of Fairfax
4100 Chain Bridge Road
Fairfax, Virginia 22030 (2)

State Clearinghouses

D.C. Mr. Elmer S. Coppie
Special Assistant to the Mayor
Office of Budget and Program Analysis
District Building
14th & E Streets, N. W.
Washington, D. C. 20004 (10)

Md. Mr. Edwin L. Powell, Jr.
Chief, State Clearinghouse
Maryland Departmentof State Planning
301 West Preston Street
Baltimore, Maryland 21201 (10)

Va. Mr. Charles Burbach
A-95 Information Officer
Virginia Division of State Planning and Community Affairs
1010 James Madison Building
109 Governor Street
Richmond, Virginia 23219 (10)

Regional Clearinghouses

Va. Mr. John W. Epling
Executive Director
Northern Virginia Planning District Commission
7309 Arlington Boulevard
Suite 300
Leohmann's Plaza
Falls Church, Virginia 22042 (10)

D.C. Mr. Walter A. Scheiber
Executive Director
Metropolitan Washington Council for Governments
Metropolitan Clearinghouse for D. C.
1225 Connecticut Avenue, N. W.
Suite 201
Washington, D. C. 20036 (30)

State & Local

Mr. James P. Alexander, Director
District of Columbia Department of Environmental Services
Presidential Building
415-12th Street, N. W.
Washington, D. C. 20004 (10)

National Capitol Planning Commission
1325 "G" Street, N. W.
Washington, D. C. 20005 (10)

Interstate Commission on the Potomac River Basin
1025 Vermont Avenue, N. W.
Suite 27
Washington, D. C. 20005 (2)

Private Organizations and Individuals

Mr. David Sanders Clark
Chairman
Committee of 100 on the Federal City
1307 New Hampshire Avenue
Washington, D. C. 20036 (1)

Mrs. John A. Bross
Committee of 100 on the Federal City
4501 Crest Lane
McLean, Virginia 22101 (1)

News Media

Washington Daily News Co.
1013 13th Street, N. W.
Washington, D. C. 20005

Washington Post Co.
1515 L Street, N. W.
Washington, D. C. 20005

The Evening Star Newspaper Co.
225 Virginia Avenue, S. E.
Washington, D. C. 20003

Northern Virginia Sun
3409 Wilson Boulevard
Arlington, Virginia 22210

Private Organizations and Individuals

Mr. William Shands
Central Atlantic Environmental Service
1717 Massachusetts Avenue, N. W.
Washington, D. C. 20036 (1)

Citizens Council for a Clean Potomac
P. O. Box 1972
Wheaton Station
Silver Spring, Maryland 20902 (1)

Northern Virginia Conservation Council
c/o Elizabeth Hartwell, Secretary
7968 Bolling Drive
Alexandria, Virginia 22308 (1)

Environmental Defense Fund
1712 "N" Street, N. W.
Washington, D. C. 20036 (2)

Frazier Kellogg
Cabin John Citizens' Association
7725 Tomlinson Avenue
Cabin John, Maryland 20731 (1)

National Wildlife Federation
1412 16th Street, N. W.
Washington, D. C. 20036 (2)

Mr. Jonas Morriss
Special Representative
Citizens' Permanent Conference on the
Potomac River Basin
206 Georgetown Building
2233 Wisconsin Avenue, N. W.
Washington, D. C. 20007 (1)

Mr. Arthur W. Sherwood
Chesapeake Bay Foundation
P. O. Box 209
17 State Circle (1)
Annapolis, Maryland 21404

Mr. John S. Winder, Executive Director
Metropolitan Washington Coalition for
Clean Air, Inc.
1714 Massachusetts Avenue, N. W.
Washington, D. C. 20036 (2)

Northern Virginia Conservation Council
c/o Marian K. Agnew, Chairman
Box 304
Annandale, Virginia 22003 (1)

League of Women's Voters of the U. S.
1200 17th Street, N. W.
Washington, D. C. 20036 (2)

Accokeek Foundation, Inc.
525 School Street, S. W.
Washington, D. C. 20024 (1)

Chesapeake Bay Foundation
P. O. Box 209
Annapolis, Maryland 21404 (1)

Mr. Orris Herfindahl
Member, Conservation Committee
Association
(Canoe Cruisers)
Canoe Cruisers Association
902 Madison Lane (1)
Falls Church, Virginia 22046

TABLE OF CONTENTS

District of Columbia Water Pollution Control Plant Upgrading and Expansion

TABLE OF CONTENTS (CONT'D)

TABLE OF CONTENTS (CONT'D)

Draft
Environmental Impact Statement
(P. L. 91-190)
District of Columbia Water Pollution Control Plant
(Expansion and Upgrading)

I. INTRODUCTION

A. General Background

The primary cause of pollution in the upper Potomac Estuary is municipal wastewater discharges. This includes raw sewage released from overloaded sewer systems, sewage treatment plant effluents, combined sewer overflows, and storm water. A listing of prior District of Columbia sewerage systems and a detailed description of existing water pollution control facilities is presented as Appendix (F). The amount of water used for industrial processes is insignificant. Industrial use consists primarily of cooling water.

Applications have been received from the States of Maryland and Virginia and from Washington, D.C., for Federal construction grant funds to expand and upgrade the Blue Plains sewage treatment facility. In order to evaluate the environmental impact of the proposed treatment facility it is necessary to define the problem and determine the sphere of influence of the treatment facility. The sphere of influence includes the air affected by exhaust from the sludge incinerator, the reaches of the Potomac Estuary affected by the effluent discharge, and the service area contributing wastewater to the Blue Plains facility.

The Blue Plains treatment plant is a regional facility; i.e., its service area is not limited by governmental boundaries. While it is owned and operated by the District of Columbia, it treats wastewater from portions of Prince Georges and Montgomery Counties, Maryland; wastewater from portions of Loudoun and Fairfax Counties, Virginia; and wastewater from the Washington, D.C. area. Currently the Blue Plains plant is treating between 75 and 80 percent of the total domestic wastewater generated in the Washington Metropolitan area.

The breakdown of the existing flow of approximately 265 million gallons per day (mgd) is as follows:

Washington Suburban Sanitary Commission (Prince Georges and Montgomery Counties, Md.)	119 mgd
District of Columbia	135 mgd
Potomac Interceptor	5 mgd
Pimmit Run Interceptor (Fairfax County, Va.)	6 mgd

The Potomac River, from its headwaters on the eastern slope of the Appalachian Mountains to the Fall Line above Washington, D.C. is a freshwater river. Below the Fall Line, the Potomac is tidal for approximately 114 miles to the Chesapeake Bay. Throughout this impact statement the tidal portion of the Potomac River will be referred to as the Potomac Estuary.

While this impact statement is primarily concerned with the Blue Plains sewage treatment facility, the discharge from the facility is an integral part of the total water quality management plan which must be developed for the Potomac River Basin.

In June 1967, pursuant to the provisions of the Water Quality Act of 1965, the District of Columbia adopted water quality standards for its interstate waters. The water quality standards consist of (1) planned water uses; (2) quality criteria designed to protect those uses; and (3) a plan for implementation and enforcement of the criteria. These standards were submitted to the Secretary of the Interior on June 29, 1967. The Secretary gave his full approval in January 1969, thus making the District of Columbia's water quality standards Federal standards.

The stated purpose of the District's standards is primarily intended to provide improved recreational opportunities as a result of water quality improvement. With the exception of the criteria related to water contact recreation (swimming, etc.), water quality objectives were to be realized in 1972. Water quality to permit contact recreation was planned for 1975 in limited zones of the Potomac River and Rock Creek.

Dissatisfied with pollution control progress, the Secretary of the Interior reconvened the third session of the conference on the Matter of Pollution of the Interstate Waters of the Potomac River and its Tributaries in the Washington Metropolitan Area (Potomac Enforcement Conference) in April 1969. The conferees represented the water pollution control agencies of Maryland, Virginia, and the District of Columbia; the Interstate Commission on the Potomac River Basin; and the Department of the Interior - Federal Water Quality Administration.

The Conference resulted in the issuance of 15 recommendations to enhance water quality of the Potomac Estuary. The most significant recommendation was the one calling for construction of advanced waste treatment facilities.

In accordance with conference recommendations, the District proceeded to implement its phased developed plan for the Blue Plains site. This was to include reclamation of 51 acres of Potomac River mud flats for plant expansion to 419 mgd, the expected flow for the year 2000. However, subsequent Department of the Interior opposition to the reclamation proposal made approval by the Federal Government unlikely. As a result, it was necessary to abandon plans for full expansion of the plant to 419 mgd.

In recognition of this impasse, the conferees reached a compromise set forth in a "Memorandum of Understanding" completed on October 7, 1970 (see Appendix G). The Memorandum called for the development of the Blue Plains site to provide advanced waste treatment for 309 mgd by the end of 1977. Thus the size of Blue Plains was limited by physical constraints rather than by the normal procedures of designing for a population projection in the service area.

The "Memorandum of Understanding" agreed to an expansion of Blue Plains to 309 mgd with the following breakdown of flows:

Washington Suburban Sanitary Commission (Prince Georges and Montgomery Counties, Md.)	148 mgd
District of Columbia	135 mgd
Potomac Interceptor	18 mgd
Pimmit Run Interceptor (Fairfax County, Va.)	8 mgd
	309 mgd

As a result of the subsequent request from the Secretary of the Interior, the District of Columbia agreed to advance the completion date of the Blue Plains treatment plant improvements to December 1974 provided certain conditions were met, including the availability of adequate Federal assistance in the form of construction grants.

B. Existing Studies

1. Water Quality and Water Supply

In November 1969 a technical advisory committee was established to determine the studies required to evaluate water quality management needs of the upper Potomac Estuary. In addition, the Assistant Secretary of the Interior requested a study of the water supply potential of the upper Potomac Estuary. Thus, a detailed water quality - water resources study of the Potomac Estuary was undertaken by the Chesapeake Technical Support Laboratory. In April 1971, a study, Water Resources - Water Supply Study of the Potomac Estuary, Technical Report 35, was completed by the Chesapeake Technical Support Laboratory, Environmental Protection Agency, to support the Potomac Enforcement Conference. A synopsis of T. R. 35 is enclosed as Appendix (E). The unedited document, which has been used to prepare the water quality aspect of this report, is available at the Region III Office of the Environmental Protection Agency.

For purposes of Conference discussion and investigation, the Potomac Estuary was divided into three reaches (1) upper reach - Chain Bridge to Indian Head; (2) middle reach - Indian Head to U. S. Route 301 Bridge; and (3) lower reach - U. S. Route 301 Bridge to Chesapeake Bay.

The study included: (1) an evaluation of pollution sources including nutrients; (2) the development and refinement of mathematical models to predict the effects of the various pollutants on water quality; (3) the projection of water supply needs and wastewater loadings; (4) an evaluation of the estuary as a potential water supply source; (5) the determination of the maximum pound loadings by zone for the various pollutants under various flow conditions; (6) an investigation of alternative waste treatment plans; and (7) an estimate of the cost of waste-water quality standards.

To evaluate the effects of effluent discharge locations on the water quality of the upper Potomac Estuary, the Water Resource - Water Supply Study of the Potomac Estuary investigated three basic alternative treatment systems. Two of the three alternatives assumed that expansion at Blue Plains is not restricted. However, this has since proved impractical because of the physical constraints and ecological considerations at the Blue Plains location. The third option, Alternative III, is similar to the proposals expressed in the "Memorandum of Understanding" in that Blue Plains was limited to a maximum capacity of 309 mgd. Additionally, it was assumed the appropriate parties would provide another regional plant or plants to accommodate the projected increases in wastewater.

For the study purposes, it was assumed that increased wastewater volumes would be treated at three proposed locations: Upper Potomac, Anacostia, and the existing Piscataway locations. Whether increased flows are treated at these locations or other locations is not important. The important fact is that the increased volumes will occur in the vicinity of the proposed locations and the treated effluent discharged into the Potomac Estuary.

Water quality simulations were made using the Dynamic Estuary Model developed by Federal Water Quality Administration personnel and future wastewater loadings formulated from the COG population projections.[a] The maximum allowable ultimate oxygen demand (UOD) loadings determined for the upper Potomac Estuary were derived using the following criteria:

Temperature	29°C. (Centigrade scale)
Freshwater inflow to estuary after water supply diversion.	300 cfs
Dissolved Oxygen (DO) in the treated effluent.	6 milligrams per liter (mg/l)
Dissolved Oxygen standard for receiving water, average	5 mg/l

(a) The Metropolitan Washington Council of Governments (COG) is a Federally-approved areawide planning organization for the Washington Metropolitan Area. It is responsible for coordinating the Office of Management and Budget's (OMB) A-95 review procedures in the Metropolitan Area.

Simulation of phosphorus (P) discharged into the Potomac Estuary was made using a mathematical model with second-order reaction kinetics. Allowable phosphorus loadings in pounds per day were determined using the following criteria:

Average freshwater flow into estuary after water supply diversion.	300 cfs
Average maximum phosphorus in upper reach from Chain Bridge, Washington, D.C. to Indian Head, Md.	0.067 mg/l
Average maximum phosphorus below Indian Head, Md. for algal control.	0.03 mg/l

Inorganic nitrogen was simulated using a mathematical model which has been verified based on observed data. Allowable nitrogen loadings in pounds per day were determined using the following criteria:

Average freshwater flow into estuary after water supply diversion.	300 cfs
Average maximum inorganic nitrogen in upper reach from Chain Bridge to Broad Creek.	0.5 mg/l
Average maximum inorganic nitrogen in upper reach from Broad Creek to Indian Head.	0.4 mg/l
Average maximum inorganic nitrogen in upper reach from Indian Head to Smith Point.	0.3 mg/l

To facilitate the determination of wastewater loadings and water supply requirements for the Metropolitan Area, population projections were distributed over 13 service areas using 1960-1970 population trends with consideration given to land use potential and other attenuating factors.

Utilizing the population projections and waste flows to existing treatment facilities, future wastewater trends were developed for the 13 service areas in the Washington Metropolitan Area. Wastewater flows are summarized below:

Year	Washington Metropolitan Area Flow (mgd)	Washington, D.C. Flow (mgd)
1970	325	252 *
1980	473	140
2000	861	160
2020	1,342	180

Since the District's allocation according to the "Memorandum of Understanding" is limited to 135 mgd, it is evident that provisions will have to be made for additional capacity at another location. The need for another regional facility has been recognized in the "Memorandum of Understanding." The actual location of this proposed regional plant has not been established to date.

---

* The wastewater flows shown for the District of Columbia for the year 1970 represent the total flow to Blue Plains which includes flow from Maryland and Virginia as well as the District proper. Flows for 1980, 2000, and 2020 reflect wastewater from the District only.

The major source of freshwater inflow into the Potomac Estuary is from the upper Potomac River Basin. In water resource management, low flow frequencies are used to determine assimilation and transport capacities of receiving waters. The 7-day low flow with a recurrence interval of once in 10 years (7-10 low flow) is the standard used by Maryland, Virginia, and the District of Columbia to determine assimilative capacity for water quality aspects. For the Potomac at Washington, the 7-10 low flow is 954 cubic feet per second (cfs) or 616 mgd. Water Resource - Water Supply Study of the Potomac Estuary takes into consideration the fact that the need for water supply is projected to use all of the river flow during critical flow conditions; therefore, a water quality management design flow of 300 cfs is used in determining the assimilative capacity of the upper Potomac Estuary. It is stated in the report that a minimum flow of 300 cfs will maintain an ecological balance in critical stream segments during low flow periods. This design flow is used throughout the report and all discussions within this environmental impact statement

Water supply demands and per capita usage were obtained from the major water suppliers in the metropolitan area and used as a baseline for the water supply projections. Total projected water requirements for the Washington Metropolitan Are are listed below:

Year	Water Demand mgd (yearly average)
1969	370
1980	556
2000	1,009
2020	1,568

In addition to existing sources of water supply, it appears that the District of Columbia's water supply and a major part of the water supply for the Metropolitan Area in Maryland and Virginia must come from the Potomac River. The water quality design flow (7-10 low flow) for the Potomac at Washington, D.C. is 616 mgd; therefore, it can readily be seen that water supply requirements in 1980 is almost equal to the critical low flow. Additional provisions for water supply must be undertaken.

The estuary can be used as a supplementary water supply source if wastewater discharges and water supply withdrawals are adequately treated.

In addition to the EPA work on water quality, close cooperation was maintained with the U. S. Army Corps of Engineers who were investigating water supply potential of the upper Potomac Estuary as part of their Northeast Water Supply Study (NEWS) for the Washington Metropolitan Area.

House Document 91-343 (Potomac River Basin Report) prepared by the U. S. Army Corps of Engineers evaluated the total water resources of the Potomac River Basin including water supply requirements to the year 2010.

C. Land Use and Population Projections

As previously stated, the Metropolitan Washington Council of Governments (COG) is the official metropolitan planning body for the Washington Metropolitan Area. As the metropolitan planning agency, COG must direct its efforts to the metropolitan scale; however, coordination of all local planning efforts must be assured. In this effort COG works with local planning agencies to establish areawide policies for orderly development and use of land resources.

The majority of the land area served by the Blue Plains plant is considered to be a developed area, rather than a growing one. Loading limitations established in the "Memorandum of Understanding" have essentially limited the Blue Plains service area to the developed area currently sewered. Developing areas outside the current Blue Plains service area will be required to use other wastewater treatment facilities.

COG has projected growth of new communities along urban corridors radiating out from the District of Columbia. Rural areas on the fringe of the Metropolitan Area are presently capable of sustaining further urbanization. This development will require additional regional facilities which will be substantially distant to Blue Plains.

As noted earlier, population projections used in the Water Resource - Water Supply Study of the Potomac Estuary were furnished by COG. These projections were derived by use of the COG's EMPIRIC Activity Allocation Model. This model consists of a set of simultaneous linear equations that relate changes over time in the distribution of regional population and employment to their original distributions at some base year, their regionwide growth over the forecast period, and the effects of public policy and investment decisions.

The base year information was compiled for COG by Hammer, Green, Siler Associates (HGS). Although local population projections were considered in the development of this information, it was noted that none of these forecasts were mutually acceptable by other agencies. Therefore, HGS Associates made an economic base study for their projections.

The total population projections for the Virginia and Maryland portions of the Metropolitan Area and the District of Columbia are summarized below:

Year	Population
1969	2,800,000
1980	4,000,000
2000	6,700,000
2020	9,300,000

II DESCRIPTION OF THE PROPOSED ACTION

Proposed additional treatment units at the plant include a Raw Sewage Pumping Station, Aerated Grit Chambers, Primary Clarifiers, Aeration Basins, Secondary Clarifiers, Nitrification Reactor Tanks, Nitrification Sedimentation Tanks, Denitrification Reactor Tanks, Nitrogen Release Tanks, Denitrification Sedimentation Tanks, Effluent Pumps, Multimedia Filters, Chlorine Contact Channels and Effluent Conduits to the Potomac River. Sludge Processing Facilities include Flotation Thickening Tanks, Sludge Blending Tanks, Vacuum Filters and Multiple Hearth Incinerators (See Figure 1).

The proposed units, in conjunction with the existing facilities which will be retained, are designed to provide complete treatment for an average flow of 309 mgd. The units will be designed hydraulically to handle flows up to a rate of 650 mgd. In addition, flows between 650 mgd and 939 mgd will receive grit removal, primary sedimentation and chlorination in the excess flow facilities before being discharged directly to the Potomac through the existing plant outfall. The excess flow facilities are designed to partially treat flows emanating during rainstorms from combined sewers in the District. These facilities are expected to be used approximately 400 hours per year. Flows in excess of 939 mgd will either be stored within the sewer system or will be bypassed to the Potomac and Anacostia Rivers at various upstream points. Bypassing would be expected approximately 240 hours per year during more intense storms.

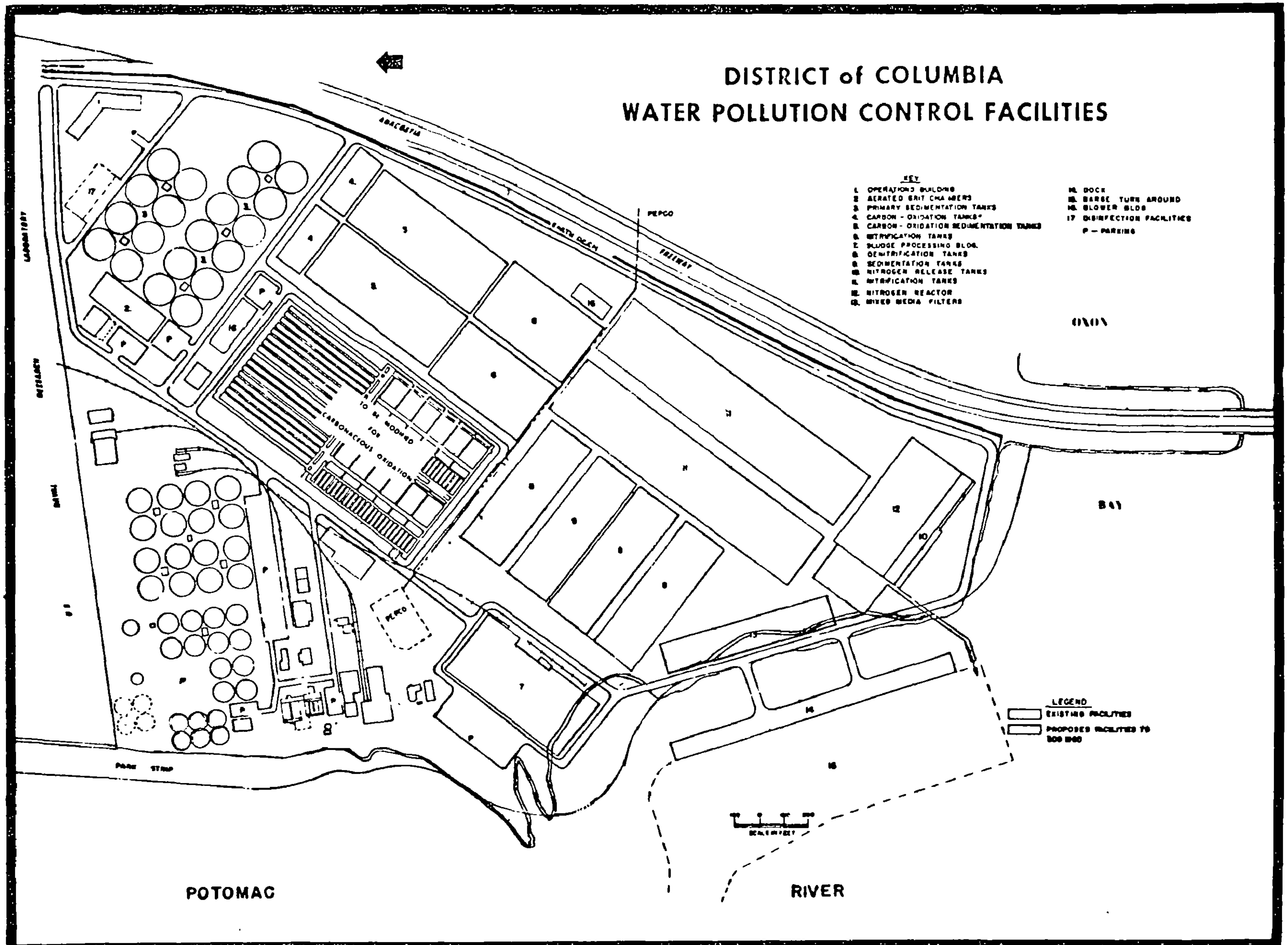


Figure 1

PROPOSED EXPANSION AND UPGRADING OF
EXISTING WASTEWATER TREATMENT FACILITIES

Design flows are normally expressed in terms of daily quantities, i.e., 309 mgd. Actual designs of Sewage Treatment Plants are based on the maximum rate that wastes may be expected to be received at a plant as the flow rates vary during the day. The flow rates may be stated in various other units, such as cubic feet per second (cfs) or gallons per minute (gpm).

The following flow rates are equivalent:

Average Daily Flow	309 mgd	480 cfs	214,000 gpm
Peak Flow to Complete Treatment	650 mgd	1,000 cfs	450,000 gpm
Excess Flow	289 mgd	450 cfs	200,000 gpm
Total Flow	939 mgd	1,460 cfs	650,000 gpm

It may be interesting to note that a flow of 309 mgd would take approximately 3.8 seconds to fill an average sized living room (12' x 18' x 8½').

The facilities are being constructed with the aid of EPA grant funds under several projects. Federal grants will total approximately $200.0 Million at 55% of the estimated cost of $364 Million. In addition to the EPA contribution, the District of Columbia will contribute $82.2 Million, WSSC $4.4 Million, the State of Maryland $43.0 Million, Fairfax County, Virginia $1.9 Million, and the Commonwealth of Virginia $2.3 Million. The D. C., Maryland and Virginia shares of the costs are allocated on the basis of capacity assigned in the "Memorandum of Understanding" (Appendix G).

Under Section 8 of the FWPC Act, if the Federal grant is to equal 55% the State must contribute 25% of the eligible cost of a project. Since the District can recover its capital investment for facilities to handle the flows from the Potomac Interceptor under existing agreements, these flows have been included as part of the District allocation of 153 mgd. Since the plant will provide treatment for wastes emanating from two States and the District of Columbia, the costs of Federal grant projects have been divided among the various State allocations. The various projects and their status are as follows:

1. Raw Sewage Pumping and Conduits

Project No.	Eligible Cost	Grant Amt.	Date of Grant Offer	Grant Paid
WPC-DC-20	$4,679,000	$1,854,440*	12/28/66	$1,854,440

* Eligible for an additional $485,060 under the reimbursable provisions of the FWPC Act.

Status: Construction Complete.

The project consisted of the construction of miscellaneous conduits and raw sewage pumping facilities to bring the pumping capacity to 939 mgd plus spares.

Construction of the Pump Station commenced in November, 1967 and completed in September, 1970. Construction of the conduits began in July, 1967 and completed in January, 1969.

Final inspection of these facilities by EPA has not been made, since they will not be operated until the primary treatment facilities being constructed under project WPC-DC-22, etc. (see below) are completed.

2. Primary Treatment Facilities

Project No.	Eligible Cost	Grant Amt.	Date of Grant Offer	Grant Payments
WPC-DC-22	$9,427,700	$5,185,230	10/27/70	$2,660,600
WPC-Md-283	9,121,100	2,750,000*	11/ 6/70	1,403,800
WPC-Va-351	493,200	271,260	5/18/71	139,100

* Eligible for $2,266,600 under reimbursable provisions of FWPC Act.

Status: Under Construction

The project consists of the construction of additional grit removal, primary sedimentation and disinfection facilities. Major components are twelve aerated grit chambers, twenty circular primary clarifiers, chlorine contact tanks and miscellaneous appurtenances. The construction contract for the primary sedimentation basins and grit removal facilities was awarded on May 6, 1971 and was approximately 57% complete on March 30, 1972. It is anticipated that these facilities will be completed by November, 1972. The construction contract for additional sludge dewatering facilities was awarded on April 13, 1971 and this work was 99% complete on March 30, 1972.

Plans and specifications for the chlorination facilities have not been submitted to EPA for review.

3. Solids Handling Facilities

Project No.	Eligible Cost	Grant Amt.	Date of Grant Offer	Grant Payments
WPC-DC-23	$13,828,100	$7,605,450	5/20/71	- 0 -
WPC-Md-296	13,378,500	7,358,170	5/20/71	- 0 -
WPC-Va-352	723,400	397,870	5/20/71	- 0 -

Status: Under Construction

The approved project consists of the construction of eight flotation thickening tanks, four sludge blending tanks, twenty vacuum filters, six multiple hearth incinerators and miscellaneous appurtenances within a solids processing building. The District has requested that the scope of the project be revised to include ten additional flotation thickening tanks, ten additional vacuum filters and two additional multiple hearth incinerators at an estimated cost of $11,618,000 which will be prorated as follows:

Locality	Estimated Cost	Federal Grant
District of Columbia	$5,752,600	$3,163,930
W.S.S.C.	5,564,600	3,060,530
Fairfax County	300,800	165,440

The contract ($2,494,000) for construction of the foundations of the Solids Processing Building was awarded on September 29, 1971 and is approximately 46% complete. Plans and specifications for the remainder of the building and equipment within it are being prepared by the consulting engineer. The entire facility is scheduled for completion in April, 1974, eights months before completion of the AWT facility.

4. Secondary Treatment Units

Project No.	Eligible Cost	Grant Amt.	Date of Grant Offer	Grant Payments
WPC-DC-24	$22,095,900	$8,845,700*	9/28/71	- 0 -
WPC-Md-299	21,373,800	7,984,023**	10/ 7/71	- 0 -
WPC-Va-354	1,155,300	667,860	10/ 7/71	- 0 -

* - Eligible to receive an additional $3,307,040

** - Eligible to receive an additional $3,771,567

Status: Under Construction

The project consists of the construction of two aeration basins, twelve secondary sedimentation basins, additional aeration facilities, an operations center for secondary treatment units, chemical feed facilities and miscellaneous plant modifications and appurtenances to increase secondary treatment capacity and to provide the initial step in phosphorus removal.

The construction contract for initial chemical feed facilities was awarded on February 29, 1972 and was 12% complete on March 30, 1972.

Plans and specifications for modifications to the existing aeration basins have been approved by EPA.

The construction plans for the remaining facilities have been submitted to EPA for review. These facilities will provide approximately 90% BOD and initial phosphorus removal and are scheduled for completion in June, 1974.

5. Excavation, Dredging, Dock and Concrete Plant

Project No.	Eligible Cost	Grant Amt.	Date of Grant Offer	Grant Payments
WPC-DC-26	$23,222,300	$12,772,260	7/28/71	- 0 -
WPC-Md-297	22,463,400	12,354,870	8/24/71	- 0 -
WPC-Va-353	1,214,300	667,860	9/ 9/71	- 0 -

Status: Under Construction

The approved project consists of dredging and construction of docking facilities, a concrete batch plant located on the dock and mass plant excavation to serve initially as an expedient to construction of major plant components included in other projects. The District has requested that the scope of the project be expanded to include an increase in the capacity of the plant's electrical system and the construction of additional parking facilities for use by contractors' employees.

The dredging and dock construction contract for the amount of $4,376,175 was awarded on December 14, 1971 and was approximately 21% complete on March 30, 1972. The $14,268,468 excavation contract was awarded on February 24, 1972 and was approximately 4% complete on March 30, 1972.

Plans and specifications for the concrete batch plant have been tentatively approved by EPA. The specifications for electrical system modifications are currently under review in the Regional Office.

6. Nitrogen Removal Facilities

Project No.	Eligible Cost	Grant Amt.*	Date of Grant Offer
WPC-DC-27	$62,656,200	$34,460,910	Not made
WPC-Md	60,608,600	33,334,730	Not made
WPC-Va-358	3,276,200	1,801,910	Not made

* - Anticipated

Status: Application being reviewed.

The project consists of construction of twenty-four nitrification reactors, twenty-eight nitrification sedimentation basins, twelve denitrification reactors, twelve nitrogen release tanks, twenty-eight denitrification sedimentation tanks plus various chemical feed facilities, aeration facilities and miscellaneous appurtenances to provide nitrogen and final stage phosphorus removal.

The facilities included in this project are currently being designed. No plans and specifications have been submitted to EPA for review.

7. Multimedia Filters

Project No.	Eligible Cost	Grant Amt.*	Date of Grant Offer
WPC-DC-28	$23,740,300	$13,057,160	Not made
WPC-Md-	22,964,400	12,630,420	Not made
WPC-Va-358	1,241,300	682,710	Not made

* - Anticipated

Status: Applications being reviewed.

The project consists of the construction of a pumping facility, thirty-two multi-media filters with chlorine contact channels and related appurtenances to enhance removal of biological and nutrient constitutents and to disinfect the plant effluent.

No plans and specifications for facilities included in this project have been submitted to the Regional Office for review. These facilities, along with the nitrogen removal features are the final major treatment units in the system and are scheduled for completion in December, 1974.

8. Miscellaneous Cleanup

A final project may be provided to cover cleanup operations and other minor facilities not included in previous projects. If necessary, its maximum eligible cost may approach $34,698,000 with an EPA grant of up to $19,083,900.

The expanded facilities when completed are expected to reduce the pollutants in the wastewater to the residuals listed in Table 1.

Upon completion of expansion, the annual operation and maintenance costs are expected to approximate $24,046,000. Of this amount $9,409,000 may be attributed to primary and secondary treatment and the remaining $14,637,000 to AWT facilities. These figures include the cost of sludge handling and disposal. Approximately 675 employees will be required to properly operate and maintain the facilities.

The existing facilities are operated by a staff of approximately 250 people. The average operation and maintenance cost for the past two years was approximately $4.5 million.

When the expanded facilities are fully operational, approximately 431 tons of sludge per day are expected to be generated. Of this amount 129.5 tons will be produced by the AWT facility. The tonnages mentioned are on a dry weight solids basis. Annual operation and maintenance costs for handling the sludge are expected to total $7,652,000 of which just under half ($3,737,000) is attributable to incineration costs.

During the plant's operational phase the following daily quantities of chemicals are expected to be used in the processes:

Phosphorus removal - Either 230 tons of alum or 118 tons of ferric chloride or a combination of these.

Nitrogen removal - Approximately 86 tons of methanol, 58 tons of lime and 2.4 tons of polymer.

Disinfection and odor control - Approximately 30 tons of chlorine.

Interim Treatment - As required by Section 10 of the Memorandum of Understanding and the October 18, 1971 agreement with Fairfax County and WSSC (Appendix G), the District is providing facilities which should reduce the BOD discharged to the Potomac to 100,000 lbs per day by May 15, 1972. Facilities to provide metal salt (alum or ferric chloride) addition to the existing secondary treatment units are under consideration.

TABLE 1

PROJECTED RESIDUAL POLLUTANTS FROM DCWPC PLANT AFTER VARIOUS STEPS IN THE PROCESS

CHARACTERISTICS	AFTER SECONDARY SEDIMENTATION mg/l	AFTER NITRIFICATION SEDIMENTATION mg/l	AFTER DENITRIFICATION SEDIMENTATION mg/l	FINAL EFFLUENT mg/l	TOTAL LOADING TO POTOMAC AT 309 mgd lbs	STANDARD * lbs
BOD, 5 Day	20	10	6	3	7736.	12,700
Phosphorus, Total	2	2	0.5	0.2	516.	560
Nitrogen, Org	4	3	2.5	1.5	3868.	-
NH_3	14	0.1	0.1	0.1	258.	-
$NO_2 + NO_3$	0	14.5	0.5	0.5	1289.	-
Total Nitrogen	18	17.6	3.1	2.1	5415.	6,130

* As Recommended by the Potomac Enforcement Conference

Sludge produced during the construction period will be disposed of by Maryland Environmental Services on state owned lands. It is anticipated that minor quantities of the sludge will be trucked to the Agricultural Research Center at Beltsville where it will be used in a research project to determine the effects of land disposal by the use of deep trenches.

Other Projects Affected by the Plant Expansion and Upgrading

1. District of Columbia

a. WPC-DC-12; POTOMAC FORCE MAIN from the Potomac Pumping Station at Theodore Roosevelt Bridge to Bolling AFB. The total eligible cost is $5,593,700 and the approved grant $600,000. Construction is nearing completion and the facilities are expected to be operable in the Spring of 1972. This is the last section necessary for full operation of the Potomac Pumping Station.

b. WPC-DC-18; UPPER POTOMAC INTERCEPTOR RELIEF SEWER (UPIR) between Foundry Branch and 31st Street in Georgetown. This is a continuation of the Potomac Interceptor which serves portions of Fairfax and Loudoun Counties, Virginia and Montgomery County, Maryland. Grants totaling $760,700 were initially approved on October 27, 1965 for a project having a current estimated eligible cost of $3,086,000. Construction contracts have been awarded on all sections of this with the exception of approximately 800 feet of the section.

The current construction consists of a 96-inch diameter sewer segment in the "Georgetown Gap," a 3000-foot missing link in the Potomac Interceptor Sewer System. An annual average of approximately 6 mgd of untreated sewage is bypassed to the Potomac River in this area. The overflow is caused by a restriction in the downstream sewer system capacity where the Rock Creek sewer system discharges into the Potomac system.

This condition causes a backup in the Rock Creek sewer and the overflows come from there. Flows from the Upper Potomac Interceptor (UPI) are pumped into the overloaded sewer thereby aggravating the situation.

Flows which would be conveyed by the proposed UPIR are connected to the existing UPI of much smaller diameter (48") which was previously operating near its design capacity. The additional flows further aggravate the situation by surcharging the UPI, causing some overflows from manholes in the area. The situation will be alleviated when the Potomac Pumping Station is fully operational and flows from the overloaded sewers are diverted through this facility. Upon completion of the UPIR, flows from the Potomac Interceptor will be conveyed directly to the Potomac Pumping Station. Excess flows from the UPI can also be diverted to the UPIR, thus eliminating the current overflow problem.

c. WPC-DC-19; POTOMAC OUTFALL SEWER from Bolling AFB to the Blue Plains site. The current grant of $758,740 was initially approved December 23, 1965, for a project having a current estimated eligible cost of $3,508,000. Construction is complete but the facilities will not be operable until project WPC-DC-12 is completed.

d. WPC-DC-25; PORTLAND STREET OUTFALL RELIEF SEWER between the Poplar Point Pump Station and the Potomac Outfall Relief Sewer. The grant offer of $2,506,020 was approved May 3, 1971, based on the District's share of the estimated eligible project cost of $4,556,400. Construction of this project under "Project C" will allow facilities in the northeast part of Washington to be utilized to their full capacity. The project is not under construction. Washington Suburban Sanitary Commission's share of the cost is included in the project WPC-Md-304.

2. Maryland - Active Projects

a. WPC-Md-170; WSSC (MUDDY BRANCH - ROCK RUN INTERCEPTING SEWERS) The project consists of approximately 58,600 lineal feet of intercepting sewer along Muddy Branch and Rock Run. The project is tributary to the Potomac Interceptor.

Initial Population (1960 census)	1900
Design Population (year 2000)	73,900
Eligible Project Cost	$1,646,000
Grant Amount	$ 512,210
Date of Grant Offer	May 7, 1968

Status: Construction complete on basic grant construction program. Increase in scope is being considered by Applicant.

b. WPC-Md-173; WSSC (JAMES CREEK)

The project consists of a pumping station and force main to convey wastes from the Patuxent Basin to the Rock Creek sewerage system.

Initial Population (1960 census)	300
Design Population (year 2000)	6,100
Eligible Project Cost	$265,000
Grant Amount	$171,870
Date of Grant Offer	April 12, 1968

Status: Construction complete

c. WPC-Md-174; WSSC (NORTHWEST BRANCH INTERCEPTOR)

The project consists of 37,500 lineal feet of intercepting sewer in the upper reaches of the Northwest Branch.

Eligible Project Cost	$820,000
Grant Amount	$215,470
Date of Grant Offer	April 5, 1968

Status: Construction complete

d. WPC-Md-219; WSSC (INDIAN CREEK, PAINT BRANCH AND LITTLE PAINT BRANCH)

The project consists of approximately 39,285 lineal feet of intercepting sewer.

Initial Population	4,360
Design Population (year 2000)	47,200
Eligible Project Cost	$1,099,000
Grant Amount	$ 414,610
Date of Grant Offer	February 10, 1969

Status: Under construction - approximately 80% complete

e. WPC-Md-209; WSSC (ROCK CREEK - ROCKVILLE INTERCEPTOR)

The project consists of approximately 4,700 lineal feet of intercepting sewer to serve the northeast section of Rockville. The project will allow the abandonment of existing inadequate facilities which are presently connected to the Cabin John System.

Initial Population	6,250
Design Population	19,700
Eligible Project Cost	$201,500
Grant Amount	$ 20,800
Date of Grant Offer	April 12, 1968

Maryland - Grant Applications

a. WPC-Md-239; WSSC (HOLLY SPRINGS)

The project consists of intercepting sewers to serve the community of Holly Springs.

Initial Population	70
Design Population	5,490
Estimated Eligible Project Cost	$65,100
Estimated Grant Amount	$35,800

b. WPC-Md-240; WSSC (PRINCE GEORGE'S COUNTY)

The project consists of the construction of relief sewers along Northeast Branch and Sligo Branch. The project is proposed to relieve a surcharging sewer which due to development may result in overflows.

Initial Population	146,475
Design Population (year 2000)	620,700
Estimated Eligible Project Cost	$4,355,300
Estimated Grant Amount	$2,177,650

c. WPC-Md-276; WSSC (CABIN JOHN CREEK)

The project consists of the construction of approximately 7,000 lineal feet of relief intercepting sewer from the Potomac Interceptor along Booze Creek and along MacArthur Boulevard.

Initial Population	85,800
Design Population	211,200
Estimated Eligible Project Cost	$782,200
Estimated Grant Amount	$430,210

d. WPC-Md-249; ROCKVILLE

The project consists of the northeast Rockville intercepting sewers which will divert flows pumped by the First Street Pumping Station to the Rock Creek system and allow the Pumping Station to be abandoned.

Initial Population	6,700
Design Population	14,090
Estimated Eligible Project Cost	$112,100
Estimated Eligible Grant Amount	$ 61,650

3. Virginia

a. WPC-VA-240; HERNDON, VIRGINIA

Interceptor sewers along Sugarland Run and Folly Lick Branch which connect to the Fairfax County system and thence to the Potomac Interceptor sewer.

Initial Population	5,000
Design Population (year 2000)	30,000
Eligible Project Cost	$781,400
Grant Amount	$257,850
Date of Grant Offer	July 24, 1967

b. WPC-VA-253; FAIRFAX COUNTY INTERCEPTOR sewers along Sugarland Run and Folly Lick Branch which connect the Herndon sewers being constructed under Project WPC-VA-240 to the Potomac Interceptor sewer.

Initial Population	4,600
Design Population (year 2000)	81,700
Eligible Project Cost	$880,000
Grant Amount	$263,990
Date of Grant Offer	August 25, 1967

Status: Construction complete

III. ENVIRONMENTAL IMPACT OF THE PROPOSED ACTION

A. Water Resources & Water Quality

The Potomac Estuary is saline in the lower reach, brackish in the middle reach, and fresh in the upper reach around Washington. Variations in salinity and nutrient enrichment from wastewater discharges have a pronounced adverse effect on the ecology of the estuary. Historical plant life cycles in the upper Potomac Estuary can be inferred from several studies as noted in the Water Resource - Water Supply Study of the Potomac Estuary[a]. Of considerable significance is documentation to the effect that in 1952 vegetation in the reaches near the Washington Metropolitan Area was virtually non-existent. In 1958 rooted aquatic plants and blooms of the blue-green algae were reported in the upper Potomac Estuary. Massive blue-green algal blooms, which are associated with large phosphorus and nitrogen loading increases, have persisted since the early 1960's. This problem is primarily attributable, on a proportional basis, to present inadequately-treated sanitary discharges from the Blue Plains and other plants in the area.

Biological observations during previous years indicate a succession of more-dominant aquatic species as incoming nutrients increase. During the summer season large populations of blue-green algae are prevalent in the freshwater portion of the Estuary. The blue-green algae are not readily used by the higher trophic forms and are often considered to be a "dead end" of the normal food chain. As the algae expires, an

---

(a) Available for inspection at the Region III Office of EPA additional demand is placed on the dissolved oxygen in the Estuary, thus reducing the assimilative capacity of the Estuary during critical flow conditions.

Mathematical model simulation of the dissolved oxygen budget including carbonaceous, nitrogenous, benthic, and algal demands indicate that the nitrogenous demand is the greatest cause of dissolved oxygen deficit in the critical reach near the wastewater discharges and that algal growths have the greatest effect on dissolved oxygen from Piscataway to Indian Head, Maryland. The nutrient enrichment and resultant eutrophication created by excessive discharges of nitrogen can only be controlled by reducing the level of nutrients discharged from domestic wastewater treatment facilities in the upper Potomac Estuary. Control of accelerated eutrophication will thus preserve the oxygen in the Estuary for assimilation of effluents which must be discharged. It will also prevent growth of nuisance aquatic growths which create objectionable odors and aesthetic conditions in the Upper Estuary.

The upper reach of the Potomac Estuary received an approximate average of 325 mgd of domestic wastewater during 1970. It is estimated that the flow will increase to approximately 473 mgd by 1980.

The existing Blue Plains sewage treatment plant had an average flow of approximately 252 mgd in 1970 and is projected to increase to 309 mgd (average) before 1975. In 1970 Blue Plains was receiving almost 80 percent of the total domestic wastewater flow in the Upper Estuary and in 1980, by projection, it will receive approximately 65 percent of the wastewater flow.

It is the opinion of this Office that advanced wastewater treatment at Blue Plains will play a key role in the future enhancement of Potomac River water quality by reducing BOD_5[a], nitrogen and phosphorous loadings in the future effluent from the Blue Plains plant.

Completion of the current expansion and upgrading of the Blue Plains facility will actually reduce the BOD_5, nitrogen, and phosphorus from approximately 145,500 lbs/day, 47,500 lbs/day, and 17,200 lbs/day[b] to less than 12,700 lbs/day, 61,130 lbs/day, and 560 lbs/day, respectively, as adopted by the Potomac Enforcement Conference for the District of Columbia. This will enhance the dissolved oxygen content in the Estuary by removing carbonaceous and nitrogenous oxygen demand and reducing nuisance algal growth by removing nutrients. Thus, the project will have a beneficial impact on the aquatic environment of the Potomac Estuary.

The Potomac River is a source of water supply for the Washington Metropolitan Area. A review of the projected water supply requirements by the Metropolitan Washington Council of Governments and the U. S. Army Corps of Engineers indicates that total water supply needs may not be available from the freshwater portion of the Potomac. The Corps has proposed a combination of multipurpose reservoirs in the Potomac Basin; however, it should not be assumed that all of the considered reservoirs will be constructed.

(a) BOD_5 is defined as that quantity of oxygen utilized in the biochemical oxidation of organic matter for five days and at a temperature of 20°C., expressed in parts per million (ppm), milligrams per liter (mg/l) or pounds.

(b) Average for July-December, 1971

Use of the Estuary for water supply is not a categorical question - certain assumptions and judgments must be made. The Water Resource - Water Supply Study of the Potomac Estuary, aided by data from a previous study (which investigated the use of the Estuary as a water supply source, primarily from the chloride intrusion aspect) concluded that the Estuary could be used for water supply. It was determined that discharge of wastewater out of the Basin would considerably reduce the water supply potential of the Estuary. The number of days that the Estuary can be used for water supply depends on freshwater flow conditions and location of wastewater discharges. Therefore, future cooperative planning efforts in the Washington Area is necessary to coordinate water supply and wastewater treatment requirements since the use of the Estuary for water supply depends on stream flows which may be altered by upstream storage, the location of wastewater discharges, and diversion of wastewater to other basins or to land if spray irrigation disposal alternatives are environmentally and economically feasible in future years.

In May 1970, Maryland's Secretary of Health and Mental Hygiene placed a moratorium on sewer connections in portions of Prince Georges and Montgomery Counties. This has essentially halted new connections in the sections of Anacostia and Cabin John Creek Watersheds which transport wastewater to Blue Plains sewage treatment facility. Connections approved prior to May 1970 are permitted to utilize the existing system.

The induced impact of this action is to create artifically higher prices for residential development land because of the decreased supply in the supply and demand ratio. Thus, housing becomes more expensive in one area and development increases in areas which may not have planned for immediate growth. Patterns of growth are then dictated by the moratorium rather than by a logical planning sequence.

Completion of the Blue Plains sewage treatment facility will not automatically allow the moratorium to be lifted. However, it is the first step toward solving the domestic wastewater treatment needs in the Washington area. The next step is selection of the location for another regional domestic wastewater treatment facility to handle flows above 309 mgd.

The existing effluent outfall is designed to discharge into the turning basin of the dredged docking facilities (See Frontispiece). Dr. Lucian Brush of Johns Hopkins University is evaluating the effect of the proposed discharge location for the District of Columbia Department of Environmental Services' Consultant. The Environmental Protection Agency will evaluate the Consultant's findings and make the final determination and recommendation as to whether or not to locate the discharge directly into the main ship channel of the Potomac. The proposed additions to the Blue Plains plant, including the outfall conduit are being designed and located so as to facilitate extension to the main navigation channel should this action become necessary.

Fuel oil will be brought to the plant by barge for use in the sludge incinerators as well as in other heating units. Approximately 60,000 gpd will be required for incineration. The District has indicated it plans to pump the oil to on-site storage tanks. These facilities will be expected to be operated in accordance with the guidelines currently being prepared by EPA.

As in any installation where oil is transferred, a possibility of spillage exists. The District will be required to construct such facilities and to operate them in such a manner so as to minimize this possibility. The U. S. Coast Guard is preparing regulations concerning prevention of pollution at oil transfer facilities. These may be expected to apply to the District. The proposed regulations were published in the Federal Register on December 24, 1971.

Should the barges be used for storage and oil transferred continuously from them directly to the combustion units the possibility of a barge breaking loose from its moorings during a storm is increased. The possibility of a line developing a leak during a period when the barge would be unmanned would also exist. Should this alternate be selected construction of a completely enclosed slip should be required to prevent any oil which may spill during the operation from reaching the River.

Before final EPA approval of the oil handling facilities is given the District will be required to prepare and to submit an adequate spill prevention countermeasure and control plan.

Chlorination of the plant effluent is being provided for disinfection. The District has been chlorinating the effluent since 1955 and has observed no adverse impacts on the biota of the river. Since residual chlorine is expected to be in a different chemical form when the new facilities are completed its effect on the river biota is unknown.

B. <u>Effects of Plant Operation on Air Resources</u>

Incinerator mass emissions (typically measured in tons per year) of the major pollutants; oxides of nitrogen, particulates, and sulfur dioxide show potential increases of each to be less than ½ of one percent of the current District of Columbia air pollution burden for these pollutants. For the entire metropolitan area, the percentage increase will be reduced to approximately 1/10 of one percent. Emissions of carbon monoxide and organic compounds will be essentially zero. Trace amounts of toxic mercury and lead compounds may also be added to the atmosphere with a negligible effect on ambient air quality.

The predicted effect of the emissions of oxides of nitrogen, particulates, and sulfur dioxide show that no meaningful degradation of air quality will occur in the immediate vicinity, the city, or the metropolitan area. For severe limits of meteorological conditions, the quality of ambient air may be diminished by small amounts to a level not exceeding 12 ½% of national air quality standards - such degradation would be restricted to local points in the vicinity which are generally expected to occur within the confines of the facility or in nearby non-residential areas east of the Potomac River. The potential degradation at other locations rapidly falls off from the predicted maximum sites. Thus from the viewpoint of both pollutant emissions and air quality, the incinerator is expected to have a negligible adverse impact. A detailed evaluation of the incinerator is presented in Appendix C.

Odors from the existing plant have been a problem in the area for many years. The adjacent Naval Research Laboratory has complained that odors become intense and produce nausea. There is also claim that structural finishes are damaged by the fumes. Complaints have also been received from persons utilizing the Anacostia Freeway.

Portions of the wastewater received at the plant are conveyed as far as 40 miles and may remain in the system as long as 30 hours. Consequently, under warm weather conditions the sewage frequently becomes septic before it reaches the plant. In passing through the treatment processes hydrogen sulfide and other odorous gases may be released at points where the wastewater is agitated.

Odors originate from the raw wastewater pumping station wet well, the grit chambers, the primary settling basins and the aeration tanks as well as the sludge processing facilities, particularly the thickening, elutriation, and vacuum filtration unit processes. A particularly severe source of odors is the sludge stockpiled on the site. Because of restrictions based on considerations of public health, the material must be retained at least one year before it is made available to the general public.

Since virtually all the land at the site will be used for treatment facilities, the sludge stockpiled on the site will be removed. Some of the sludge will be utilized in the construction of the Oxon Run Golf Course. The remainder will be disposed of at approved landfill operations by contract.

Since March 1969 the incoming sewage has been continuously prechlorinated to reduce odors. Under the proposed expansion and upgrading, facilities to control odors are included.

Prechlorination at the raw sewage pump station wet well and at the influent to the primary clarifiers will be provided. Chlorine prevents the release of hydrogen sulfide gas from the wastewater. Capacity is being increased to provide a maximum dosage of 15 mg/l at the design flow.

Exhaust gases from the raw sewage pump stations and the aerated grit chambers will be deordorized by ozone treatment before being discharged into the atmosphere.

The primary sedimentation tanks have been designed so as to allow continuous sludge withdrawal which will alleviate odors caused by sludge standing on the bottom of the tanks for a period of time. The tanks may be covered in the future if this become necessary. The exhaust gases would be treated by ozonation.

The gravity sludge thickeners, which will remain in use have been covered. The flotation thickeners, sludge blending tanks, vacuum filters and multiple hearth incinerators will all be housed in the Solids Processing Building. The ventilation in this building is arranged in such a way as to utilize the exhaust air and vacuum pump discharges for incinerator combustion air. Any odors will be destroyed in the incineration process itself or in the fume furnace through which all exhaust gases are passed.

Upon completion of the proposed expansion, the incinerated ash will be hauled directly from the solids handling building to an approved landfill site for disposal.

Some concern exists as to the effects of organisms in the wastes which may be discharged to the air by the activated sludge process. From a review of the available literature it is apparent that little research has been done along this line, especially with regards to viruses.

Studies were conducted at the University of Cincinnati in 1968 on "The Emission, Identification, and Fate of Bacteria, Airborne from Activated Sludge and Extended Aeration Sewage Treatment Plants." The largest plant used in the studies was 12 mgd. Pertinent conclusions reached in the report were:

1. Under the worst conditions, contamination of the air in the vicinity of the waste treatment plants extended 100 - 200 ft. downwind of the aerators. These distances and beyond should provide a safety factor. The minimum distance from proposed aeration basins to the plant property line at Blue Plains is approximately 150 feet along the Anacostia Freeway.
2. Approximately 300 total bacteria per cu. m. airborne at 50 ft. downwind would result in an inhalation rate of 2 bacteria per minute. This was not considered to be a significant hazard.
3. There is no epidemiological evidence to indicate the danger to public health from sewage treatment plant aerosols.

4. The predominant genera in these aerosols were Klebsiella, Escherichia and Aerobacter. Klebsiella are frequently implicated in respiratory infections.

5. Important factors associated with the recovery of bacteria at increased distances from the emitting source include wind velocity and other climatic factors, the quality of the sewage and the particle size.

The above study was limited to bacteria in its scope. We are unaware of any serious illnesses to STP operating personnel at Blue Plains caused by or attributed to their day-to-day activities in treating sewage.

Since no conclusive evidence has been presented concerning their effects it is felt that further research be conducted concerning the public health effects of airborne pathogens from STPs.

Incinerator destruction of most pathogens is assured by the high temperatures and sludge residence time in the incinerator. The combustion temperatures and durations to which the gas stream is exposed both in the incinerator and afterburner provide further assurance of pathogen destruction. Thus, neither the gas effluent into the ambient air, nor the residue ash which is to be disposed of in a sanitary landfill, offer a potential source of any magnitude for contamination from living organisms.

C. Other Project-Related Environmental Effects

The primary source of noise in a plant of this type is the blowers which supply air to the aeration basins. In the existing blower building the blower room is insulated from the rest of the building to protect the employees. The sounds are also insulated from the outside to reduce their levels to less than objectionable. The additional blowers needed for the expanded facility will also be insulated.

A second source of noise at the plant is in the sludge handling facilities. These facilities will all be housed in one building and are being designed to reduce noise levels to within a safe and comfortable range for operating personnel.

It is anticipated that the impact of noise from the plant during operation will be negligible outside the plant property. Within the various buildings precautions will be taken to reduce levels to satisfactory levels.

The visual impact of the plant from both the River and the Anacostia Freeway will be minor since most of the treatment units are low profile tank structures. The one major building which will be highly visible is the solids processing building which is approximately 600 by 280 feet. A 300 foot section of the building which houses the incinerator equipment will be 91 feet high with 4 stacks having heights of 114 feet above ground.

The building will be architecturally simple in design and in harmony with new architectural designs for this type of building in the Washington area. The basic concrete facing panels encompass the whole in clean, horizontal lines, and interrupted by the introduction of vertical ribs in the entrance way, thereby eliminating monotony. The entrance way and the vertical ribs will project shadows which will be continuously changing with the sun.

The building is located far enough from the waterline to be properly landscaped with grass, shrubbery and trees to blend with the park strip along the Potomac River proposed by the National Capitol Planning Commission. The District is cooperating with the Commission in their recommendations for the strip as well as other aesthetic considerations.

The incinerator gases will be treated so as to make them invisible when emitted from the stacks.

The project is not expected to have much impact in land use in the Metropolitan Area since immediately upon completion the facilities will be operated at nearly their design capacity. The development of the service area is considered to be mature rather than developing.

D. Short-Term Effects During Construction

It is anticipated that some siltation will occur during construction of the facilities. This is unavoidable but is and will continue to be minimized by construction procedures. (Appendices J and K) Under the mass excavation contract, two 61 foot diameter settling basins are to be constructed. Drainage from the plant site will be routed to these tanks for settling of any silt prior to discharge of the water to the Potomac. The basins are designed so that one may be taken out of service for periodic cleaning as this becomes necessary.

In addition to the settling basins the various contractors are required to promptly provide temporary measures to prevent erosion such as the construction of temporary berms, dikes, dams, slope drains, and use of temporary mulches, mats, seeding or other control devices. See Section 1-B of the District of Columbia construction specifications, included in Appendix J.

The areas where most of the new construction will occur are presently being utilized as a sludge storage area. During a recent trip to the site it was observed that little if any vegetation occurs in this area and some of the sludge is washed away during rain.

Operation of the concrete plant should have little or no effects on water quality near the site although it will be located on the dock. Raw materials will be brought to the site by barge and unloaded directly into the plant as needed.

This action will reduce the possibility of accidental spillage versus site stockpiling for future use since materials would be double-handled and hauled greater distances. Should materials be stockpiled, there exists the possibility of pollution from runoff during adverse weather.

The plant itself is to be operated in such a manner so as to prevent materials from escaping into the River. A major source of water pollution from concrete operations comes from the cleaning of trucks and other equipment. Trucks used to deliver the concrete are often cleansed at the nearest stream and the wastewater, with concrete residue is purposely washed into the stream. The rigid D. C. contract specifications require that mixing and delivery units be washed out and waste concrete be separated with:

1. the wastewater conveyed to the silting basin, and

2. the concrete residue disposed of at approved locations.

Also, no waste materials or washwater is to be dumped or allowed to run into the bay or River.

Since the batch plant is on the wastewater treatment site, trucks will be operated only on the premises and therefore control will be simplified than if they left the site to pick up loads elsewhere.

The plant may be expected to meet its present or a higher efficiency during the construction of the new facilities. Under a current contract, facilities to provide alum or ferric chloride feed to the existing aeration basins are under construction. These facilities are to be completed by May 15, 1972 and when they are in operation, a substantial increase in plant efficienty can be anticipated.

Some decrease in efficiency may be expected as individual units are taken out of service for modification; however, the efficiencies should not reduce below the current plant level.

EPA guidelines for Design, Operation and Maintenance of Waste Water Treatment Facilities require continuation of the same degree of treatment by the existing plant during the construction period for alterations. If this is not feasible, a minimum of primary treatment and disinfection must be provided at all times. Bypassing of raw sewage during the construction of the additions is not allowed unless it is absolutely necessary. If untreated effluent must bypass the system, it must be kept to an absolute minimum and receive prior approval from EPA.

During construction of the new power substation and modification of the existing substation, it may be necessary to shut down some of the existing electrical facilities in order to connect new work to them. The contractor will be required to minimize the number and duration of shut downs, or outages. He will also be required to work 3 shifts of 8 hours each to minimize the duration of any outages.

Some dust may be expected to result from construction activities. However, since most construction will be below grade where the soil is moist (continuous dewatering will be required), this is not expected to be a significant problem. The main access road around the plant site is paved and will reduce dust generation caused by traffic movements. The contractors are required to provide and maintain temporary measures to control dust during construction (Appendix J).

Some minor siltation is expected to occur during dredging operations which is caused by the disturbance of river bottom materials as they are lifted into scows and again as it is released by scows in the Dyke Marsh restoration area. Siltation is being minimized by use of a clamshell bucket in lieu of hydraulic dredging which dissolves the spoil into a slurry and then returns the water solvent to the River. The bottom dump scows drop the spoil in one or several large masses which rapidly sink to the bottom with little breakup as would occur if the spoils were removed by clamshell bucket or by hydraulic means.

EPA has been monitoring the dredging operations continuously since they began. Samples have been taken approximately once per week and tests have shown no adverse affect on water quality from the operation. Also, no changes in benthic biota, attributable to spoil disposal, have been observed. Should adverse affects on water quality be noted in the future, dredging will cease until a barrier is constructed to protect the mainstem of the Potomac River.

The dredged spoils are being utilized at the Dyke Marsh area as part of the National Park Service project to restore portions of the marsh which were previously destroyed by commercial dredging for sand and gravel. NPS plans to recreate a marsh environment. (Appendix A).

Heavy metals contained in the bottom sediments at Blue Plains are not in solution. During dredging operations, they generally will not dissolve since they are removed in large masses of earth. The metals are more concentrated at the surface than at deeper locations. Since some mixing of dredged materials taken from various depths will occur, the metals will be somewhat diluted by the material itself.

The dredged material will be placed in 20 to 40 feet deep holes at the disposal site to fill them to a level approximately 8 feet below the water surface. Clean landfill will be trucked into the site and used to complete the restoration. Any heavy metals in the dredged spoils will be trapped under the fill and should they migrate to the surface through saturated material, they will be sufficiently diluted so as to not be harmful.

During construction operations local noise levels are anticipated to be higher than normal. Under the proposed expansion the time available for construction is being reduced from the original 5-3/4 years to 2-3/4 years. This will reduce the short-term noise impact by 3 years but during the construction period will be more intense because of simultaneous activities.

Most of the construction will take place below ground level and this will have a buffering effect on noise levels beyond the site. Since the surrounding area is not residential in nature, night construction should not be particularly intrusive.

The use of the on-site concrete plant and docking facilities should reduce rail and truck traffic in surrounding neighborhoods. These facilities are located approximately 2300 feet from the Naval Research Laboratory property line and 900 feet from the Anacostia Freeway.

Land use in the area is not expected to be affected during construction with the exception of a small area located near South Capitol Street and Oxon Run which will be used as a contractor storage area. This land is owned by the National Park Service and will be restored to its original condition as required by the NPS permit. (See Appendix J).

Some degree of general inconvenience will be experienced by the surrounding area during the construction period. This impact cannot be completely avoided but mitigative measures will be employed as discussed in various sections of this report.

IV. ADVERSE IMPACTS WHICH CANNOT BE AVOIDED SHOULD THE PROPOSAL BE IMPLEMENTED

During the construction and useful life of the project certain adverse environmental effects are associated with the plant but are expected to be minimized, insignificant, or temporary.

Dredging of the navigation channel from the main channel in the Potomac to dockside is presently being implemented by use of clamshell bucket and scow in lieu of more efficient and economical hydraulic techniques. Since extensive disturbance and thus high turbidities of bottom materials is associated with hydraulic dredging, the clamshell method was selected for this operation. Adverse consequences from this project feature have been and are expected to continue to be minimal. These findings are documented in Appendix A.

The effect of disposal of spoil material downstream in Dyke Marsh is also considered to be minimal and of a short-term nature. Use of bottom-dump scows reduces the dispersion characteristics of the dredgings. Since this operation i integral to the National Park Service Restoration Plan, disposition of this material at the designated site is considered to be a long-term intangible benefit.

As presently planned, incineration of undigested sludge from future AWT facilities will occur at adjacent multiple hearth furnaces. Although this action will eliminate offensive odors and aesthetic impacts, an additional burden will be placed on ambient air quality. As clearly demonstrated in the previous section of this report and Appendix C, the incinerators will be designed utilizing contemporary abatement techniques and sophisticated equipment. The air quality impact of the incineration features for the D.C. plant is expected to be negligible although it must be conceded that these emissions are additive to the existing regional loadings.

The plant's aesthetic impact on the Potomac Estuary has also been minimized by incorporating certain architectural concepts into the design of the structures (See rendering at the beginning of this report). Noise generated from plant operation will be confined to the facilities and should not affect nearby residences to any significant degree as stated in Section III.

Short-term effects associated with construction activities and plant operation are and will be minimized to the greatest extent possible by rigid controls and a well-planned construction timetable. These impacts have been considered in detail in the previous section. Also, planned measures to mitigate these effects have been presented.

The action under consideration is not envisioned to jeopardize or conflict with the goals set forth in Section 101(b) of the National Environmental Policy Act of 1969.

V. ALTERNATIVES TO THE PROPOSED ACTION

TREATMENT ALTERNATIVES

A. No Action. Since the plant is currently overloaded (annual average flow of 259 mgd in 1971 vs. the annual average design flow of 240 mgd), this is not considered to be a practical alternative. In addition to the 259 mgd treated, approximately 6 mgd overflows into the Potomac River at the Georgetown Gap. The continuing discharge of this quantity of secondary-treated effluent to the Potomac without advanced waste-water techniques would continue to degrade the River in the future no matter how sophisticated other plants in the area treated their discharge.

Additional equipment and modifications must be made to increase the plant reliability. Increased conduit capacity between the primary sedimentation and the aeration tanks is necessary. Also, additional sludge handling facilities would have to be installed to provide adequate capacity to handle existing loads and loads that would persist even if the flows were reduced.

Reduction of pollution loadings to the Potomac is mandatory. Without substantial upgrading or abandoning Blue Plains facilities, this cannot be achieved. Therefore, a no action plan is considered to be unrealistic.

B. Retain capacity at 240 mgd but upgrade plant. This proposal was presented at the May 21, 1970 session of the Potomac Enforcement Conference by Vinton W. Bacon, Professor of Civil Engineering, University of Wisconsin, Milwaukee, who was retained as a consultant by the Department of the Interior. In his report, Mr. Bacon recommended the following for Blue Plains:

1. The capacity at the plant be limited to 240 mgd for the present.

2. Washington Suburban Sanitary Commission's (WSSC) flows other than through the Potomac Interceptor Sewer be limited to 45 mgd.

3. WSSC should immediately commence design and construction of facilities for tertiary treatment of flows in excess of 67 mgd.

4. Blue Plains be upgraded on the following schedule:

a. Primary facilities - contracted immediately for 240 mgd capacity, including excess flows;

b. Secondary facilities - begin design immediately and complete within one year; complete construction by December 31, 1972.

c. Tertiary facilities - begin design within one year and complete within one year; complete construction by December 31, 1975.

Mr. Bacon recommended that flows to the D. C. plant be allocated as follows:

Flows from:	Actual Present Inflows (mgd)	Projected Inflows (mgd)	
	Year 1970	Year 1980	Year 2000
District of Columbia	124	135	180
Potomac Interceptor:			
Maryland	1	10	22
Virginia	4	14	42
Other than Potomac Interceptor:			
Virginia	7	6	8
Maryland (WSSC)	113	45	45

As noted in the preceding table, flows from WSSC (other than through the Potomac Interceptor) would be reduced to 45 mgd. This was considered to be WSSC's capacity rights based on their capital investment of $5.5 million at the time Bacon's report was prepared. The formula used is as follows:

$$\frac{\$5.5 \text{ M Invested by WSSC @ B.P. X } 240 \text{ MGD}}{\$29 \text{ M total Investment @ B.P.}} = 45.5 \text{ MGD}$$

Under the 1954 Agreement between the District and WSSC, the latter agency requested that it be allocated a capacity of 88.6 mgd in the 240 mgd plant. Payments to the District were made on the basis of the WSSC share of expansion after 1954. Provisions exist in the Agreement for WSSC to amortize the cost of sewerage facilities existing in 1954 based on their flows through these facilities. The question of WSSC's "capacity rights" must be settled in the courts and would entail several years delays. It is doubtful that any design or construction of facilities to accommodate flows between 45 and 88.6 mgd would be undertaken by the Commission prior to final disposition of this matter. Therefore, the Blue Plains facilities would continue to be overloaded, thus discharging inadequately-treated wastes for several years after its completion in December, 1975.

Bacon stated in his letter report to the Department of the Interior that the Blue Plains plant "cannot be expanded to treat the waste load which will be generated in the metropolitan area by the year 2000 (420 mgd estimated) simply because the Potomac estuary does not have the capacity even if the degree of treatment exceeds 99% removal." Professor Bacon based his conclusions upon a review of the work done by Dr. Norbert Jaworski, Federal Water Pollution Control Administration, Chesapeake Technical Support Laboratory (now part of the Region III Office of EPA).

Dr. Jaworski's Technical Report #39 indicated that the Water Quality Standards minimum Dissolved Oxygen (D.O.) of 5.0 could be met if 57,000 pounds of Ultimate Oxygen Demand (U.O.D. is a combination of the carbonaceous and the nitrogenous oxygen demands) is discharged to Zone 1.[a] This report stated that at a capacity of 419 mgd, Blue Plains would have to provide 98% removal of 5-day BOD, 93% removal of nitrogen, and 98% removal of phosphorus.

(a) Zone 1 is that reach of the Potomac River between Chain Bridge and Broad Creek, as delineated in Technical Report #35, April , 1971, CTSL, EPA.

The 240 mgd capacity Bacon recommended was arbitrarily established since it is the current average annual flow that the existing plant was designed to treat. The plant is designed to treat an average daily flow of 290 mgd during the maximum summer months. However, with the necessity to bypass the secondary units when flows exceed a 300 mgd rate, the 290 mgd design figure does not seem practical to use.

The pros and cons of Bacon's argument are listed below:

1. ADVANTAGES

a. Initially, a smaller design flow will be handled at the plant, 240 vs. 309 mgd. However, the total discharge of pollutants to the Potomac at this point will remain approximately the same in either instance so any advantages would be minimal. Under Bacon's proposal the design capacity would ultimately be increased to 297 mgd which is only 4% less than the current project.

2. DISADVANTAGES:

a. The Blue Plains project would be completed one year later than currently planned.

b. Other plants in the area which would complement Blue Plains in enhancing water quality of the Potomac would probably be further delayed as a result of future court actions concerning "capacity rights."

Mr. Bacon's proposal was never fully considered by the District and shortly after it was introduced by Professor Bacon, the FWPCA requested that the various interested parties meet to discuss and develop an acceptable alternative. The October 1970 "Memorandum of Understanding" (Appendix G) led to the establishment of plant capacity at 309 mgd.

Bacon recommended that disposal of digested sludge on a crop rotation basis be given consideration since solids disposal by incineration can be both a source of air pollution and expensive. He stated that a loading factor of 20 dry tons per acre per year is a conservative design criterion. With an annual sludge production of 157,000 tons this would require an area of 7,850 acres or 12.3 square miles. The area of Alexandria is approximately 9,600 acres or 15 square miles. Sludge disposal alternatives will be subsequently discussed in this section.

C. Other Types of Treatment Considered.

General: Prior to reconvening the Potomac Enforcement Conference in April and May 1969, The District of Columbia's Consulting Engineers prepared a report recommending that the plant be upgraded and enlarged to meet the then existing standards for 90% removal of BOD and suspended solids, with flexibility to meet anticipated higher standards for BOD, phosphorus, and nitrogen removals. The initial phase of the plan involved expansion of primary treatment facilities, construction of additional secondary treatment facilities using the step-aeration activated sludge process, and construction of a new sludge processing facility for all sludges generated from primary and secondary treatment. Upon completion of the first phase, the plant would have a capacity of 309 mgd which would be adequate until approximately 1980. At that time, additions to increase the capacity to 369 mgd, which would be sufficient for another ten years, would be constructed. In 1990, the capacity would be increased to its ultimate of 419 mgd which should suffice until the year 2000.

The May 1969 Potomac Enforcement Conference recommended the following effluent criteria at a flow of 309 mgd:

Parameter	lbs/day	mg/l
BOD	12,700	4.95
Total P	560	0.22
Total N	6,130	2.39

All alternatives considered since that time were compared on the basis of their abilities to meet the criteria listed above. The various methods of treatment studies were reported in June 1970. This report did not include a detailed discussion of all aspects of each alternative, but did include factors for each of the primary systems which possess a major bearing on project feasibility. The two major treatment systems investigated with various alternate combinations for use at Blue Plains were:

1. Independent physical-chemical treatment.
2. Biological treatment.
   a. Conventional-tertiary treatment (physical-chemical additions)
   b. Bio-chemical treatment (nitrification-denitrification)

The costs, advantages, and disadvantages of each system are discussed in the following paragraphs and were supplied by the District of Columbia and its consultants from their report dated June 1970.[1] A detailed discussion of these processes follows:

1. <u>Independent Physical-Chemical Treatment System</u>

The independent physical-chemical treatment system involves the use of two-stage lime precipitation of either raw wastewater or primary settled wastewater for removal of organic material and phosphorus. The lime precipitation stage is followed by filtration, ion exchange for nitrogen removal, and carbon absorption for removal of remaining organic materials. Sludge from the lime precipitation stages would be dewatered and recalcined to reclaim a portion of the lime for reuse. Nitrogen removed by ion exchange would be discharged to the atmosphere as ammonia. Three alternatives of this system were investigated. Each alternative varied only in the method by which excess flows, which were to receive at least the equivalent of primary treatment and disinfection, were handled.

Capital Cost @ 309 mgd	350 - 395, $ Millions
Annual Operating Cost	31.5 - 34.0 $ Millions
Total Annual Cost	56.5 - 62.5, $ Millions

(a) Metcalf & Eddy Report - Comparative Evaluation of Advanced Waste Treatment Systems 6/17/70

A major advantage of the system was that it occupied the least amount of area of the systems studied. In addition, as a physical-chemical system it was not subject to biological upset.

The system incorporated the use of an ion exchange process for ammonia removal which could result in the direct discharge to the atmosphere of approximately 25 tons per day of ammonia. It was not known what objectionable or hazardous conditions this discharge might create during quiescent atmospheric conditions such as inversions. Investigations were scheduled for evaluation of ion exchange in the EPA-DC pilot plant to determine if it would be feasible to reclaim the ammonia from the off-gas leaving the ion exchange system before it was discharged to the atmosphere. At the time of the plant design selection no such reclamation system existed, and if such a system were feasible, it would require additional costs.

Air stripping at a high pH of ammonia from the plant flow was considered, but was determined to be inapplicable because of known operating problems with scaling and freezing, and the inability to meet effluent nitrogen criteria during the winter season.

The system incorporated the use of a carbon adsorption system which appeared to present serious and unresolved problems in controlling slime growths on the carbon. There were also several unknown parameters involved in handling combined chemical and organic sludges from first and second stage lime precipitation.

A final and major disadvantage of the system was that it required the demolition of all existing treatment units at the plant and would be the most difficult to incorporate in the system without affecting the continuous operation and the maintenance of present treatment levels during construction.

At this time(6/70) the District elected to eliminate this process from further consideration and decided to expand the existing facilities by the use of advanced biological processes (Conventional-tertiary or biochemical treatment).

The three alternatives for treating the excess flows considered were as follows:

a. Excess flows to receive two-stage lime treatment and disinfection.

Capital Cost, $Millions	395
Operating Cost, $Millions/Year	34.0
Total Annual Cost, $Millions/Year	62.5
Total Cost/mil gal treated, $	554.00

This would result in the production of a higher quality excess flow effluent which would offer more protection to the estuary for reuse. A 419 mgd plant can be accommodated on the existing site without the use of multi-level settling tanks. Omission of primary sedimentation would cause widest variation in influent concentrations. These variations would require good operating control of chemical dosages and sludge recirculation. Rag accumulations on mixers and flocculations would be severe without primary settling and would require screening to prevent their entrance into the process.

b. Excess flows to receive primary sedimentation in storm tanks followed by disinfection.

Capital Cost, $Millions	350
Operating Cost, $Millions/Year	31.5
Total Annual Cost, $Millions/Year	56.5
Total Cost/mil gal treated, $	501.00

A 419 mgd plant can be accommodated at the existing site without the use of multi-level settling tanks. Disadvantages and advantages to this action are the same as for (a) above, except that the use of storm tanks for excess flow treatment would reduce the range of flows to be handled by the lime precipitation process. The estimated average frequency of tank filling and emptying (about every four days) would result in a continually unpredictable and relatively frequent cleaning chore that would be undesirable from an operating standpoint insofar as personnel staffing and odor control are concerned.

c. All flows, including excess flows to receive conventional primary treatment with excess flows disinfected and discharged after primary treatment.

Capital Cost, $Millions	360
Operating Cost, $Millions/Year	32.0
Total Annual Cost, $Millions/Year	58.5
Total Cost/mil gal treated, $	519

This variation would require the use of multi-level settling tanks at an additional cost of $5 million to accommodate a 419 mgd plant at the site. The excess flow effluent would be of somewhat lower quality than that produced by (a) above.

Biological Treatment

The biological treatment employed the basic facilities already existing at the District of Columbia plant but required the addition of various advanced biological or physical-chemical processes to achieve the desired discharge standards. These processes can be put together in many different treatment systems. The individual treatment processes considered include the following:

1. Secondary treatment processes

   a. Step aeration
   b. Oxygen activated sludge
   c. Modified aeration

2. Phosphorus Removal processes

   a. 2-stage lime precipitation
   b. Single-stage lime-soda precipitation
   c. Metal ion precipitation (mineral addition)

3. Nitrogen Removal processes

   a. Ammonia stripping
   b. Ion exchange
   c. Biological nitrification-denitrification
   d. Breakpoint chlorination

Secondary Treatment Processes

a. Step-Aeration System

The step-aeration activated sludge process is based upon an aeration tank divided into 3 or 4 equal compartments or passes. Primary effluent can be introduced in varying amounts to any or all of the passes. Sludge from the secondary sedimentation tanks is returned to the first pass. Usually, primary effluent is not introduced into the first or even into the first and second passes. This permits the return sludge to undergo re-aeration and regeneration, and to oxidize the organic matter absorbed from previous contact with the primary effluent. This process was proposed for the secondary treatment units in the February 1969 engineering report prepared by Metcalf and Eddy.

Research conducted at the EPA-DC pilot plant in 1970 and 1971 encountered severe operational problems. These were possibly caused by filamentous organisms in the District's wastewater which, when introduced into the step-aeration system employing a relatively long biological growth period, could stimulate the reproduction of these organisms.

During the operation of the system, it became apparent that filamentous growths could by eliminated only by addition of hydrogen peroxide, a very costly method for control. Very careful operational control of the biological system would be essential to prevent the recurrence of the filamentous growth. It was further observed that the filamentous organisms in the effluent prevented satisfactory operation of subsequent nitrification systems if employed after step-aeration. Wide variations in the amount of nitrification which occurred in the step-aeration system were also detrimental to the growth of nitrifying organisms in the subsequent nitrification system or to nitrogen removal by breakpoint chlorination or ion exchange. Some denitrification occasionally occurred in the secondary settling tank with a resulting loss of solids in the overflow. The results of pilot plant testing strongly indicated that use of the step-aeration system would result in a process that is extremely difficult to control, particularly with respect to maintaining effective biological or physical-chemical nitrogen removal. The low process reliability observed during the operation of the step-aeration system in the pilot plant was not consistent with the degree of reliability necessary for discharge of effluent into the Potomac River.

b. Oxygen Activated Sludge Process

The oxygen activated sludge process uses oxygen gas to operate the secondary activated sludge wastewater treatment process. The system is based on a series of enclosed, concurrent gas-liquid contracting stages to enable high overall oxygen adsorption efficiency at a high overall average energy transfer. The contacting units are fitted with a gas-tight cover to contain the oxygen aeration gas. On-site oxygen gas generation plants are the most economical and desirable form of oxygen supply for most applications of the oxygen process.

Use of the oxygen process could result in a cost savings due to the utilization of smaller aeration tanks. This system has been operating at the EPA-DC pilot plant since May 1970 and problems of solids sepration and growth of filamentous organisms have occurred. During the winter months when wastewater temperatures were low, solids separation in the settling tank became difficult and solids escaped into the effluent. The difficulty in solids separation required larger than desired sedimentation tanks.

The oxygen process produced appreciable nitrification during the summer months which would create similar impact on subsequent nitrogen removal processes as occurred in step-aeration.

During the study period, alum was added to the system to explore the possibility of phosphorus removal by this process. The limited research did not reveal that the low phosphorus residuals required by the discharge standards could be achieved and also revealed that lime would be required to control the pH during mineral addition.

c. Modified Aeration System

The modified aeration system is presently employed in the District's plant and is capable of achieving 70 - 80% BOD and suspended solids removals. Since interim requirements of the October 1970 Memorandum of Understanding called for 90% removal of suspended solids and BOD prior to the construction of the advanced waste treatment facilities, this method was not seriously considered prior to the summer of 1971. It was also believed that the higher BOD and SS concentrations in the process effluent would interfere with the nitrification process.

Research conducted at the EPA-DC pilot plant indicated that modified-aeration effluent was a satisfactory feed to the nitrification system for the following reasons:

1. The variation in effluent quality from the mean values was markedly less than in the step-aeration and oxygen systems as operated at the EPA-DC pilot plant.

2. The ability to nitrify the modified effluent was demonstrated in the pilot plant.

3. Nitrification did not occur in the modified-aeration system even in the summer months.

4. Filamentous growth was not a problem in solids separation.

Phosphorous Removal Processes

The April 1969 Enforcement Conference effluent requirements resulted in limiting phosphorus concentration in the effluent to 0.22 mg/L at 309 mgd. Studies at the EPA-DC pilot plant indicated that these requirements could be met by two-stage lime precipitation and possibly single-stage precipitation using a lime-soda process. However, the use of lime precipitation would be more expensive than use of a metal salt (i.e., alum or ferric chloride) for precipitation of phosphorus within the biological treatment systems. Research work conducted prior to June 1970 indicated that it was not feasible to achieve specific phosphorus removal levels with the mineral addition method.

After June 1970 the three methods of phosphorus removal that were considered are:

a. Two-stage lime precipitation

In two-stage treatment, sufficient lime is added to the water in the first stage to raise the pH above 11. Precipitation of hydroxyapatite, $C_a\ CO_3$, and $Mg(OH)_2$ occurs. Between the first and second stage settlers carbon dioxide is added to reduce the pH to 10 where $C_a\ CO_3$ precipitation occurs. Phosphates included in the hydroxyapatite are removed when the precipitate settles. The sludges are then removed, thickened, centrifuged and recalcined in multiple-hearth furnaces and the recovered lime is reused in the treatment process. Approximately 90% of the phosphorus can be removed in the centrate when 25% of the solids entering the centrifuge are allowed to remain in that stream. Approximately 15% of the recoverable lime is lost in the process.

The data obtained from operation of the two-stage lime precipitation process when a high-quality step-aeration effluent could be obtained clearly demonstrated this system's ability to achieve phosphorus removals after subsequent filtration which could meet stipulated effluent quality criteria, provided satisfactory biological (90% BOD removal) treatment was achieved.

The results indicated that use of two-stage lime precipitation on a modified-aeration effluent or any other secondary effluent containing high concentrations of suspended solids and BOD did not produce an effluent after filtration containing acceptably low concentrations of phosphorus.

b. Single-Stage Lime-Soda Precipitation

In the single stage process a combination of lime and sodium carbonate is added to the wastewater to raise the pH to a desired value, usually less than 10, where the calcium carbonate ($C_a\ CO_3$) precipitates and removes the phosphorus with it. The settled lime sludge may be recalcined for recovery of lime similar to the process in the two-stage system.

Tests conducted at the EPA-DC pilot plant indicated that using modified-aeration effluent, the single-stage system with subsequent filtration was not capable of consistently obtaining acceptable phosphorus removals. The single-stage lime precipitation system seems to depend more heavily on a consistently high quality feed than the two-stage system. The consulting engineer decided to drop further consideration of this process in the summer of 1971.

c. Metal Ion Precipitation

In this process phosphates are removed by combining them with Aluminum or Iron (Ferric) ions to form a precipitate when alum (or ferric chloride) is added to the system between the aeration and the secondary sedimentation tanks for any activated sludge process. Additional tank capacity is not required with this process. Lab pilot research demonstrated that with proper pH control and filtration, residual phorphorus levels of approximately the discharge standards could be achieved.

A two-point mineral addition can be employed if activated sludge process is followed by nitrification-denitrification system. With the two-point application and filtration, phosphorus levels in the effluent at both EPA-Manassas and EPA-DC pilot plants were consistently lower than the Enforcement Conference requirements.

Alternates involving the use of alum or ferric chloride encounter the problem of chemical supplies, especially during the initial years. Contacts by the District representatives with Allied Chemical, Olin Chemical, American Cyanamid, Dow Chemical and Pennwalt Corporation all have indicated either limited supplies and/or higher costs unless long-term contracts could be negotiated. Approximately 71,500 tons per year of alum, or 36,000 tons per year of ferric chloride would be required initially. Neither Allied Chemical, Olin Chemical, or Dow Chemical have surplus alum or ferric chloride. However, American Cyanamid could manufacture 35,000-43,000 tons per year of alum, available immediately, and Pennwalt Corporation could supply about 20,000 tons per year of ferric chloride. By using both ferric chloride and alum, the initial demand could be met.

In the long-term, the demand for these chemicals at other advanced wastewater treatment plants should result in increased industrial production. All of the manufacturers are aware of the potential demand and are following the market carefully.

Nitrogen Removal Processes

The May 1969 Potomac Enforcement Conference required an effluent from the Blue Plains plant to contain not more than 2.39 mg/l total nitrogen. The methods of nitrogen removal studied were as follows:

1. Ammonia Stripping
2. Ion Exchange
3. Biological Nitrification-Denitrification
4. Breakpoint Chlorination

The ammonia stripping and ion exchange processes were previously described in the physical-chemical systems.

3. Biological Nitriciation-Denitrification

Nitrification and dentrification are the last two stages of a three-stage activated sludge system. Nitrification is the biological oxidation of ammonia and nitrite in the wastewater to nitrate. It is accomplished in two steps (ammonia to nitrite and nitrite to nitrate) by two types of bacteria in an aerobic activated sludge process. Denitrification is a anoxic activated sludge process (carried out in the absence of air) where bacteria use the oxygen in nitrate (NO_3) to oxidize a carbonaceous source, i.e., methanol. In the reaction the nitrate is reduced to nitrogen gas, and discharged to the atmosphere.

Research at various installations has indicated conclusively that a properly designed and operated nitrification-denitrification system can achieve the nitrogen standards required for discharge of the D.C. effluent into the Potomac. Research indicated that careful control of influent BOD was required for satisfactory operation of the system. Too low a BOD (less than 20 mg/l) prevented satisfactory bio-flocculation within nitrification. Too high a BOD loading (a function of the detention time within nitrification) interferes with nitrification efficiency.

4. Breakpoint Chlorination

In this process, chlorine is added to the wastewater in sufficient quantities to convert ammonia in the wastewater to nitrogen gas which is released to the atmosphere. Breakpoint chlorination does not achieve any significant destruction of organic nitrogen; therefore, its success in meeting Potomac River effluent requirements depends largely upon the installation of upstream processes which are capable of reducing organic nitrogen to low levels. Nitrification in upstream systems cannot be tolerated since the nitrate nitrogen would not be removed by the process.

Breakpoint chlorination would not appear to be compatible with the step-aeration or oxygen process in which nitrification occurs unless operating techniques are employed to prevent nitrification in the activated sludge process. Lake Tahoe has attempted to control nitrification within conventional aeration by chlorine. Breakpoint chlorination could be used with the modified aeration system. The use of breakpoint chlorination is feasible only when applied to a secondary treatment effluent in which nitrification is prevented. The process requires the addition of approximately 100 to 150 mg/l of chlorine. Sodium hydroxide is also added for pH control. Thus, the effluent will contain relatively high concentrations of sodium and chloride ions. If the water is to be reused the removal of these ions may be essential to develop the full reuse potential of the effluent.

Processes employing breakpoint chlorination would require a supply of approximately 130 tons per day of chlorine. If purchased, this amount would be transported by rail or truck. An additional 500 to 1,000 tons of liquid chlorine would be stored on site for treating peak loads and as a reserve for shipping delays. Serious safety hazards would be associated with shipment and storage of such large quantitites of chlorine.

An alternate supply could be obtained by the construction of a chlorine production plant. Approximately 25,000 kw (kilowatts) of additional power would be required for on-site production. Sources of supply of the 240 tons per day of salt required would have to be developed. Normally, a chlorine production plant of this size would contain about 100,000 pounds of mercury in cells. The plant would have to be environmentally acceptable.

2. Biological Treatment System

The treatment processes previously described were evaluated by the District of Columbia and its consultants in the following treatment systems:

A. Conventional Tertiary Treatment Systems

The conventional-tertiary treatment systems involved the use of conventional primary and biological secondary treatment followed by two-stage lime precipitation, filtration, and ion exchange or breakpoint chlorination. Mineral addition within the biological secondary could be considered as an alternate to two-stage lime precipitation. Primary and secondary sludges would be handled by conventional methods of dewatering and incineration. Sludges from the lime precipitation stages would be handled in the same manner as the independent physical-chemical system. The conventional-tertiary system involved capital and operating costs which were essentially similar to the independent physical-chemical process. Several separate alternates within this system were evaluated. These combinations were as follows:

1. Step-aeration biological secondary treatment, two-stage lime precipitation, filtration and ion exchange.

2. Oxygen activated sludge secondary treatment, two-stage lime precipitation, filtration and ion exchange.

3. Step-aeration, two-stage lime precipitation, filtration and breakpoint chlorination.

4. Oxygen activated sludge, two-stage lime precipitation, filtration and breakpoint chlorination.

5. Step-aeration, mineral addition, filtration, breakpoint chlorination, carbon adsorption.

6. Oxygen activated sludge, mineral addition, filtration, breakpoint chlorination, carbon adsorption.

7. Modified aeration, mineral addition, filtration, breakpoint chlorination, carbon adsorption.

The following is a summary of the reasons given by the District and its consultants for rejection of the various alternates:

1. Step-aeration, two-stage lime precipitation, filtration and ion exchange.

This process was rejected for the following reasons:

a. It contained the same disadvantages as the physical-chemical system insofar as ammonia removal by an ion exchange system was concerned.

b. Inability to consistantly meet phosphorus requirements due to the difficulties in operating the step-aeration process on D.C. wastewater.

c. Further research would be necessary to evaluate potential lime scale accumulation in main conduits.

d. The system would require two completely separate sludge processing methods - one for primary and biological secondary sludges, and a second system for the first and second stage lime precipitation sludges.

e. Nitrification which occassionally occurred in the step-aeration process prevent nitrogen removal requirements from being met.

f. This alternative would require the use of multi-level construction to accommodate the plant on the existing site.

2. Oxygen activated sludge, two-stage lime precipitation, filtration and ion exchange.

This system was rejected for the same reasons as alternative 1 plus the following:

a. The conversion of existing aeration tanks for pure oxygen use would present major hydraulic and construction difficulties to integrate with existing aeration and secondary sedimentation tanks, thus creating additional difficulties in maintaining present treatment levels during construction.

b. Nitrogen removal requirements could not be met due to the nitrification which occurred in the oxygen process during the summer months.

c. Further research to more fully evaluate the oxygen activated sludge process would be required.

3. Step-aeration, two-stage lime precipitation, filtration and breakpoint chlorination.

This system was rejected for reasons b, c, d and e under alternative 1 as well as:

a. Safety hazards associated with the shipment or production and storage of large quantities of chlorine.

b. Possibility of necessity to remove sodium and chloride ions from effluent in the future to develop its full reuse potential.

4. Oxygen activated sludge, two-stage lime precipitation, filtration and breakpoint chlorination.

This system was rejected for the reasons given under alternative 3 plus the oxygen process problems listed under alternative 2.

5. Step-aeration, single-stage mineral addition, filtration, breakpoint chlorination, carbon adsorption.

This system was rejected for the following reasons:

a. The nitrogen removal requirements would not be met as in alternative 3.

b. Problems associated with chlorination as listed in reasons b and c under alternative 3.

c. It was not felt that single-stage mineral addition would consistently produce an effluent which would meet phosphorus requirements, even with filtration.

6. Oxygen activated sludge, single-stage mineral addition, filtration, breakpoint chlorination, carbon adsorption.

This system was eliminated for the same reasons as alternative 5 plus reasons a, b and c under alternative 2.

7. Modified aeration, mineral addition, filtration, breakpoint chlorination, carbon adsorption.

This system was eliminated for the following reasons:

a. Reason c under alternative 5.

b. Problems associated with the use of chlorine listed in reasons b and c under alternative 3.

It should be noted that with the modified aeration system in which nitrification is prevented the nitrogen removals required to meet effluent standards could be accomplished.

B. Bio-Chemical Treatment Systems

The bio-chemical treatment system incorporates conventional primary and biological secondary treatment, biological nitrification-denitrification for removal of nitrogen, and filtration. The bio-chemical treatment system substitutes the use of nitrification-denitrification process for nitrogen removal, thus eliminating many of the disadvantages associated with ion-exchange or breakpoint chlorination which were considered in the other two major systems for nitrogen removal. This system, however, requires the largest land area, although a substantial reduction could be obtained if aluminum (or ferric chloride) addition to the secondary facilities would produce adequate phosphorus removal. If two-stage lime precipitation was required for phosphorus removal, extensive use of multi-level settling tanks would be necessary to accommodate a 309 mgd facility at the existing site.

The District felt that the major advantage of this system was that it incorporated components which contain the highest degree of confidence in achieving BOD, nitrogen, and phosphorus removals and employed a single sludge disposal system for which design and operating experience had long been established. Also, the system could be added to the present plant with a minimum of interruption to plant operation and efficiency.

Nine separate alternates within this system were evaluated. These combinations are as follows:

1. Step-aeration, nitrification-denitrification, two-stage lime precipitation and filtration.

2. Oxygen activated sludge, nitrification-denitrification, two-stage lime precipitation and filtration.

3. Modified aeration, nitrification-denitrification, two-stage lime precipitation and filtration.

4. Step-aeration, nitrification-denitrification, single-stage lime precipitation and filtration.

5. Oxygen activated sludge, single-stage lime precipitation and filtration.

6. Modified aeration, single-stage lime precipitation, filtration.

7. Step-aeration, mineral addition, nitrification-denitrification, filtration.

8. Oxygen activated sludge, mineral addition, nitrification-denitrification, filtration.

9. Modified aeration, mineral addition, nitrification-denitrification, filtration.

The following is a summary of the reasons given by the District and its consultants for acceptance or rejection of the various alternatives:

1. Step-aeration, nitrification-denitrification, two-stage lime precipitation and filtration.

This series was rejected for the following reasons:

a. Operational difficulties in the step-aeration process and nitrification which occurred; each prevented the satisfactory operation of the nitrogen removal processes.

b. This system would require the largest land area or the maximum of multi-level construction to be accommodated on the existing site.

c. Further research would be necessary to evaluate potential lime scale accumulation in main conduits.

d. The system would require separate sludge processing systems - one for biological sludges and the second for first and second stage lime precipitation sludges.

2. Oxygen activated sludge, nitrification-denitrification, two-stage lime precipitation and filtration.

This system was rejected for the reasons b, c and d in alternative 1 plus:

a. The conversion of existing aeration tanks for pure oxygen use would present major hydraulic and construction difficulties to integrate with existing aeration and secondary settling tanks, thus creating additional difficulties in maintaining present treatment levels during construction.

b. The nitrification which occurred in the oxygen aeration stage during summer months prevented the satisfactory operation of the nitrogen removal process.

3. Modified aeration, nitrification-denitrification, two-stage lime precipitation and filtration.

This system is capable of producing an effluent of high quality which would meet the requirements set by the Potomac Enforcement Conference. It was considered until the final design decision was made and was rejected when it was determined that two-step mineral addition could achieve the required phosphorus removals within the available plant site. Should this system have been selected, an additional eight multiple-hearth furnaces identical to the eight utilized in the current project would be required for lime recalcination. Emissions from these could be expected to be similar to the proposed facilities.

4. Step-aeration, nitrification-denitrification, single-stage lime precipitation, filtration.

This system was dropped from consideration for the following reasons:

a. Same as reason "a" in Alternative 1.

b. The single-stage lime precipitation process was not considered sufficiently reliable due to its dependence on a very high quality influent for use at this facility.

5. Oxygen activated sludge, nitrification-denitrification, single-stage lime precipitation, filtration.

This system was rejected for the reasons a, b and c in alternative 2 and reason b under alternative 4.

6. Modified aeration, nitrification-denitrification, single-stage lime precipitation, filtration.

This system was rejected for reason b listed under alternative 4.

7. Step-aeration, mineral addition, nitrification-denitrification, filtration.

This system was rejected for the following reasons:

a. Reasons "a" under alternative 1.

b. The system would not be constructed on the existing site without the use of multi-level construction.

8. Oxygen activated sludge, mineral addition, nitrification-denitrification, filtration.

This system was dropped from consideration for reasons a, b and c under alternative 2.

9. Modified aeration, mineral addition, nitrification-dentrification, filtration.

This is the process sequence which was accepted by the District for use. It was felt that it would produce an effluent which meets all Potomac Enforcement Conference requirements.

The use of mineral addition to the modified aeration process can produce an unnitrified effluent of consistently high quality for the nitrification and denitrification reactions to be optimized. The addition of a second dose of metal ions in the nitrogen release tanks can reduce the residual phosphorus to a satisfactory level.

The process has the disadvantage of being based on biological reactions and therefore subject to disruption by toxic materials which may occassionally be present in the wastewater.

It is this office's opinion, however, that the system selected by the District if properly designed and operated is capable of consistently producing an effluent which will meet Enforcement Conference requirements.

D. South Tahoe Design

The 7½ mgd South Tahoe treatment plant consisted of conventional biological treatment including primary settling, aeration, and secondary settling, followed by chemical treatment and phosphate removal, nitrogen removal by ammonia stripping, mixed media filtration, activated carbon adsorption, and disinfection. There are three solids (sludge) handling systems, each utilizing multiple hearth furnaces. The sewage sludges are incinerated to insoluble, sterile ash; the granular carbon is thermally regenerated and reused, and the lime sludge recalcined for reuse.

The biological treatment units are of conventional design. Phosphates are removed by two-stage lime precipitation using a rapid-mix basin where lime is added to the wastewater, and a flocculation tank and clarifier where the phosphate-laden sludge is settled. The wastewater is then recarbonated using carbon dioxide to recover calcium as calcium carbonate which is settled in the second stage clarifier and passed through mixed-media filters and carbon columns. The mixed-media filters remove all suspended solids and significant amounts of phosphorus from the water as well as protect the carbon columns from interruptions in biological and chemical treatment. The carbon columns "polish" the wastewater, removing much of the remaining BOD, color and detergents.

Some problems have occurred caused by calcium deposits in pipelines carrying lime slurry with high pH water, or lime sludge. The lines must be maintained frequently using cleaning pigs. The addition of lime raises the pH to a level where the ammonium ions are converted to ammonia. Initially the wastes are passed through a stripping tower where the ammonia is discharged to the air. This process has been abandoned due to freezing problems and calcium carbonate deposits. The plant is now considering breakpoint chlorination for nitrogen removal.

The wastes are finally disinfected by chlorination before discharge to Indian Creek Reservoir. Tests were made for viruses during two summers and none were recovered from the chlorinated effluent. Although the results (which are based on extremely limited data) are favorable, it is not possible to make any substantial conclusions at this time.

No serious breakdowns have occurred at Tahoe with the exception of the ammonia stripping towers. Since all treatment units are duplicate, when one is inoperable the load is treated by the other unit.

Individual units from the Tahoe type plant were evaluated in various combinations. Results from the EPA-DC pilot plant indicated that adequate phosphorus removal could not be achieved using single-stage lime precipitation with the effluent from modified aeration basins. Two-stage precipitation was abandoned when it was determined that alum precipitation could meet the Enforcement Conference effluent requirements.

The ammonia stripping and breakpoint chlorination considered at different times at Tahoe were considered at Blue Plains but discarded due to reasons stated previously in this section.

Mixed media filtration and chlorination are being utilized in the proposed expansion at Blue Plains.

Carbon columns for adsorption of remaining organics were considered as part of the independent physical-chemical system but not in other systems since the required treatment levels probably would not be achieved even with carbon columns but can be met in the selected system without their use.

The portions of the project necessary to meet Potomac River requirements were considered but discarded at the time the basic design decisions were made for the reasons described previously in this section.

E. Spray Irrigation (Muskegon Plan) -

The treatment system being constructed for the Muskegon, Michigan area was first brought to this office's attention in November 1971, over a year after the District of Columbia had been committed to enlarging and upgrading the existing Blue Plains facility by the end of 1974. The Muskegon system consists of a collection network, pump station and approximately 11 miles of force main to transport the raw sewage to the treatment site, 24 acres of aerated lagoons, 2 - 850 acre storage lagoons and approximately 6,000 acres of irrigation land which acts as a "living filter" for the treated effluent. A drainage network is being provided to prevent the soil from becoming saturated. The entire system is designed to treat an average daily flow of 42 mgd from domestic and industrial sources.

Before a system of this type can be designed or its cost estimated with reliability, a location or locations for the facilities must be determined. It was felt that the spray area must be within a 100-mile radius of Washington to make it feasible at all to construct. A 100-mile radius circle passes near Richmond and Charlottesville, Virginia; Cumberland, Maryland; and Harrisburg, Pennsylvania. Nearly all the Maryland and Delaware portions of the Delmarva Peninsula with the exception of the easternmost 10 miles is included. The area is effectively reduced on the west by the presence of the Blue Ridge Mountains; unless the Potomac River was followed, the wastes would have to be pumped over or through (by tunnel) the Blue Ridge Mountains.

Any areas which are planned for other than agricultural use in the next 50 years or so could not be effectively utilized since the pipes are considered to be permanent fixtures.

Areas north and west of Washington were not considered practical since the wastes would have to be pumped back through the city or pumped around it to reach those locations. Should further consideration be given in the future to facilities in this direction it is recommended that wastewaters be intercepted along the Potomac River, Rock Creek, and Anacostia Rivers near the District of Columbia Line and pumped back from those locations to lessen the flows which would be pumped from the District. This would allow the pipelines through the District to be smaller and they could be constructed with less difficulty and disruption to established communities.

Areas in Prince George's and Anne Arundel Counties were not considered practical since they will be virtually developed in the next 50 years.

From discussion with Maryland Environmental Services staff it was suggested that some suitable areas might be found in Calvert or St. Mary's Counties. However, it is doubtful that the acreage available would be adequate to serve the District's needs. Therefore, the remaining area in Maryland which appears to be most desirable is the Delmarva Peninsula. Possible areas in Virginia were not considered.

It is highly recommended that the flows be retained in the Potomac River Basin since the discharge of these quantities of waste beyond the Basin would probably preclude the Upper Potomac Estuary as a possible future source of water supply.

Potential land areas were calculated for several systems. Design criteria similar to Muskegon's were used where practical and Virginia's "Tentative Design Criteria For Spray Irrigation For The Disposal Of Sewage Effluents Which Have Received Secondary Treatment" (Appendix D) were also utilized. The following is the basis of the estimates:

1. Treatment facility - Aerated lagoons having a depth of 15 feet (Muskegon).

2. Holding ponds - 120 day capacity having a depth of 9 feet (Muskegon). These are necessary to provide storage for flows during winter months and rainy weather. The detention time could possibly be reduced for the District of Columbia area since it has a milder climate. A minimum 30 day detention time is required by Virginia Standards.

3. Spray application rate - Used two inches per week maximum which is the tentative Virginia standard. It is noted that soil characteristics might require lower rates. Muskegon used three inches per week.

4. Border zones - Tentative Virginia standards require a fence to be located 60 feet beyond the normal projected spray area with an additional 400 - 600 feet from the fence to the property lines of existing or proposed residences or highways. The minimum 400 foot distance was used in the calculations.

Areas required for the following flows were calculated:

1. 309 mgd - Blue Plains design flow

   473 mgd - Anticipated flow, District of Columbia Metropolitan Area, year 1980

   861 mgd - Anticipated flow, District of Columbia Metropolitan Area, year 2000

   1342 mgd - Anticipated flow, District of Columbia Metropolitan Area, year 2020

The areas in acres needed are shown in Table 2 along with the land utilized at Muskegon. All areas are net and do not include embankments, dikes, etc.

TABLE 2

Acreage Required to Accommodate Spray Irrigation Techniques

	Muskegon	Blue Plains	D. C. Metropolitan Area		
			1980	2000	2020
Flow, mgd	42	309	473	861	1,342
Aerated lagoons	24	63	97	176	275
Holding pond	1,700	12,700	19,354	35,231	54,913
Spray field	6,000	66,300	101,627	184,990	288,340
Border zone	2,276*	2,500	3,084	4,160	5,190
Total (Rounded)	10,000	81,600	124,200	224,600	348,800

* Adjusted to equal total of 10,000 acres purchased.

A brief discussion of the advantages and disadvantages of spray irrigation versus the proposed Blue Plains expansion follows:

a. Advantages

1. Nutrients in the wastewater would be returned to the natural cycle and be used as fertilizer for crops.

2. Increased crop yields due to irrigation and fertilizer effects.

3. Wastewater will be cleaned as it passes through the soil.

4. Nutrients would be completely removed from the Potomac Estuary where they are currently responsible for algae growth.

5. Blue Plains site could be utilized for other purposes, i.e., parks. Removal of existing facilities would involve considerable cost.

6. Removal of incinerator emissions from atmosphere.

7. Less susceptible to shock loadings or industrial discharges, however, there is minor industrial wastes in the District of Columbia area.

b. Disadvantages

1. Delay in reducing pollution in the Potomac. Blue Plains is scheduled for completion in December, 1974. A spray irrigation system would probably take several additional years to complete. Site and rights-of-way acquisitions for force mains would take three years minimum, unknown maximum. The District's Department of Environmental Services does not have the power of condemnation beyond District boundaries. All land must be acquired by negotiation or by another cooperating agency such as the Maryland Environmental Services. Design time would require about 1-2 years, and construction time 2-3 years, assuming that the project would be fragmented into many small contracts. The total time necessary to commence spray irrigation operations (absolute minimum) is 6 years. A more realistic timeframe is estimated to be 11 years. Project design could proceed concurrently with rights-of-way acquisition.

2. Pumping raw sewage - Should a leak or break in the force main occur, serious health hazards and/or severe water pollution might result from the discharge of untreated sewage. Air must be injected into the system periodically to prevent the wastes from becoming septic. This results in obnoxious and explosive gases being produced.

3. Power required for pumping - It takes 532 kw power to raise 309 million gallons of water 10 feet in elevation. In order to pump the wastes out of the District of Columbia area they must be raised at least 200 feet in elevation. The total power required to pump wastes a distance of 100 miles would be approximately 37,220 kw, which is sufficient to meet the average demand of 52,000 homes.

4. Reliability of pumping and treatment - Several pump stations must be constructed with electrical power supplied to them. Should any one station in the transmission system become inoperable due to power failure, the total system would fail. At Blue Plains, power is delivered to the substation on site from four different independent sources. Should any one fail the system can immediately be switched to another source. The substation transformers are also designed to be operated to compensate for voltage drops which may occur in the system during "brownouts". This may not be feasible in a series of facilities.

5. The spray irrigation system extends over many square miles and would be much more difficult to supervise than a more compact system.

6. The possibility of crossing Chesapeake Bay where the maximum depth ranges from 60 to 120 feet would cause severe construction difficulties as well as potential pollution problems should a leak occur. Underwater leaks would be difficult to discover and repair.

7. The land required for spray irrigation is 81,600 acres.

8. The major consumer costs involves the land which is currently not eligible for Federal participation. This cost must be directly borne by the public.

9. Approximately 200 families had to be relocated under the Muskegon project at an estimated cost to the Federal Government of $1,600,000 under the Relocation Assistance Act, PL 91-646. Relocation requirements for Blue Plains wastewater would probably be substantially greater.

10. Transfer of large volumes of water out of the Potomac Basin.

11. A large percentage of land required will be devoted to border zoning. For each mile of highway through the irrigation field an additional 111.5 acres of land will be required.

12. Siltation during construction may be reduced but not entirely eliminated.

C. Unknowns

1. Effects of increased flows in local streams due to spray irrigation. Will this increase the chances of flooding downstream?

2. Effects of waterfowl utilizing storage ponds for nesting areas. Will they transmit pathogenic viruses and bacteria?

3. Long-term effects of discharging trace elements to the soil. Boron, for instance, is detrimental to plant life in sufficient quantities. After many years of irrigation practices, will the land become infertile? Some current research being conducted at Virginia Tech indicates this may be a reality.

SLUDGE DISPOSAL ALTERNATIVES

Solids removed by sedimentation tanks are withdrawn from the tanks as a liquid-solid mixture which contains 94 - 99% water, is highly putrescible, contains pathogenic organisms and is unsatisfactory for disposal on land or in water. The process selected to convert this offensive material to a relatively innocuous residue, permitting its ultimate disposal without nuisance or hazard, has a profound effect on the efficiency, nature, and cost of the basic treatment processes. The method of sludge processing selected should not result in recycling to the treatment process in excessive amounts of solids, organics and nutrients which could overload the process and result in plant effluent quality deterioration.

Various sludge processing and disposal systems were compared on their abilities to afford optimum removal of pollutants, minimize deleterious effects on all phases of the environment, and offer reasonable construction and operating costs.

Appreciable amounts of phosphorus and nitrogen are removed in sludge by the sedimentation processes, but upon digestion they are converted to soluble forms which, after elutriation, must be returned to the incoming wastewater flow and hence find their way into the plant effluent. The phosphorus removed by alum coagulation remains with the sludge and is not present in appreciatle quantities in the supernatant liquor.[a]

(a) Culp Advanced Wastewater Treatment, P. 180

Each of the processes currently employed at the District's plant (gravity sludge thickening, anaerobic sludge digestion, digested sludge elutriation, and dewatering) involves return to the treatment process of varying amounts of BOD, SS and nutrients. The magnitude and effect of these returns can be reduced but not eliminated by additional sludge processing and treatment facilities to compensate for the recycled loads. The facilities needed to digest all sludge produced by the selected system would include 35 additional digestors. The resulting nitrogen load recycled to the system in the supernatant would require a 28% increase in the size of the nitrification and denitrification reactors. A smaller increase in the other nitrogen removal facilities would also be required. The site is not sufficiently large to accommodate these additional facilities.

A variety of sludge processing methods are employed in the United States and in foreign countries. Most of these involve disposal of the resultant residue on land or ocean after various degrees of pre-processing. The residue may range from a partially stabilized liquid-solid mixture to an inert ash. The methods applicable to this project logically divide into two broad categories based on the ultimate disposal of the processed solids:

(a) Ocean Disposal

(b) Land Disposal

(a) Ocean Disposal: The disposal of partially stabilized liquid sludge to the ocean either through a subaqueous pipeline or a specially-designed vessel has been practiced in some coastal cities for many years, including New York City, Philadelphia, and Los Angeles. At the time a preliminary engineering report was completed in February 1969, the FWPCA (an agency whose function are now included under EPA) was considering a nationwide policy on ocean disposal. Compliance with the following guidelines was required before any water pollution control project involving ocean disposal of sludge would be considered eligible for construction grants under PL 84-660:

(1) Such a disposal system should be supported by an adequate demonstration that alternative methods of disposal have been reviewed and are either not economically justified or create a greater pollution hazard;

(2) Adequate and effective assurances must be given that the sludge to be disposed of will receive satisfactory treatment in every case;

(3) The selected disposal area must, on the basis of adequate study, demonstrate that there is no foreseeable hazard of pollution or violation of applicable standards;

(4) Arrangements must be made for appropriate monitoring and a commitment made to move the disposal area when, in FWPCA judgment, a pollutional hazard is created <u>and</u> a commitment made to abandon ocean disposal if another site cannot be found or if long-term effects of sludge dumping are found, in the judgment of FWPCA, to be unduly deleterious to water quality;

(5) Adequate assurance must be given that the sludge will be dumped in the selected area and in the manner prescribed either by FWPCA or in the dumping permit.

The District's engineers concluded that ocean disposal could not be considered a long-term solution to the sludge problem.

The Council on Environmental Quality in its report to the President of the United States in October 1970 recommended that ocean dumping of digested or other stabilized sludge should be phased out and no new sources allowed. Also, elimination of ocean dumping of undigested sewage sludge was recommended. In cases in which substantial facilities and/or significant commitments exist, continued ocean dumping may be allowed only until alternatives can be developed and implemented. Continued dumping was recommended only as an interim measure.

It has been this office's policy for several years to discourage any communities not presently using ocean dumping of sludge from starting this practice. Municipalities within the region which do practice this method of sludge disposal are also being encouraged to develop alternative methods.

(b) Land Disposal: Prior to January 1969, when Metcalf and Eddy's preliminary report recommending expansion of the plant was issued, the District considered several methods of sludge disposal on land. Such methods which were studied and abandoned as not practical were:

1. Pumping digested sludge to drying beds.

2. Pumping digested sludge to farm land for irrigation and fertilizing.

3. Disposal of digested sludge in lagoons.

4. Disposal of partially dewatered digested sludge as a soil conditioner or to a landfill.

5. Disposal of flash-dried digested sludge as a soil conditioner.

All the above-listed alternatives with the exception of incineration specified digested sludge. As mentioned previously, nutrients removed in the primary sedimentation process plus additional BOD would be returned to the treatment process with the supernatant if anaerobic digestion was used. The phosphorus removed by alum coagulation would not be returned in appreciable amounts. Research indicates that the use of alum has no effect on the digestion process. No information was found concerning the effects on digestion of the use of ferric chloride as a precipitant.

Besides nutrient problems, anaerobic digestion presents operational difficulties and requires much attention. It was reported that digestor problems generally have increased because of the conversion to biodegradable detergents.

Anaerobic digestion has one advantage in that the process results in the production of methane gas which may be used as a fuel.

Alternatives considered for disposal of digested sludge are as follows:

1. Pumping to drying beds

This was studied and abandoned since "a vast open area is needed and is not available". Approximately 77 acres of covered or 102 acres of uncovered drying beds would be required. Should uncovered beds be desired, a buffer zone surrounding them would be necessary to reduce the effects of odors on nearby residences. Should covered beds (resembling greenhouses) be chosen, a smaller buffer zone would be required to reduce vandalism by objects thrown through glass panels. None of the areas include provisions for access roads to remove the dried sludge.

The dried sludge would probably be disposed of through the fertilizer market or by landfill operations. Channels for disposal must be sought to accommodate these substantial quantities.

Siltation and erosion would occur during construction of the pipeline and beds, although this can be reduced by the use of proper construction methods.

2. Pumping to farm land for irrigation and fertilizing.

This method was abandoned because the only agricultural land available was in another State and it was felt that permission to cross State lines would not be granted.

For this method to be presently considered, a suitable site would have to be acquired or contracted. Also, right-of-ways for the pipeline must be obtained. Since the District does not possess condemnation powers beyond its area, this could present a problem without the hearty cooperation of the other affected States. It is felt that some delay will be experienced in completing the solids handling facility should a pipeline be constructed. Siltation would occur during construction of the pipelines.

The Maryland Environmental Services has contracted to conduct research on the practicality of utilizing Blue Plains sludge as a fertilizer by "deep plowing" into agricultural land. They propose to truck the sludge to the points of disposal. The use of trucks would add to odors in the vicinity of the plant as well as to traffic problems.

3. Disposal of digested sludge in lagoons.

This alternative was rejected for the following reasons:

a. Digestion problems described previously.

b. The need to acquire large and well isolated tracts of land. Lagoons may be filled to a depth of approximately 4 feet with detention for 2-3 years. Using sludge with approximately 95% moisture and a 3 year detention time, lagoon areas of 1700 acres would be required. Additional areas for buffer zones for odor control would be necessary.

c. Possibility of ground water pollution.

d. Necessity to treat excess liquid which would overflow from a lagoon.

e. Necessity to dispose of dried sludge or acquire additional lagoon sites.

f. Need for porous ground - the septic tank problems in the metropolitan area indicate that the subsurface soils are not suitable for lagooning.

g. Possibility of insect infestation.

h. Right-of-way problems getting to the site.

Lagooning of sludge appears practical only when inexpensive land is available and located relatively close to the treatment plant site. This is not the case in a major metropolitan area such as Washington, D.C.

4. Disposal of partially-dewatered sludge as a soil conditioner or to a landfill.

This method is currently practiced by the District but is felt to be impractical in the future due to the greater quantities of material produced with the AWT processes, and the gradually decreasing demand for such sludge. Areas would be required to store the sludge before it was hauled away, especially during winter months when it could not be used as a soil conditioner.

Disposal to a landfill was also considered inapplicable due to the undesirability and expense of hauling, and the lack of available land within a reasonable distance.

5. Disposal of flash-dried digested sludge as a soil conditioner.

This method would utilize a flash-drying system similar to the one constructed in the early 1950's at Blue Plains. Due to a decreasing demand for this material as a fertilizer, this method was abandoned due to its limited potential. Air pollution would result from the flash-drying units although this may be reduced by control equipment.

The flash-drying system has the major disadvantages of complexity, potential for explosions, and potential for air pollution by fine particles. It is not considered equal to other furnace designs in comparative situations.

6. Disposal of incinerated sludge ash to a landfill.

This is the method of disposal selected by the District.

It has the advantage that the smallest amount of material to be disposed of results. The ash is generally inert and causes a minimum environmental impact at final disposal.

The major disadvantage of this method is the potential air pollution which may be caused by incineration. It is felt that this pollution can be adequately controlled so as to meet applicable standards. Air pollution implications resulting from the incineration feature of this project is addressed in detail in Section III and Appendix C of this report.

7. Other Methods of Sludge Treatment

The use of pyrolysis was not considered by the District as a means of sludge treatment. Pyrolysis of sewage sludge is in the early research and development stage, with any results being at least 5 to 10 years away. At present EPA is not supporting any research on this subject.

The pyrolysis process results in decomposition and the formation of a fuel gas (part carbon monoxide, part hydrogen). The gas is used to support the unit's combustion and to drive off water. Overall, the process would probably not be cheaper than incineration since filtration would continue to be required.

ALTERNATIVES TO DREDGING

Several alternatives for conveying construction materials, excavated soils, chemicals, process wastes, etc., to and from the plant site have been considered. Access to the site is limited to three possible transportation modes: highway, rail and water.

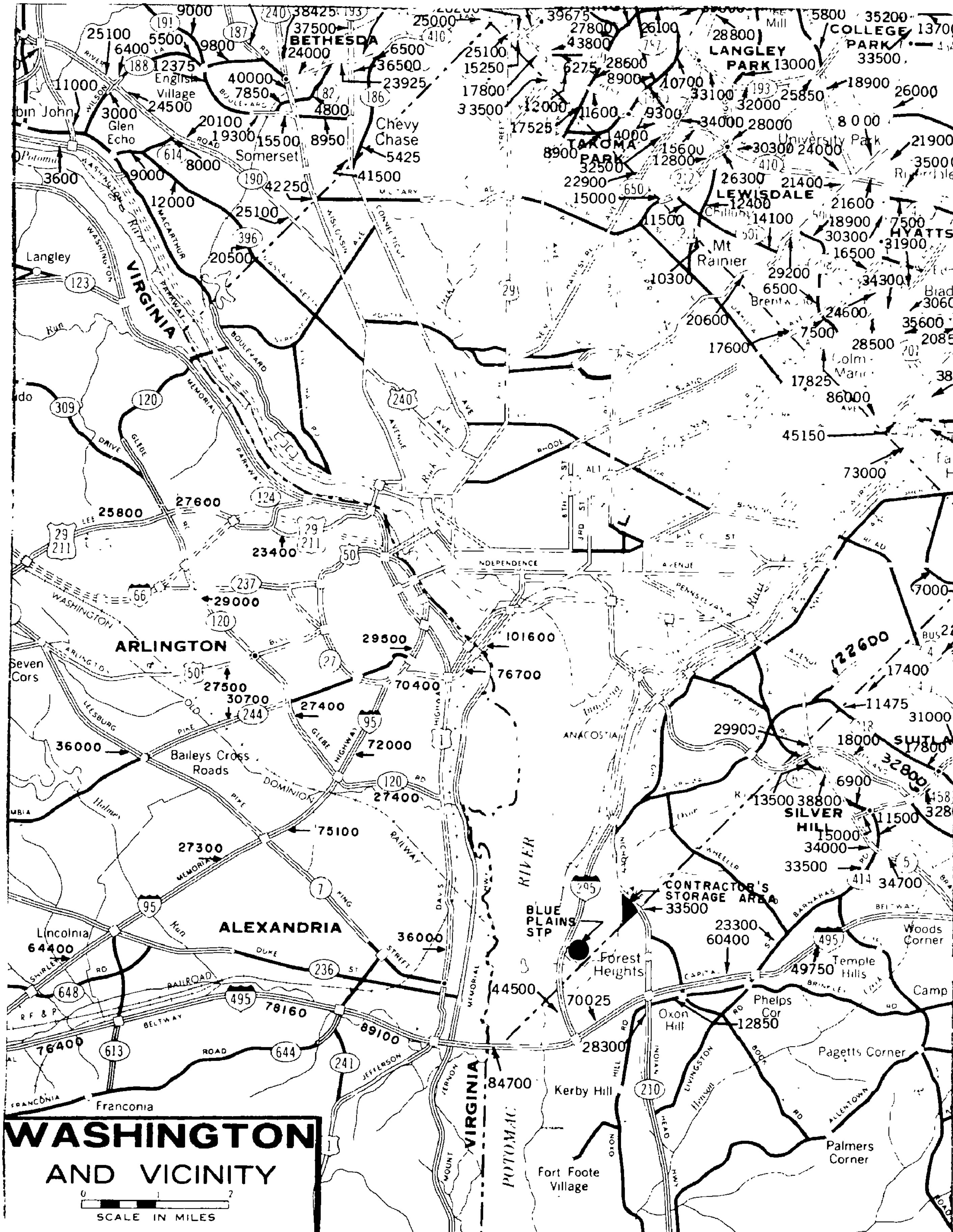
1. Highway. There are two roads which provide access to Blue Plains. The major route is the Anacostia Freeway, I-295, which provides access from both the North and the South Freeway (Figure 2). Traffic from the north must exit from the freeway at the Naval Research Laboratory exit and follow Overlook Drive to the plant site. Traffic is controlled by a traffic light at the intersection with Chesapeake Street and by a stop sign at the entrance to the NRL.

   Traffic from the south must exit at the NRL interchange, cross under the Freeway and turn left at the entrance to the Laboratory.

   Egress from the site southbound is directly onto the access ramp to the freeway. Traffic would be a serious problem during the evening rush hours.

   Egress northbound can only be accomplished by making a left turn across the southbound freeway access ramp, and then proceed to the stop sign at the NRL entrance. Traffic may turn onto the freeway at this intersection.

   Traffic from the north may also reach the site by using South Capitol Street and Overlook Drive which parallels the freeway. This traffic would cross the entrances of the



AVERAGE DAILY TRAFFIC (1971) IN THE WASHINGTON METROPLITAN AREA

Figure 2.

SOURCE: FEDERAL HIGHWAY ADMINISTRATION
U.S. DEPT. OF TRANSPORTATION

Anacostia Naval Air Station and Bolling AFB, before reaching Chesapeake Street, and then proceed to the plant as described above. A special freeway interchange was considered but was abandoned since it would probably take as long to construct as construction of the plant itself. To delay the plant construction until the interchange was complete would mean a several year delay in cleaning up the Potomac.

Permission to construct a temporary exit ramp from the plant site has been requested from the District of Columbia Department of Highways; however, no action has been taken.

2. Rail. A single railroad spur presently provides rail access to the plant site. This line generally parallels the Anacostia Freeway for about 6 miles from the railroad yards between E. Capitol Street and Massachusetts Avenue, S. E. The railroad passes through residential and industrial-commercial areas from the yards to near South Capitol Street, then passes along the Anacostia Naval Air Station and through Bolling AFB and the NRL. The railroad crosses the Suitland Parkway near its intersection with the Anacostia freeway without the use of a grade separation structure.

The railroad is presently used to convey chlorine, ferric chloride and polymers to the Blue Plains facility. Approximately 2.27 tank cars of chlorine are used per week on an annual average. During the peak summer months nearly three carloads are utilized each week.

Use of the railroad to convey large quantities of materials would require a parallel line and marshalling yard at the site. Since virtually all the land at the site is occupied by existing structures or will be occupied by facilities being constructed, there is no space for the marshalling yard on land. Permission to parallel the line through the military bases would probably not be given for security purposes. With a substantial increase in rail traffic there is a definite possibility that a grade separation structure would be necessary at the Suitland Parkway crossing to limit the adverse effects on traffic on that road. This would necessitate a substantial delay in the completion of the treatment facility.

3. Water. There is currently no water access to the plant site. Under the proposal, a navigation channel to the Federal project in the Potomac and a turning basin is being dredged and dock facilities constructed. This access will provide for efficient transport of construction materials and will guarantee timely shipment of chemicals during the operational life of Blue Plains. Should extensive transportation delays of incoming chemicals occur, the Potomac River would be extremely vulnerable to an effluent of very poor quality. Waterborne access to the site greatly reduces the probability of an incident of this type when compared to highway transportation in the Washington Metropolitan Area.

All forms of access are somewhat limited in their usefulness during and upon completion of the expansion. There will be very little, if any, land available for the contractors use for storing and assembling materials on the site. Area for these purposes has been designated at South Capitol Street near the District of Columbia - Maryland line on land owned by the National Park Service. A copy of the Park Service permit conditions is included in Appendix K. From this area the contractors will haul supplies into the site when they are to be utilized in the construction.

Use of the roads is somewhat limited due to the necessity of minimizing interruptions to the operations of the Naval Research Laboratory. The Laboratory has expressed their concern in this regard to the District when they stated that the traffic volume impact of a construction force of 1000 to 2200 workers at the Laboratory's main gate could well be intolerable inasmuch as the Interstate 295 interchange serving NRL is now functioning at full capacity (Appendix M). An increase in traffic of 750 to 2000 automobiles daily and the truck traffic serving an accelerated construction effort will produce traffic congestion and road hazards which will seriously hamper the operations of the Laboratory.

The District has indicated that although the peak construction workforce will reach 2300, it does not anticipate that there will be a corresponding increase in automobile traffic passing the main gate of the Naval Research Laboratory. Except for the initial stages of construction, it will be impossible, due to the very limited area available for construction to accommodate more than a handful of private automobiles on the site; accordingly, arrangements will be made to transport construction workers from a nearby parking location to the construction site each day by bus. Therefore, while a modest increase in the number of private automobiles on Interstate 295 may be anticipated, traffic in the vicinity of NRL is not anticipated to increase significantly.

Also, the normal construction hours of 7:30 a.m. to 4:00 p.m. should blend reasonably well with the 7:45 a.m. to 4:15 p.m. and 8:00 a.m. to 4:30 p.m. shift schedules of NRL.

With regard to truck traffic, the use of massive construction techniques are planned to meet construction deadlines. Construction materials and much of the spoils are expected to be transported in and out of the site by barge. This will involve, among other things, the erection of docking facilities and a temporary concrete plant. Again, while we must recognize that there will be some truck traffic which is not presently experienced, this increase will be modest in comparison to the amount of truck traffic generated during construction activities if waterborne transportation is not utilized.

It should be noted, however, that first stage development (additional primary facilities and sludge processing) which is now under construction involve conventional construction methods. Excavated material is being removed from the site by truck, while construction materials will be transported by truck and rail. As of March 30, 1972, the major excavation contractor is hauling the material away by truck. A major portion of his trucking is being accomplished at night and on weekends to minimize impact on traffic. Trucking during peak rush hours has been prohibited.

The following quantities of materials will be required during construction and operation of the treatment facilities:

1. During Construction:

   a. Approximately 450,000 cubic yards of concrete for use in construction of the various structures at rates up to 2,000 yards per day.

b. Approximately 2,500,000 cubic yards of excavated materials must be removed from the plant site for disposal.

c. Equipment utilized in processes.

2. During Operation:

a. Approximately 60,000 gallons per day of #2 fuel oil for the sludge incinerators. Natural gas may be used if sufficient supplies become available.

b. Approximately 230 tons of alum per day or 120 tons of ferric chloride per day for phosphorous removal for a combination of the above.

c. Approximately 86 tons of methanol per day for nitrogen removal.

d. Approximately 58 tons of lime per day for nitrifications.

e. Approximately 30 tons of chlorine per day for odor control and disinfection.

f. Approximately 2.4 tons of anionic polymers per day for nitrogen removal.

g. Various chemicals for laboratory tests.

1a. Concrete: The District plans to construct a concrete batch plant at the docking facilities and supply concrete to the various contractors as they require it. The coarse aggregate, sand and portland cement will be barged in and unloaded directly from barges into the batch plant, thus eliminating the need for large storage areas for the materials. Concrete will be loaded into "ready-mix" trucks for hauling to site locations where it will be placed.

No alternate locations for the batch plant within the site were considered due to the need for large material storage areas for which there is no space available.

Should a batch plant be set up at a location beyond the plant site, the concrete would be trucked to the site using ready-mix trucks. The District estimates that a peak rate of 200 - 10 yard truck loads of concrete must be placed to meet the December, 1974, completion date. This additional amount of traffic would have a significant adverse impact on the operation of adjacent facilities.

Raw materials would be hauled to the batch plant site by barge, rail or truck. Extensive delays could result if highway transportation or rail are utilized.

The Environmental Defense Fund and Mrs. Agnew (Section VII and Appendix M) suggested that Bolling AFB be used as a site for the batch plant and concrete be hauled by rail to Blue Plains for placement. This is impractical for several reasons:

(1) Bolling AFB has planned uses for all its vacant land.

(2) Noise created by the plant and rail traffic will affect persons living in the Base housing which will be constructed in the near future.

(3) Raw materials must be transported in by rail and stored on site. Use of the railroad for this would

aggravate traffic problems on the Suitland Parkway since there is a grade crossing at that point. Bolling has no dock facilities capable of accommodating barge traffic.

(4) Ready-mix trucks must be loaded onto flat cars for transport to Blue Plains. High-quality concrete must be homogeneous and must be continuous agitated from the time water is added until it is poured. There are no known railroad cars with revolving drums for concrete.

(5) The rail traffic through the Naval Research Laboratory to Blue Plains would creat noise and traffic problems with the Base as well as security problems.

Another alternative considered was to require the contractor to purchase concrete from local plants. The concrete would be trucked to the site, again creating traffic problems. If normal portland cement is use, the concrete batch must be mixed and poured once water is added within 1-1/2 hours, or one hour if the temperature is about 85°F. This time limit does not allow a flexible transit time.

Under the present contract for construction of the primary units, the District encountered difficulty in controlling the quality of concrete purchased from local suppliers and several batches were rejected. The contractor later set up a batch plant on-site for his use and since that time the quality of concrete has always exceeded minimum standards.

The District expects to save approximately \$460,000 in the cost of concrete by the use of the on-site batch plant.

b. Excavated Materials: Excess suitable materials which are excavated from the site will be disposed of in several locations. Approximately 210,000 cubic yards of excavated earth plus 35,000 cubic yards of digested sludge from the plant stockpile will be utilized in the Oxon Cove Landfill which is to ultimately be utilized as a golf course. The materials will be trucked from the plant site to this location. The remaining sludge stockpile will be employed at various landfills at the contractor's disposal areas in the Metropolitan Area.

Some of the excavated material with the exception of the sludge may be expected to be hauled to the Dyke Marsh restoration project and placed within the top several feet of the fill (Appendix A). This material will be placed on spoil materials generated as a result of the navigation feature of this project and deposited in the Marsh area.

Removal of excavated materials by rail would require a total of 56,000 carloads or 300 cars per day and would be impractical due to:

(1) Increased traffic and noise through military bases.

(2) Need to construct second track before proceeding which would considerably delay construction.

(3) Stoppage of traffic on Suitland Parkway while trains passed.

(4) Construction of a railroad yard at Blue Plains to store cars while they are loaded. As previously stated, area restrictions would not permit a railroad car storage area at the site.

(5) Load transfers from railroad cars to trucks for hauling to final landfill location, or construction of a railroad spur to that site.

Some of the materials will be removed by trucks. Should the entire volume be removed by truck, approximately 1000 truckloads per day must be removed over a period of nine months. Peak rates of removal would approach 1700 truckloads per day or approximately 1.4 trucks per minute. Unless a second access route to the site is constructed, traffic at the entrance to the Naval Research Laboratory would be severely affected.

In addition to the effects on traffic, the use of highways for hauling in concrete and removing excavated materials could result in a significant adverse impact on ambient air quality and noise levels.

c. Process Equipment: Some of the larger pieces of equipment which will be used in the process are expected to be too large to be readily transported to the site by either road or rail. By the use of barges this equipment may be preassembled and then transported by water at a possible considerable savings in cost.

2. During Operation

a. Fuel oil: Approximately 60,000 gallons per day of fuel oil will be used in the plant, most of it in the sludge incinerators. Virtually all oil used in the Metropolitan Area is transported in by barge. Should the dock facilities not be utilized it would be necessary to truck oil to the plant site from another dock area. This could be expected to cost an additional $3000 per day and would create an increased possibility of damage from spillage due to double handling of the oil.

b. Alum or ferric chloride: Approximately 230 tons of alum or 120 tons of ferric chloride will be used each day in the treatment plant operation. This amount of alum would require approximately 5 railroad cars per day to transport. The cost of alum delivered to the site by various modes is as follows:

(1) Barge - $5.00 per ton

(2) Rail - $8.50 per ton

(3) Truck - $20.40 per ton

Annual savings by barge would be expected to amount to $600,000 over rail and $2,600,000 over truck.

c. Methanol: The 86 tons of methanol used each day is expected to be supplied by barge. No cost savings over other transportation methods was calculated.

The use of barges to transport the above listed materials is expected to reduce the daily traffic to the site by a total of 9 railroad cars or 26 trucks during operation.

The lime and chlorine is expected to be transported to the site by rail and the polymers and laboratory chemicals by truck.

VI. RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Upgrading and expansion of the secondary wastewater treatment facilities to tertiary (AWT) is the first significant step toward enhancing water quality of the Potomac Estuary, which is one of the primary functions of the proposed action. Once other Sewage Treatment Plants along the Potomac upgrade the quality of their effluent, future generations will reap the long-range benefits of these improvements. Blue Plains AWT should not be regarded as an individual project, but rather as one vital link in the future wastewater management plan for the Potomac Basin. To accrue the projected environmental benefits of this 309 mgd facility, other area municipalities must cumulatively follow suit or explore and utilize other alternative means of wastewater treatment than that which presently exists.

Selection of the proposed features for Blue Plains in no way precludes other future treatment options for facilities riparian to the Potomac River.

Although it may be the opinion of some that tertiary wastewater treatment and disposal of sludge by incineration only accomplishes a change from one pollution form to another, the environmental benefits of significantly improving Potomac River water when weighed in perspective against the environmental costs of a negligible effect on ambient air quality appears to easily justify this undertaking. It should also be reintera here that several Federal agencies, including EPA, are undertaking intensive research investigations to determine the environmental and economic feasibility of utilizing agricultural lands for the disposal of undigested sludge. If these techniques prove to be viable, and do not pose an imminent danger to the health, and welfare of the locale, disposal by incineration may be utilized in future years as an alternative or backup method to land disposal.

However, the dire necessity to immediately upgrade and expand the existing facilities is obvious and has been well documented throughout this report. To postpone design and construction of this plant for land disposal alternatives to become available is entirely unrealistic, especially since a timeframe cannot be provided.

Since disposal of spoil materials at Dyke Marsh is complementing the National Park Service's Restoration Plan, this action is considered to enhance the state of the environment for future generations.

VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED.

The planned steps to upgrade and expand existing facilities at Blue Plains can be viewed as an irreversible resource commitment since abandonment of this plant in future years appears to be unlikely. However, it should also be noted that the existing site was devoted to this use years ago when the original plant structures were installed.

If a major accidental spill occurs at the docking facilities during oil transfer or other unloading operations this could result in irreversible damage to the Potomac Estuary. This impact has been recognized in Section III of the report and implementation of the proposed Coast Guard pollution prevention regulations (Appendix L) will further reduce the probability of this occurrence.

As asserted in the environmental impact section of this report and documented in Appendix C, the project's effects on ambient air quality has been evaluated as being insignificant. Therefore, the air resources of the region are not considered to be irreversibly or irretrievably affected should the expansion and upgrading program at Blue Plains be undertaken.

The project's induced effects on land use changes and future development in the Washington Metropolitan Area is expected to be minor since the plant will operate close to design capacity when the AWT features are placed on line.

As stated previously, the material dredged to secure dependable transportation access to the site will be deposited downstream in Dyke Marsh and is part of a master plan to re-establish wetlands that were previously forfeited to sand and gravel operations.

The only other resource commitments associated with project implementation that are known to this office consist of the various fuels, chemicals, and other materials required to operate the plant throughout its useful life.

VIII PROBLEMS AND OBJECTIONS

Listed below is a summary of problems and objections received to date for the planned construction of the District of Columbia's Blue Plains advanced waste treatment plant. Appendix M presents pertinent correspondence and information received since EPA commenced funding the expansion and upgrading of Blue Plains.

A. Those groups opposed to the Blue Plains Project:

1. Committee of 100 on the Federal City. It passed a resolution stating that an environmental impact statement should be provided regarding the effect of the proposed incinerator on ambient air quality of the Capitol Region and requested a comprehensive analysis of alternative sludge disposal systems, specifically the feasibility and practicability of a land disposal system for sewage sludge. This Committee feels that sludge incineration will be a major air pollution problem because present technology does not offer proven or practical methods for the control of the sulphur and nitrogen oxides produced by sludge incineration.

2. Metropolitan Washington Coalition for Clean Air, Inc. Mr. John S. Winder, Jr., Executive Director stated that the proposed incinerator operations may emit significant quantities of nitrogen oxides and other harmful pollutants. He expressed concern about the possible environmental effects of the proposed sludge incinerators and urged a halt to construction of the project pending completion of an environmental impact statement.

3. Naval Research Laboratory, Washington, D. C. The NRL stated that the impact of 1000-2000 construction workers at Blue Plains would create an intolerable traffic situation at its main gate and expressed concern over the increase in sludge production. It requested that appropriate action be taken in order that the Blue Plains plans include adequate facilities for increased vehicular traffic and for reducing sludge and processing odors below present levels.

4. Northern Virginia Conservation Council (Former Position) Marian K. Agnew, former President of the Council, stated that Blue Plains AWT project will transfer the pollution problem from the water to the air. She feels that the spray irrigation system is better than the physical-chemical treatment and burning of sludge. During 1971, she spoke for the Council before the Potomac Enforcement Conference favoring the recycling of natural resources and the use of natural biological processes in preference to elaborate, highly technological methods.

5. Environmental Defense Fund. Scott H. Lang, Washington Counsel, has raised numerous questions with regard to incineration, dredging and filling, advanced waste treatment, land contained systems, plant capacity and interim treatment at Blue Plains. He has met with EPA on several occasions to discuss these issues and has requested that an environmental impact statement be prepared which covers all elements of the proposed expansion. EDF has been particularly concerned that Blue Plains should be "considered within the context of the total region-wide waste treatment strategy, not just a solitary project."

B. Proponents of the Blue Plains AWT Plant:

1. Northern Virginia Conservation Council (Current Position) On January 12 and 26, 1972, the Board of Directors and the membership respectfully, modified their positions of November 10, 1971. Upon reconsideration, they endorsed the "proposals of the Conference to expand the capacity of the District of Columbia's Blue Plains sewage treatment plant to 309 mgd by December, 1974, and to upgrade it to advanced waste treatment, as partial steps toward solution of the area's" problems. In addition, they requested that EPA comply with NEPA and produce additional statements on effluent quality, sludge removal, and incineration; and that all concerned agencies study land contained systems within the Potomac River Basin.

2. Citizens Council for a Clean Potomac. The Council passed a resolution on January 18, 1972, urging "the U. S. Congress and the political jurisdictions in the Washington Metropolitan Area to continue the Blue Plains expansion and upgrading program." They feel that the volume of wastewater generated and the particular physical conditions in the area make consideration of land disposal methods for Blue Plains impractical from both cost and technological standpoints.

3. Groups that have testified at the Potomac Enforcement Conference regarding the Blue Plains project are listed below. These groups have either endorsed or not objected to the report.

a. League of Women Voters.

b. Canoe Cruisers Association of Washington, D. C.

c. Accokeek Foundation, Inc.

d. Cabin John Citizen's Association

e. Chesapeake Bay Foundation.

f. National Wildlife Federation.

g. Citizens Permanent Conference on the Potomac River Basin.

APPENDIX A

DREDGING AND SPOIL DISPOSAL

APPENDIX A
DREDGING AND SPOIL DISPOSAL
DISTRICT OF COLUMBIA WATER POLLUTION CONTROL PLANT
(BLUE PLAINS)

INTRODUCTION

Dredging for an entrance channel and turning basin at Blue Plains began in mid-January, 1972. Early establishment of these facilities, along with the proposed pier, were a prerequisite for the waterborne delivery of construction materials and equipment for plant expansion and modification (Photos 1 and 2, page A-11). These facilities will subsequently be used for delivery of maintenance material following completion of plant modification.

The dredging is being done by a barge-mounted crane equipped with a clamshell bucket (Photo No. 3, page A-11). The spoil is loaded directly into bottom dumping hopper scows (Photo No. 4, page A-12), which are then moved to the disposal site by tugs. The disposal site, Dyke Marsh, is located about 3 1/2 miles downstream, along the Virginia shore, immediately below New Alexandria (Exhibit 3, page A-15). Much of the Marsh, which encompasses about 385 acres, has been demolished by commercial dredging for sand and gravel, a practice still on-going at the north end of the Marsh. Most of the Marsh is owned by the National Park Service (NPS), with the bulk of the acreage acquired from the dredging company. NPS plans to restore the marsh and re-create a marsh environment.

Disposal of spoil from Blue Plains is being restricted to the 20 to 40 feet deep holes created by the removal of sand and gravel

(Photo Nos. 6 and 7, page A-12). Separating these deeps from the main stem of the River is a bar or barrier sill which rises to within 3 feet of the surface. An auxiliary channel crosses this sill and connects the deep with the navigation channel in the Potomac (Exhibit 4, page A-16). Present development plans by NPS project the filling of the deep holes to -8 feet below mean low water (mlw) with barged material. Trucked landfill material will be used in the parts of the marsh which are to be filled to or above water level.

The landfill is also in progress, moving out from the northwest corner of the area now being spoiled (Photo Nos. 8 and 9, page A-13). As the material is dumped from the trucks, a bulldozer pushes it into the marsh. In the final phase, as shown in Exhibit 5, page A-17, an island will be constructed on the barrier sill and will enclose a lagoon. Bridges constructed across channels connecting the lagoon with the river will be removed after the fill is complete, to isolate the island.

An integral part of the agreement under which NPS acquired 260 acres of the Marsh from Smoot and Gravel Company (now Potomac Sand and Gravel), was the right of the Grantor to continue dredging 150 acres of the transferred marsh until 1999. Also, an additional 85 acres of contiguous marsh, original property of NPS, can be dredged until 1989. About 3 acres, leased by NPS as a marina, at the extreme northwest corner of the marsh are exempted from dredging. Of the approximately 385 acres included in Dyke Marsh, all but 28 acres on the south edge are now owned by NPS.

BACKGROUND

A Public Notice (Exhibit 1, page A-8), was issued on November 16, 1970, describing an application by the District of Columbia Government for a Permit "to construct a pier and a bulkhead, to dredge a channel and a turning basin, and to place fill material in the Potomac River." This application was the culmination of several years of study, discussion and discarded alternatives. The application represented another effort by the District to begin work in modifying, expanding, and improving the Blue Plains Sewage Treatment Plant. The controversial section of the application concerns the deposition of the spoil material from channel and turning basin construction into the Potomac River at Dyke Marsh.

Sediment samples were taken by Region III, EPA technicians on December 8, 1970 and February 18, 1971 at the proposed dredging sites. These were than analyzed at the Chesapeake Technical Support Laboratory (now Annapolis Field Office) and were found to be polluted beyond the parameters set forth in EPA's "Criteria for Determining the Acceptability of Dredged Spoil Disposal to the Nation's Waters" (Exhibit 6, page A-18). These criteria are guidelines, disseminated to the Regional Offices on January 11, 1971, to be used on a case-by-case basis in determining if dredged spoil could be dumped in open water.

This Office notified the District in March 1971, following analysis of the muds, that the bottom sediments at Blue Plains were contaminated and were not acceptable for open water disposal. It was recommended that alternative disposal methods, including containment devices at Dyke Marsh, be considered.

Core samples were taken at varying depths to -18 feet below the water/mud interface by the applicant on June 8, 1971, to determine the vertical extent of pollution in the bottom at Blue Plains. CSTL technicians were present to sample the cores at the time of coring. Analysis of the samples disclosed that contamination was also present in the natural material underlying the sediment blanket (Exhibit 7, page A-19). Further examination of the cores revealed that the underlayment was a heavy, clay-like material with sufficient consistency to retain its identity when dumped on the barge. This weight and consistency would ensure rapid settling and minimal particle dispersion if the material was dropped into water from a bottom dump scow.

The urgent need for a spoil disposal site to expedite acceleration of the Blue Plains Treatment Plant expansion led to consideration of optimal benefits. The upgrading of the Sewage Treatment Plant will have a far reaching beneficial effect on a much longer reach of the Potomac Estuary than might conceivably be adversely affected by localized impact at the Dyke Marsh site. Spoil from Blue Plains dredging is proposed to be used for fill no closer than 8 feet below water surface (mlw), with clean overburden used to complete the fill to marsh level. Presuming the overburden, similar to that now being filled from land, to be free of deleterious substances, any metals that might migrate through saturated sediments would be diluted. If the marsh is restored according to plan, conditions of the restored portion should have physical characteristics comparable to the presently existing marsh.

Examination of nautical charts of the proposed spoil site revealed that it was, in fact, a deep hole separated from the navigation channel and river main stem by a submerged sill, or bar, about 3 to 5 feet under the surface. This obstruction reduced the possibility of dispersion of dumped material by water currents to a bare minimum. Since normal river flow through the spoil site was almost non-existent, particle dispersion and water-mixing would occur during periods of ebb-tide, if at all.

A decision was made, subject to approval of acceptance of the dredged spoil as fill for the base of the marsh by NPS, to permit the dumping of the spoil in Dyke Marsh. Conditions attached to such permission were:

1. Dredging would be done by clamshell bucket so as to minimize turbidities and effect on water quality at the disposal site.

2. Spoil would be loaded directly into bottom dump barges or scows. No other disposal method would be used at Dyke Marsh.

3. Water quality would be monitored by EPA and, if dumping was found to be having an adverse effect, operations would be stopped.

4. In the event that spoil disposal did adversely affect water quality, a containment dike would be constructed riverward of the spoil area before operations could be re-started.

The decision to restrict dredging to use of a clamshell bucket was made in order to minimize mixing of spoil with the receiving waters. A corollary condition was the requirement for disposal from bottom dump scows only. These conditions precluded use of hydraulic dredging with attendant problems arising from dissolving the spoil into a slurry and the resultant return of the water solvent to the River.

<u>SUMMARY</u>

Water quality, as well as bottom sediments, at Dyke Marsh, Blue Plains and in the Potomac River directly across from the marsh, have been monitored by the Annapolis Field Office (Exhibit 8, page A-22). Monitoring and sampling has been accomplished on an average of once per week for the period January 26 (initial disposal) to March 8, 1972 (date of writing). Tests have disclosed no adverse affect on water quality from the spoil disposal. This same negative result has been found on chemical and biological composition of the bottom adjacent to the spoil area. Samples from the River, across from the Marsh, have been used for comparison in addition to data obtained from Dyke Marsh prior to spoil disposal. No changes in benthic biota, attributable to spoil disposal, have been observed (Exhibit 9, page A-22).

On February 23, 1972, an AFO craft, equipped with a depth finder sensitive enough to chart the spoil as it settled below the hopper barges, was held close to a scow as the dump was made. The depth finder was started at the opening of the final compartment. As soon as the scow was empty, it was moved away by the tug and the AFO boat was moved over the dumping site. All of the shadows charted by the depth finder as the spoil sank to the bottom disappeared within 10 minutes (Exhibit 10, page A-23). The only trace of the dump came from a water discoloration. Approaching darkness, associated with a storm, precluded meaningful observation as to persistance of the discoloration.

List of Attachments:

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1715
BALTIMORE, MARYLAND 21203

NABOP-P(Govt. District of Columbia)18 16 November 1970

PUBLIC NOTICE

TO WHOM IT MAY CONCERN:

The U. S. Army Engineer District, Baltimore has received an application from GOVERNMENT OF THE DISTRICT OF COLUMBIA, DEPARTMENT OF SANITARY ENGINEERING, PRESIDENTIAL BUILDING, 415 12th STREET, N. W., WASHINGTON, D. C. 20004, for a Department of the Army permit to construct a pier and a bulkhead, to dredge a channel and turning basin, and to place fill material in the POTOMAC RIVER AT MARBURY POINT, WASHINGTON, D. C.

Plans showing the proposed work are on file in the Operations Division, 1628 Federal Building, 31 Hopkins Plaza, Baltimore, Maryland 21201, and may be seen by interested parties. Copies of the plans are attached to this sheet. The plans indicate that none of the proposed structures will extend more than 360 feet channelward of the mean high water shoreline at a point on the easterly shore immediately downstream from Marbury Point. The plans also indicate that approximately 470,000 cubic yards of material, consisting of sand, silt, and mud, will be dredged and transported to and deposited at Dyke Marsh, Virginia. The dredging will be accomplished with a bucket dredge.

The decision as to whether a permit will be issued will be based on an evaluation of the impact of the proposed work on the public interest. Factors affecting the public interest include, but are not limited to, navigation, fish and wildlife, water quality, economics, conservation, aesthetics, recreation, water supply, flood damage prevention, ecosystems, and, in general, the needs and welfare of the people. Comments on these factors will be accepted and made part of the record and will be considered in determining whether it would be in the best public interest to grant a permit. All comments should be furnished in writing to this office on or before 16 December 1970.

It is requested that you communicate the foregoing information concerning the proposed work to any persons known by you to be interested and who, not being known to this office, do not receive a copy of this notice.

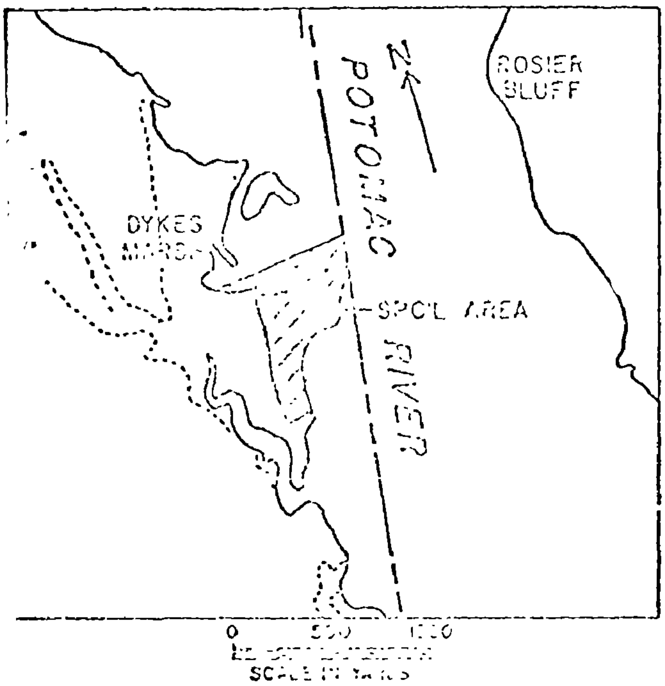
FOR THE DISTRICT ENGINEER:

JOHN L. REYNOLDS
Chief, Operations Division

2 drawings attached

Exhibit #1

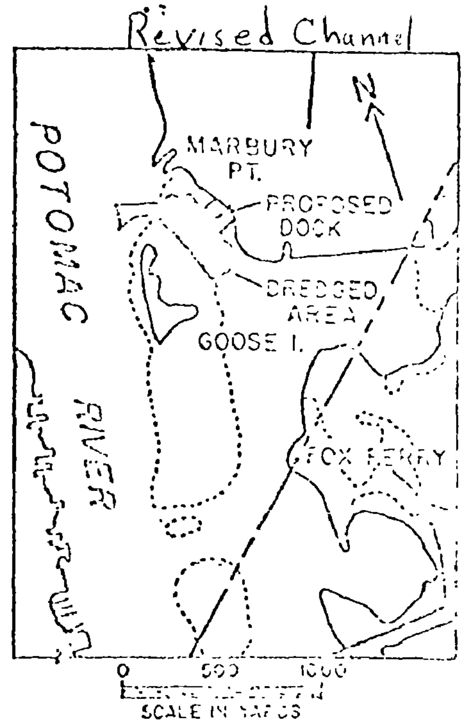
NOTE: CONTAINMENT OF SPOIL IN THE DISPOSAL AREA WILL BE PROVIDED IF REQUIRED BY THE ENVIRONMENTAL PROTECTION AGENCY MONITORING PROGRAM TO MAINTAIN APPLICABLE FEDERAL-STATE WATER QUALITY STANDARDS AND BENEFICIAL WATER USES.



SPOIL AREA

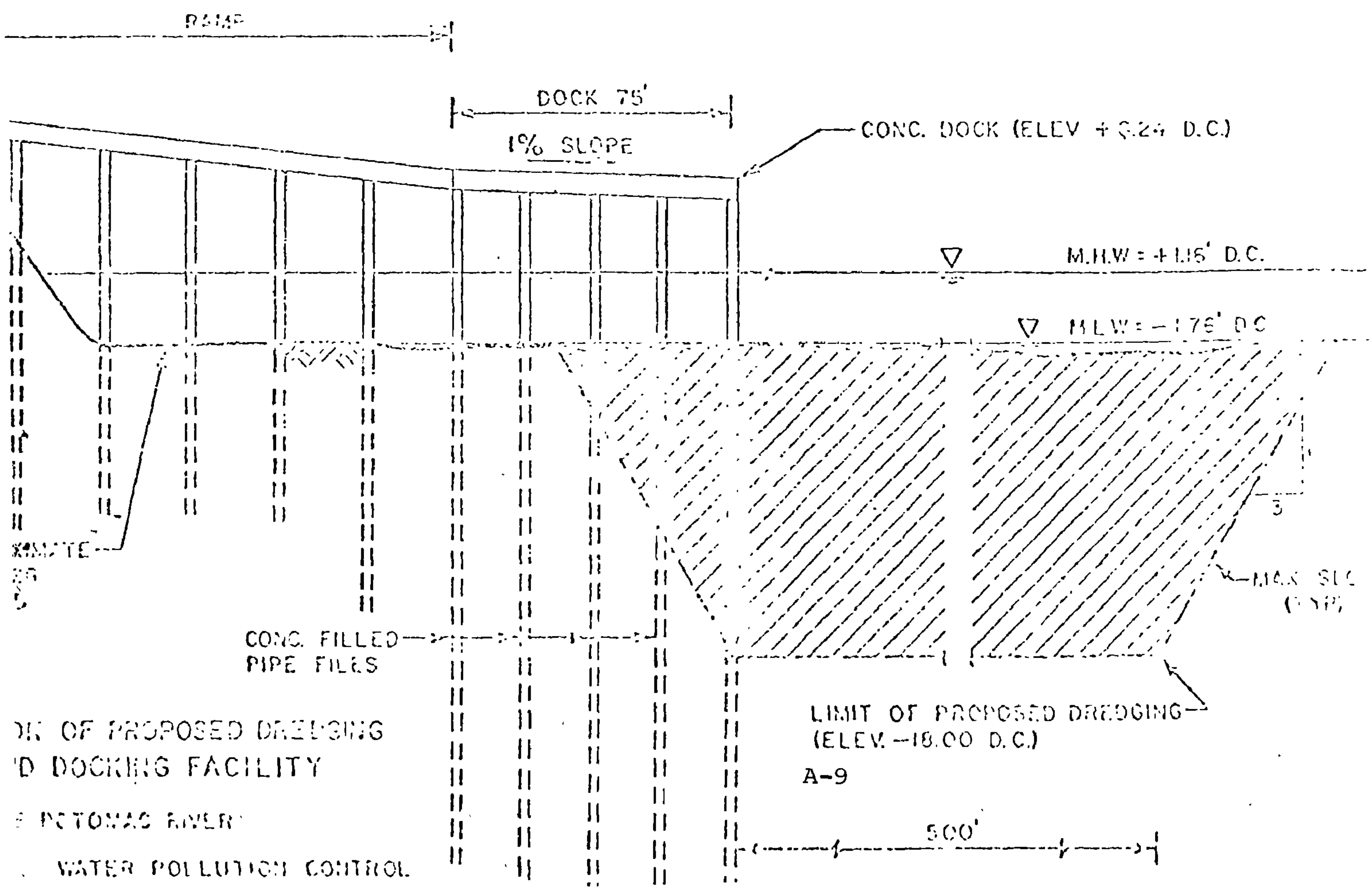
TRACED FROM — U. S. DEPT. OF COMMERCE C&G SURVEY MAP

APPROXIMATELY 600,000 C.Y. OF SAND AND SILT TO BE DREDGED BY ... DREDGE. EXCAVATED MATERIAL TO BE DISPOSED OF AT DYKE MARSH.



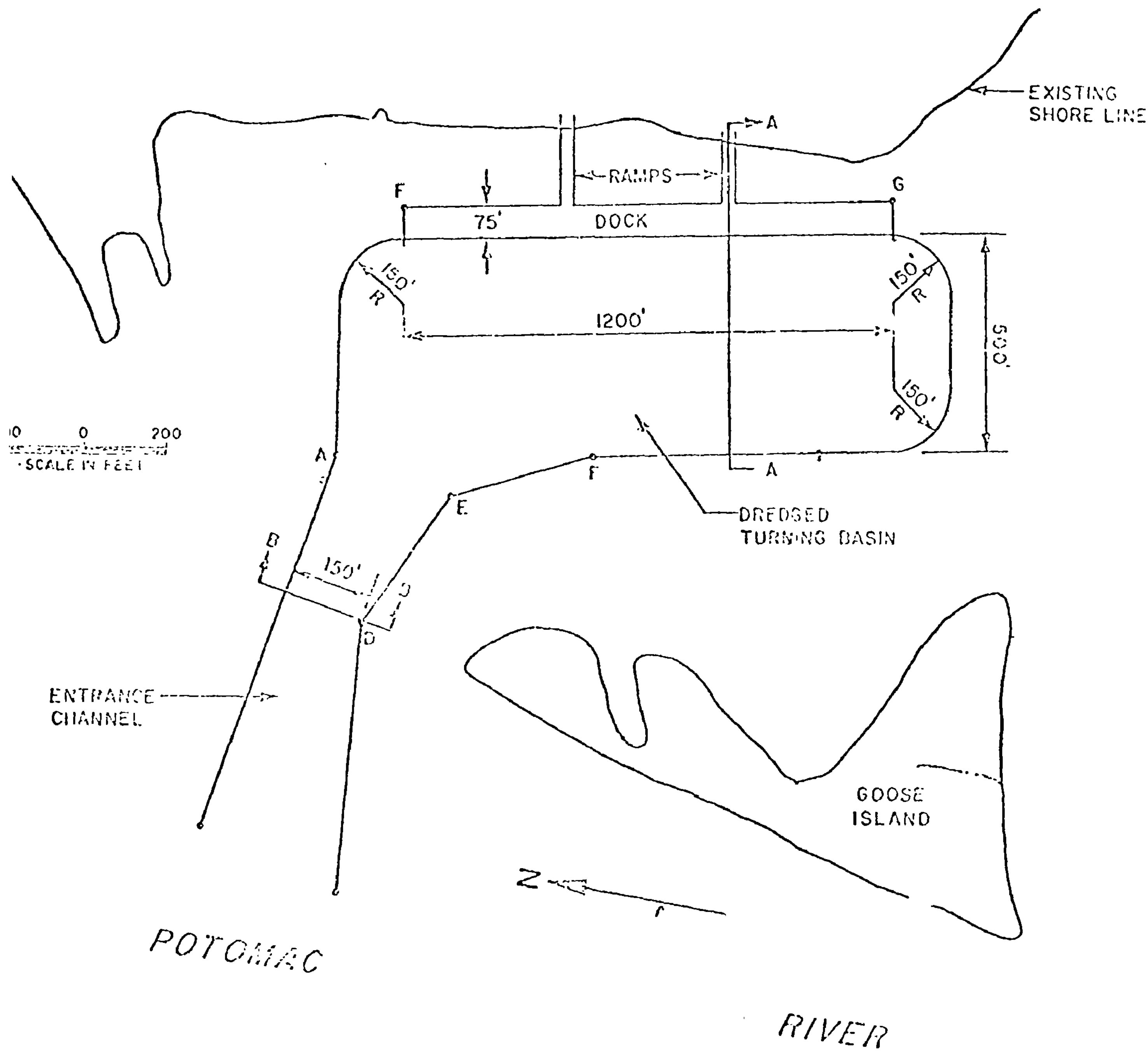
LOCATION MAP

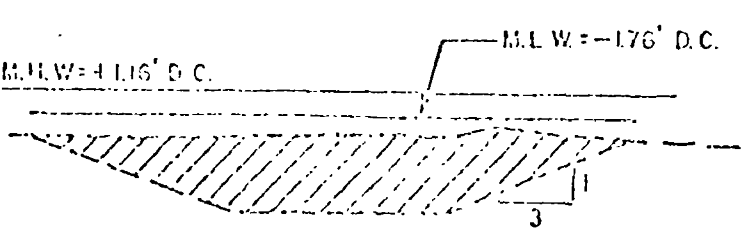
TRACED FROM — U. S. DEPT. OF COMMERCE C&G SURVEY MAP



...N OF PROPOSED DREDGING
...D DOCKING FACILITY
... POTOMAC RIVER
... WATER POLLUTION CONTROL

A-9





A-10

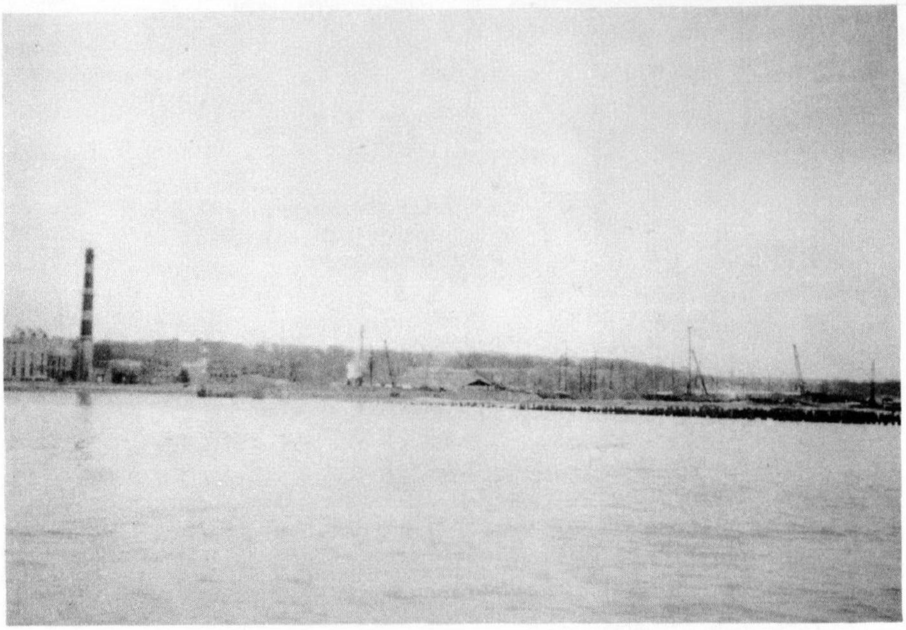
-Revised-

SECTION OF PROPOSED DREDGING
AND DOCKING FACILITY

IN: THE POTOMAC RIVER

DISTRICT OF COLUMBIA
WATER POLLUTION
CONTROL PLANT
(BLUE PLAINS)

January 26, 1972



As seen from Dredging Site

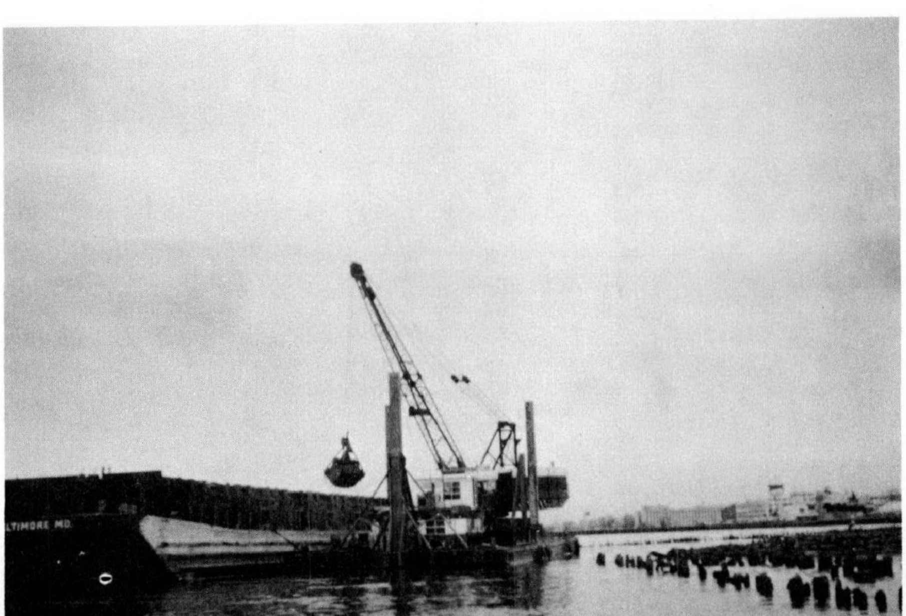
Incinerator Stack at Left

Photo No. 1

Old Pilings at Dredging Site

Incinerator Stack in Center

Photo No. 2



Bottom Dump Hopper Barge being Loaded by Dredge

Photo No. 3

Exhibit No. 2

Loaded Hopper
Barge approaching
Dyke Marsh

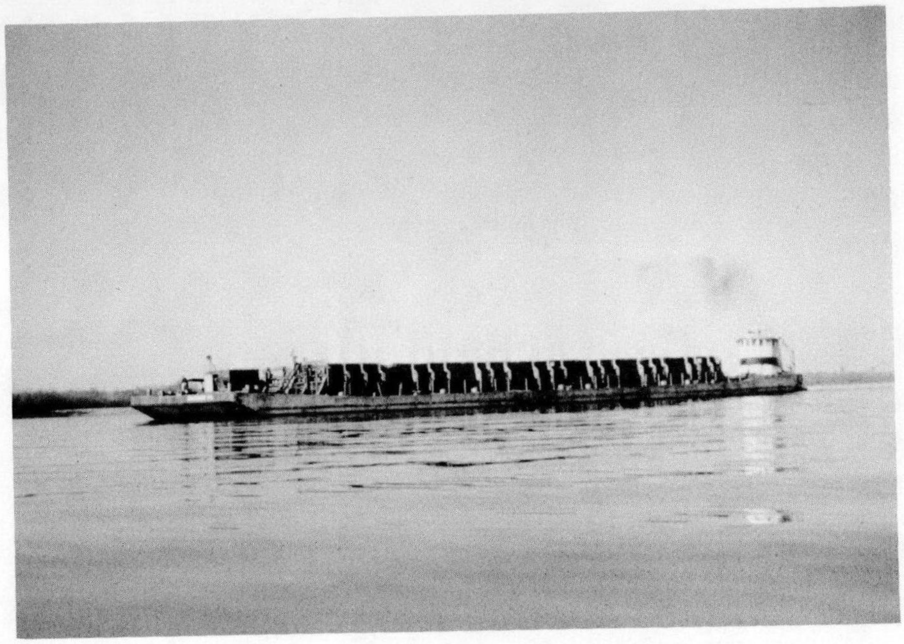


Photo No. 4

Barge in Position
to Empty at Dyke Marsh

Photo No. 5

Sign Marking
Limit of Dyke Marsh
Spoil Area

On Barrier Sill

Photo No. 6

Dyke Marsh
Spoil Area
Looking Northwest
from Barrier Sill

Photo No. 7

Trucks Dumping
Fastland Excavation
Material for Dyke
Marsh Landfill

Photo No. 8

Bulldozer pushing
Landfill Material
into Dyke Marsh

New Alexandria
in Background

Photo No. 9

Remnant of
Original Marsh

Orange Navigation
Aids

Photo No. 10

Boundary of
Original Marsh
Area still to be
Dredged

Photo No. 11

Exhibit No. 3

A-15

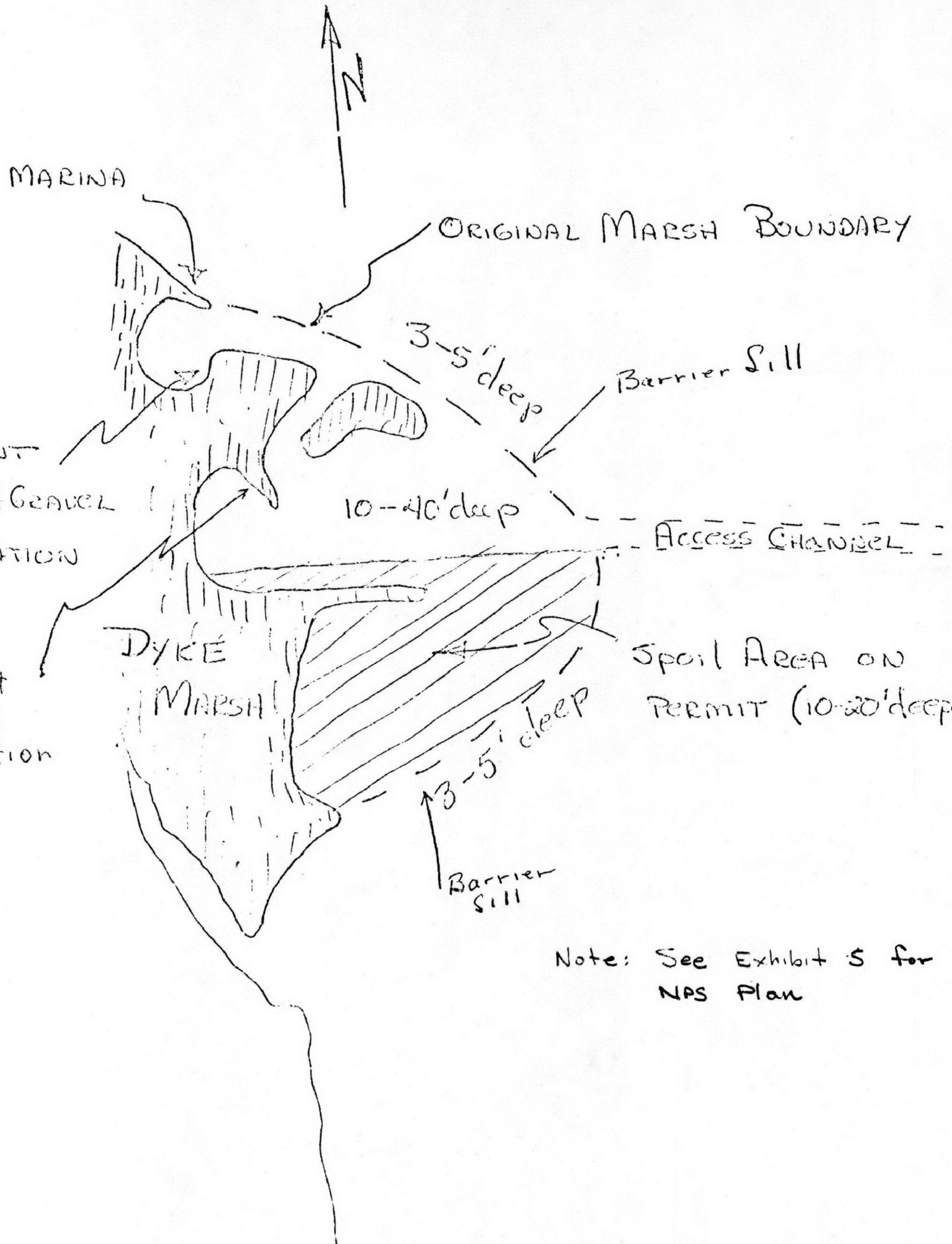

N
MARINA
ORIGINAL MARSH BOUNDARY
3-5' deep
Barrier Sill
PRESENT
SAND & GRAVEL
OPERATION
10--40' deep
ACCESS CHANNEL
DYKE
MARSH
Spoil AREA ON
PERMIT (10-20' deep)
3-5' deep
Present
Landfill
operation
Barrier
Sill
Note: See Exhibit 5 for
NPS Plan

Exhibit No. 4

PAGE NOT

AVAILABLE

DIGITALLY

The volatile solids and C.O.D. analyses should be made first. If the maximum limits are exceeded the sample can be characterized as polluted and the additional parameters would not have to be investigated.

Dredged sediment having concentrations of constituents less than the limits stated above <u>will not be</u> automatically considered acceptable for disposal. A judgment must be made on a case-by-case basis after considering the factors listed in (a) through (h) above.

In addition to the analyses required to determine compliance with the stated numerical criteria, the following additional tests are recommended where appropriate and pertinent:

Total Phosphorus
Total Organic Carbon (T.O.C.)
Immediate Oxygen Demand (I.O.D.)
Settleability
Sulfides
Trace Metals (iron, cadmium, copper, chromium, arsenic, and nickel)
Pesticides
Bioassay

The first four analyses would be considered desirable in almost all instances. They may be added to the mandatory list when sufficient experience with their interpretation is gained. For example, as experience is gained, the T.O.C. test may prove to be a valid substitute for the volatile solids and C.O.D. analyses. Tests for trace metals and pesticides should be made where significant concentrations of these materials are expected from known waste discharges.

All analyses and techniques for sample collection, preservation and preparation shall be in accord with a current FWQA analytical manual on sediments.

Bottom Samples

Dyke Marsh - Blue Plains

Location		Date	VS	COD	[illegible]	TKN	Hg	Pb	Zn	Cd	Cr	Cu
Blue Plains	3A	12/15/70						65.59	1033	0.08	411	152
	54"B		44,100			1,087	2.8	19.93	163	ND	354	219
	54"C		63700			1460	3.9	34.04	571	0.09	57.2	37.9
	54"D		104,200			5,238	3.5	[illegible]	[illegible]	0.11	[illegible]	36.[illegible]
	54"E		110,600			7,172	5.0	37.33	700	0.05	[illegible]	34.6
Blue Plains	54"A	2/18/71	95,600		2,779	24,151	13.1	92.48	293	1.97	12.3	679
	54"B		90,900		5,190	20,861	2.4	105.70	291	[illegible]	75	105.7
	54"C		55,300	-	1023	11,271	2.7	45.78	386	12.[illegible]	370	434
	54"D		74,000		635	8,391	2.0	41.05	280	1.47	46.[illegible]	37.9
	54"E		43,700		2187	22,399	1.3	72.99	326	1.52	63.7	96.0
Dyke Marsh	1	2/18/71	43,[illegible]		1686	14,375	2.2	37.89	163	0.52	20.79	34.6
	2		2550		2010	7,363	0.5	37.43	196	1.17	46.30	203
Blue Plains - Core	1'	6/5/71	28,800	60,870	850	530		349	150	ND	ND	30.[illegible]
	3'		56,700	96,960	380	1,770	-	350	182	ND	ND	45.1
	5'		63,200	94,120	ND	1,310		ND	776	ND	.90	44.8
	10'		65,400	62,080	266	640		56.0	66.3	ND	.27	22.7
	18'		83,300	102,190	570	1,450		15.0	85.5	ND	ND	36.3
Blue Plains Core	1	1/26/72	60,700	66,[illegible]	1,080	1,860	0.5	ND	200			
	2		90,300	[illegible]	2,790	2320	0.5	ND	110			
Dyke Marsh	* 3	1/26/72	66,300	64000	6,060	1,390	0.5	ND	260			
	4		75,000	67,000	[illegible]	2440	0.5	ND	60			
	5		59,500	[illegible]	2550	2700	0.6	ND	60			
	6		25,100	14,000	930	640	0.1	ND	ND			
	7		22,[illegible]	10,100	1,330	310	0.2	ND	ND			
	8		144,600	[illegible]	2,120	1030	0.05	ND	ND			
	9		55,500	27,000	230	380	0.0	ND	ND			
	10		55,100	57,200	1,440	1110	0.3	ND	110			
	11		55,000	[illegible]	410	1,110	0.3	ND	ND			
	12		85,000	91,000	770	1900	0.5	ND	150			
	13		91,200	71,000	6,210	2,430	0.4	ND	148			
Dyke Marsh	4	1/13/72	91,200	94,000	930	3,050	0.1					
	5		92,700	87,000	2480	2,830	0.3					
	6		103,000	90,500	1,920	2,870	0.1					
Dyke Marsh	2	2/16/72	71,000		550	8300	1.2					
	3		71,000		750	7,100	1.3					
	9		45,500		350	2000	ND					
	10.		60,000		650	7400	1.3					
Dyke Marsh	7	4/22/72	7,700		160	1,730	ND					
	8		72,[illegible]		140	25,110	3					
	9		74,[illegible]		230	23,890	8					
	10		64,000		150	9,700	2.4					
	11		95,600		2,510	21,600	.4					
	12 [illegible]		257,000		3810	35,200	5.3					
	13 [illegible]		143,700		6,770	61,710	1.5					

*ND - Non-Detectable

Exhibit No 7

Exhibit No. 7

Dyke Marsh - Blue Plains Water Samples

Location		Date	Vol Sol	COD	[illegible]	TKN	Hg	Pb	Zn
Blue Plains	1	1/26/72	—	—	— ①	1.26	* ND	* ND	0.024
	2					2.04	ND	ND	0.011
Dyke Marsh	3	1/26/72	—	—	—	1.71	ND	ND	
	4		—	—	—	1.53	ND	ND	
	5		—	—	—	2.21	ND	ND	
	6		—	—	—	2.08	ND	ND	
	7		—	—	—	2.19	ND	ND	
	8		—	—	—	1.76	ND	ND	
	9		—	—	—	2.13	ND	ND	
	10		—	—	—	1.22	ND	ND	
	11		—	—	—	2.31	ND	ND	
	12		—	—	—	1.95	ND	ND	
	13		—	—	—	1.60	ND	ND	
Dyke Marsh	14	2/3/72							
	15								
	16								
	17								
	18								
Dyke Marsh	6	2/16/72			②	8,000	ND		
Dyke Marsh	1	2/23/72				8,000	ND		
	2					10,100	ND		
	3					8,200	ND		
	4					8,000	ND		
	5					8,160	ND		
	6					8,100	ND		

* N.D. - Non Detectable

① % Dry weight

② Milligrams per Liter

A-21

Exhibit No. 8

Dyke Marsh 2/16/72

Benthic Organisms - Biological Analysis

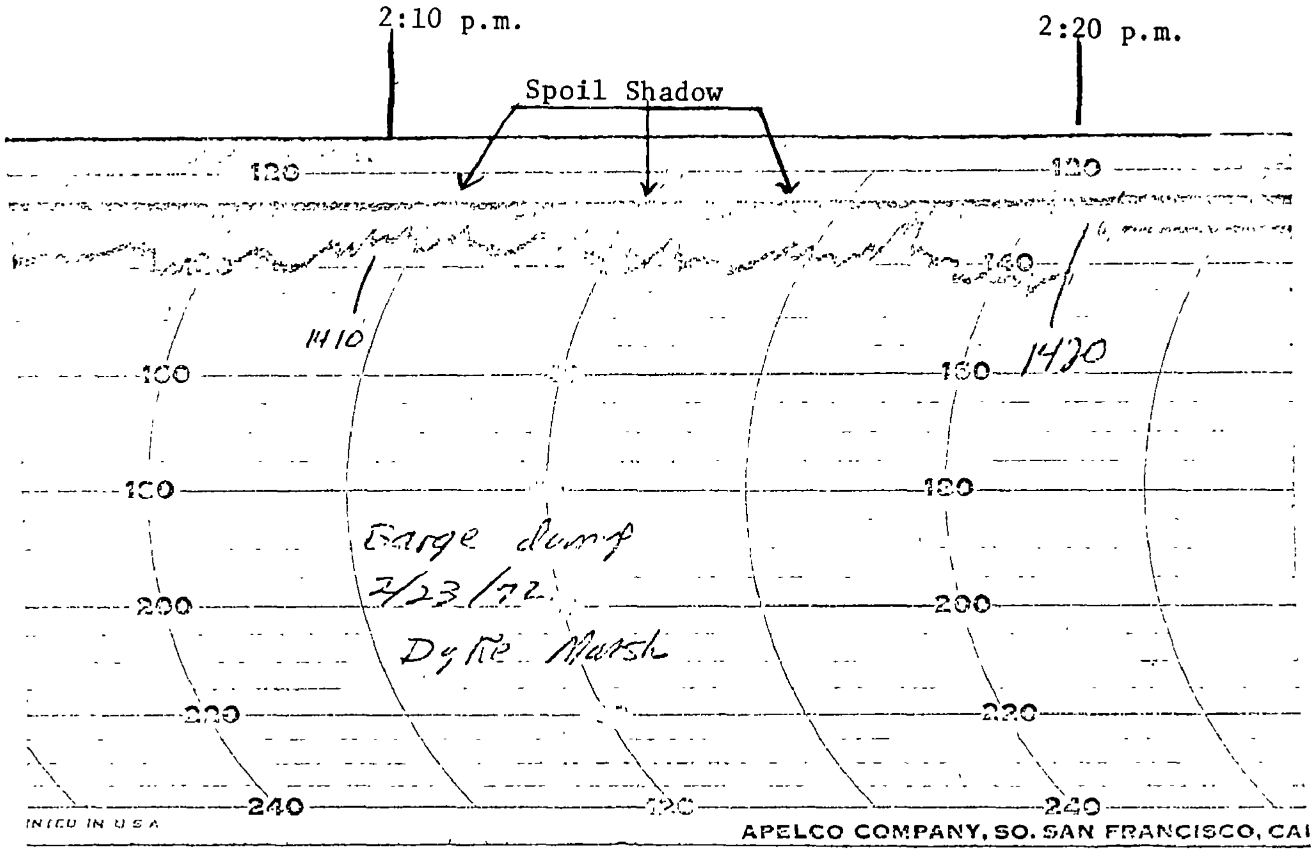
	Tubifex	Chironomus Larvae	Elliptio Sp.	Amnicola Sp. (Shell)	Ophidonais Sp.	Sphaerium	Gastropod Shell	N.
Bluff	20	13	1 shell	6				
...re - Radio Towers	11	3		2		4		
...rsh - S. end "C"		1	1 shell	2		1		
...rch - Marker "C"	2.	8						
Broad Cr	24	1	1	20				

Dyke Marsh 2/23/72

	Tubifex	Chironomus Larvae	Elliptio Sp.	Amnicola Sp. (Shell)	Ophidonais Sp.	Sphaerium	Gastropod Shell	N.
Bluff	29	16	1 shell	1	–	–	–	
- Radio Towers	34	27	1 live 2 Bones	1	1	–		
...rsh - S. End Flats	18	3	–	8	–	3		
...sh - Marker "C"	32	2	–	–	1	1		
...sh - Dump Site ...n cove	6	1	–	–	–	–	4	

Exhibit No. 9

February 23, 1972



Depth finder graph, February 23, 1972 on site of barge dump at Dyke Marsh. Note spoil shadow appearing at 1410 (2:10 p.m.) and completely dissipated at 1420 (2:20 p.m.). Total life of spoil shadow (until spoil settled on bottom) was 7 minutes

Exhibit No. 10

APPENDIX B

UNIT PROCESSES

APPENDIX B

UNIT PROCESSES

I. Aerated Grit Chambers

The primary function of the aerated grit chamber is the removal from the wastewater of sand and other inorganic materials. This operation is essential in that the sand and inorganic materials, if not removed, would contribute to excess wear in pumps and other plant components. The sand when settling out, would constitute inorganic sludge build-ups in basins and channels throughout the facility - thus reducing detention time and efficiency. The application of air at this stage improved sedimentation and grease coagulation. The air also replenishes oxygen depleted from the waste water by natural biological processes prior to induction to the waste treatment process.

Chambers of the design used at Blue Plains are efficient in removing inorganic particles 0.2mm and over.

Twelve (12) additional grit chambers each 20 feet wide, 70 feet long and 15 feet deep are to be constructed under the expansion.

II. Primary Clarifiers (Sedimentation Tanks)

The purpose of the primary clarifiers is to remove settleable and floatable solids and suspended solids from waste water. The clarifiers maintain the waste water in a relatively quiescent state and the particles suspended in the waste water which have a higher specific gravity than the liquid tend to settle. These particles are then removed from the bottom of the tank by a system of mechanical plows and surface skimmers and pumps to a sludge holding tank. The removal of the solids from the waste water results in a reduction of 50 to 60% of the bacteria and a BOD reduction of 25 to 40% in relation to the degree of efficiency in operation. The average efficiency of this type unit is 35 to 65% removal of suspended solids.

Twenty (20) circular clarifiers be each 120 feet in diameter with 14 feet sidewall water depth are to be added. Eight (8) of these are necessary to treat excess flows received at the plant during storms.

All primary sedimentation tanks will be operated continuously regardless of the incoming flow. Any flows in excess of a 650 mgd rate will be conveyed directly to the excess flow chlorine contact tanks from the clarifiers.

III. Excess Flow Chlorine Contact Tanks

Chlorine contact tanks having a total detention time of not less than 20 minutes at peak flow rates (289 mgd) will be constructed to provide disinfection of the excess flows before their discharge to the Potomac River.

IV. Aeration Basins (Secondary Reactors)

The aeration basins produce a sludge floc by stimulating the growth of zoogleal bacteria and other organisms. The waste water is aerated and charged with activated sludge. By maintaining a well affected condition conducive to aerobic growths, the biological degradation of organic materials is accelerated, thus resulting in a diminishing of the oxygen demand of the wastewater. The injection of air also replenishes the oxygen depleted during previous semi-septic conditions. Upon leaving the basins, the waste is of such nature that solids are easily removed through sedimentation.

V. Secondary Sedimentation

(At this location, the addition of metal salts for phosphorus removal is made. The affects of this is discussed later under Phosphorus Removal). The solids in the waste water after leaving the aeration basins are in a highly flocculent state and settle to the bottom of the secondary sedimentation tanks. The secondary sedimentation tanks are similar in operation to the primary clarifiers and are also equipped with mechanical surface skimmers to remove coagulated oil foams and gaseous sludge which rise to the surface of the waste water.

Twelve (12) additional tanks are to be constructed each 260 feet long, 80 feet wide and 12 feet deep.

VI. Nitrogen Removal System

The system implemented in the Blue Plains facility is a three (3) stage biological system designed to produce an effluent containing 2 mg/l or less of total nitrogen. The three stages are:

1. Carbonaceous Oxidation (previously discussed)
2. Nitrification
3. Denitrification-nitrogen release

The three-stage system allows management of the separate biological transformations which are necessary for successful denitrification. The high rate system discussed previously handles the bulk of the carbonaceous removal and also removes some nitrogen at this station, the waste activated sludge is removed. The nitrification stage receives a predominately ammonia nitrogen feed and an enriched culture develops because each system has its own sludge recycle.

The high rate system also protects subsequent nitrification stages from toxic chemicals. Heavy metals, cyanides, thiocyanides and toxic organic materials will be either absorbed or biologically degraded before they reach the nitrification stage. Since this is a staged system, there can be no direct short circuiting of materials from the influent to the effluent.

Nitrification is the two-step biological oxidation of ammonia in the wastewater to nitrite then to nitrate. It is accomplished by nitrite and nitrate forming bacteria in the presence of air. During the process, alkalinity is destroyed which unless replaced may cause the pH of the wastewater to fall to levels which will inhibit nitrification. Therefore, lime must be added to maintain the alkalinity especially if alum or other alkalinity-reducing chemicals have been added previously for phosphorus removal.

The nitrification system consists of:

1. Twelve (12) nitrification reactor tanks, each 260 feet long, 83 feet wide and 30 feet deep.

2. Twenty-eight (28) nitrification sedimentation tanks each 242 feet long, 80 feet wide and 15 feet deep.

3. Aeration equipment and pumps to return sludge from the sedimentation tanks to the nitrification reactor tanks.

Denitrification is the reduction of nitrate nitrogen to nitrogen gas which is discharged to the atmosphere. Once controlled nitrification has been established, the biological denitrification process can be optimized.

The nitrified effluent flows to a stirred anaerobic reactor where methanol is added in proportion to the nitrate nitrogen concentration. The denitrification organisms utilize the oxygen component of the nitrate radical to oxidize the organic carbon of carbonaceous matter. A carbon source, usually methanol which is the cheapest commercial source, must be added to create the reaction. This reaction takes place in the absence of oxygen from the air and results in the formation of carbon dioxide and nitrogen gas. The chemical reaction is as follows:

$$5CH_3OH \neq 6H^{\neq 1} \neq 6NO_3^- \longrightarrow 5CO_2\uparrow \neq 3N_2 \neq 13H_2O$$

Both carbon dioxide and nitrogen gases have limited solubility in water. Gas bubbles tend to form and adhere to the solids in the liquid thus inhibiting their settleability in the final clarifier. By agitating the liquid by pumping air through it in the nitrogen release tanks, the CO_2 and N_2 are driven off. The sludge is then allowed to settle in the final clarifiers. Units involved at Blue Plains include the following:

1. Eight (8) denitrification reactor tanks. The exact dimensions are presently unknown since they are in the early design stages.

2. Six (6) nitrogen release tanks. The exact dimensions are presently unknown since they are in the early design stages.

3. Twenty-two (22) denitrification sedimentation tanks, each 265 feet long, 80 feet wide and 16 feet deep.

VII. Phosphorus Removal

Phosphorus removal is accomplished in two points in the system:

1. Secondary sedimentation

2. Nitrogen release tanks

The removal is by chemical precipitation and subsequent removal will produce sludges in the various basins. Materials used as precipitants in this plant are alum or ferric chloride and polymers.

1. Alum is a phosphorus precipitant. The aluminum ions combine with the phosphate ions to form aluminum phosphate, an insoluble precipitate.
2. Ferric chloride is a phosphorous precipitant. The ferric ions combine with the phosphate ions to form ferrous phosphate, also an insoluble precipitate.

Alum and/or ferric chloride is added to the wastewater at the influent to the secondary clarifier and the precipitated sludge containing phosphates is settled in that unit.

At the nitrogen release tanks, alum or ferric chloride is added to precipitate the phosphorous. Polymer may be added to coagulate the phosphorous precipitate which is settled out of the wastewater and removed from the denitrification sedimentation tanks.

Additional facilities for phosphorous removal consist of chemical storage and feed equipment.

VIII. <u>Filtration and Disinfection</u>

Effluent filtration will be accomplished by the use of mixed media filters.

Mixed media filtration refers to filtration through filter beds in which the filter media is stratified from large to small particle size in the direction of flow. Mechanically, this is accomplished by utilizing media of different specific gravities.

This process removes almost all remaining solids as well as much of the residual BOD, phosphorous, and nitrogen from the water.

Chlorine contact chambers are constructed under the filter beds. At this point, sufficient chlorination takes place to kill all nitrifying organisms and almost all remaining bacteria.

Units involved in this phase of treatment include:

1. Thirty-six (36) multimedia filters, each 40 feet long, 52 feet wide and 16 feet deep.
2. Four (4) chlorine contact channels 840 feet long, 25 feet wide and 17 feet deep located beneath the multimedia filters.

The total detention time in the plant is 24 hours at average flow. The dimensions of the above-described units may be slightly altered as the final design is prepared.

IX. Sludge Handling Facilities

a. Sludge Thickeners

The sludge removed from the primary sedimentation basins will be pumped to the six existing gravity thickening tanks. These thickening tanks utilize a sedimentation process similar to that which occurs in the clarifiers. Scum which forms on the surface will be removed by skimmers and pumped with the thickened primary sludge to the sludge blending tanks. The remaining liquid supernatant will be returned to the existing primary clarifiers and pass through the complete treatment.

Excess activated sludge from the secondary, nitrification and denitrification systems will be wastes to flotation thickening tanks for concentration. Biological sludges such as the waste activated sludges are usually lighter, more bulky and tend not to concentrate in gravity thickeners. In the flotation tanks, air is supplied to the fluid. The rising bubbles increase the buoyancy of the solid particles and cause them to concentrate at the surface of the liquid in the tanks. The concentrated sludge normally is withdrawn to the sludge blending tanks. The liquid supernatant is returned to the aeration basins and passes through the remainder of the treatment process.

Eighteen flotation thickening tanks are proposed, each 60 feet long, 20 feet wide and 12 feet deep.

b. Sludge Blending Tanks

Four tanks for mixing together into a homogeneous mixture gravity-thickened primary sludge, flotation-thickened waste activated sludge, and skimmings from the primary and secondary clarifiers will be constructed. These facilities are needed to produce uniform sludge feed to the dewatering facilities. Each tank will be 44 feet in diameter and 20 feet deep.

c. Vacuum Filters and Associated Facilities

The blended sludge is conditioned by adding chemicals before it is dewatered to a non-fluid form on vacuum filters. The vacuum filter consists of a cylindrical drum with a filter media covering the outside surface. Internally, the drum is divided into drainage compartments which connect to the filtrate system. About 20 to 40% of the drum is submerged in the filter "pan" containing the sludge as the drum is rotated. A sludge mat is formed on the filter media as a result of a vacuum (10 to 26 inches mercury) applied to the drainage compartments servicing this submerged portion. As the mat, or cake, rotates out of submergence, vacuum and dewatering are continued. The cake is scraped from the drum just before it would be submerged in the pan once again. The dewatered cake is then passed by conveyor to the incinerators. The liquid withdrawn (filtrate) is returned to the plant for complete treatment.

Thirty vacuum filters, each with an area of 600 square feet are proposed as well as associated chemical handling and sludge conditioning facilities.

d. Incinerators

Eight 12 hearth, multiple hearth incinerators are proposed to incinerate the dewatered sludge to an inert ash. Their operation and air pollution control equipment are discussed in detail in Appendix C and will not be discussed here.

The incinerators are designed so that they may be operated also as drying facilities to reduce the quantities of sludge to be disposed of. When operated in this manner, the resultant material is suitable for disposal by plowing into crop land. The pathogenic organisms in the sludge would be destroyed by the heat, however, the organic matter in the sludge which has value as a fertilizer would not be destroyed. When used only for drying, the incinerators would operate at lower temperatures and it may be expected that lower levels of gaseous pollutants would be produced. In addition, the ash particles associated with incineration, would be virtually eliminated at the source.

APPENDIX C

SLUDGE INCINERATION

TABLE OF CONTENTS

LIST OF FIGURES

APPENDIX-C, SLUDGE INCINERATION

SECTION I - INTRODUCTION

The disposal of sludge from sewage treatment plants has been limited to 3 basic alternatives. These are ocean dumping, land disposal, and incineration. In October 1970, the Council on Environmental Quality recommended in its "Ocean Dumping - A National Policy," that ocean dumping of sludge should be phased out as an ultimate disposal practice. The sludge from the Blue Plains Sewage Treatment Plant has actually never been "ocean dumped." The choices presently available are, therefore, to employ some form of land disposal or to incinerate the sludge.

The purpose of this appendix is to examine the impact on the environment of the sludge incineration alternative. Trade-offs with other alternatives are discussed elsewhere in this report. At the outset, it must be recognized that any alternative will result in some pollution and must be evaluated in terms of the environmental degradation which inevitably will result. For incineration, the prime concern is its inherent potential for air pollution.

In evaluating the incineration alternative, criteria in the following categories were considered:

a. Incinerator effluent in relation to emission standards and regulations.

b. Impact of incinerator effluent on air quality.

c. Guidelines developed from Environmental Protection Agency studies.

d. General considerations based on engineering judgement.

The design characteristics and description of the proposed incinerator are given in the following section of this appendix. This information has been provided by and reviewed with Whitman, Requardt, and Associates, the engineering firm contracted for the engineering design of the incinerator by the District of Columbia's Department of Environmental Services. Subsequent sections of the appendix contain performance evaluations and summary findings concerning the use of the sludge incineration process.

SECTION II - INCINERATOR DESCRIPTION

2.1 General Description

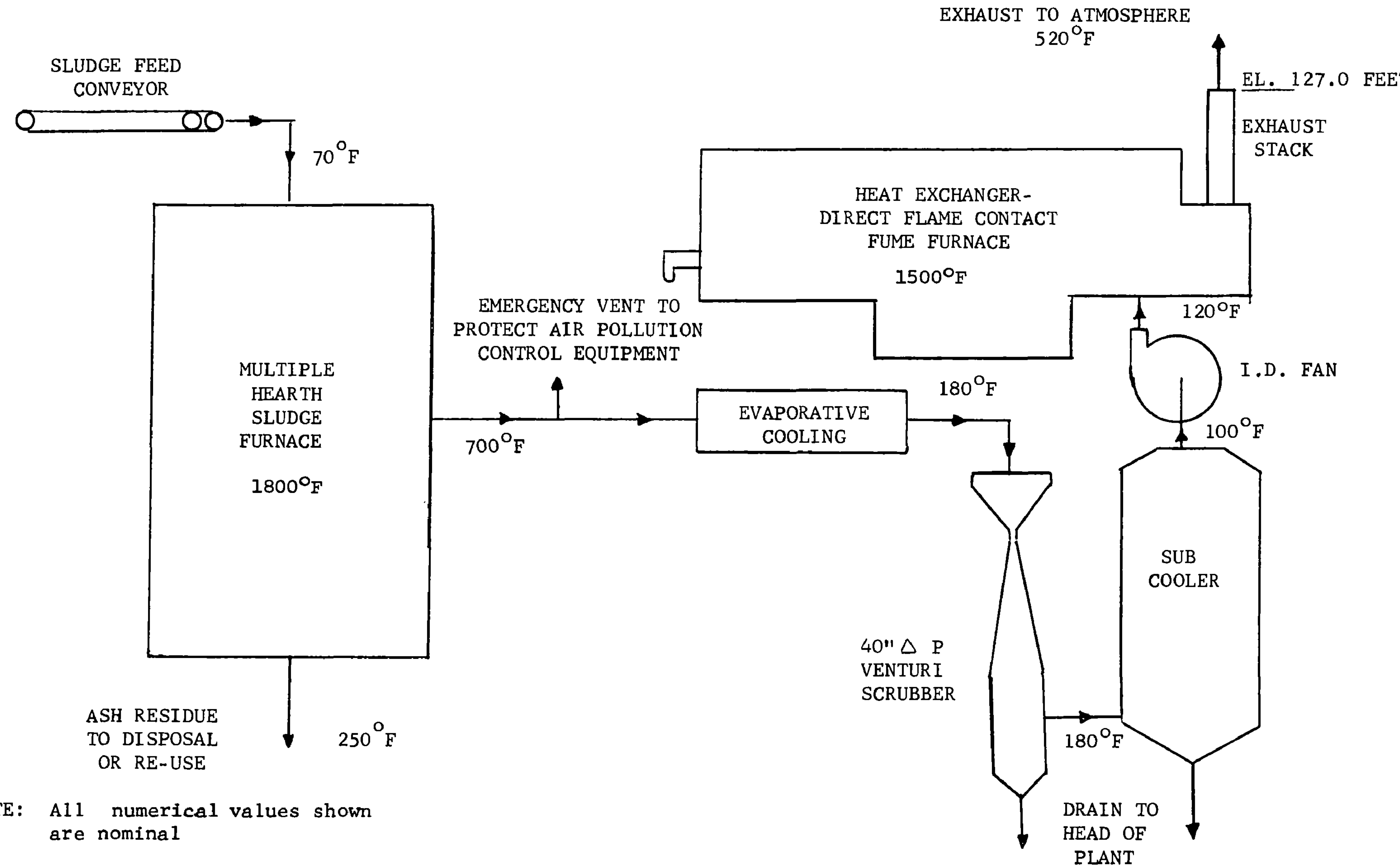
The incinerator will consist of 8 multiple-hearth furnaces, of which a maximum of 7 are on-line and one on standby, each having a maximum capacity of 6,860 pounds per hour (#/hr) dry solids, at up to 82% moisture as fired. Primary pollution control equipment consists of a high-energy venturi scrubber for particulates and a direct flame afterburner for visible plume attenuation and odor control.

The design of the incinerator will be completed by July 31, 1972, with construction anticipated to begin by October 1, 1972 and completed by July 1, 1974.

2.2 Detailed Description

2.2.1 Incinerator Operation (Refer to Figure 1)

Raw sludge is generated by other portions of the waste treatment plant which handles predominantly residential waste matter from the Washington, D. C. Metropolitan Area. By means of conveyors, this sludge is fed into multiple hearth furnaces where it is incinerated with the aid of auxiliary fuel. (No. 2 fuel oil or, if available, natural gas. The exhaust gas from this process will be cooled from approximately 700°F to 180°F by evaporative cooling using filtered plant effluent water. Upon leaving the evaporative cooling section, the cooled exhaust gas will be cleaned in a high energy venturi scrubber automatically maintaining a constant 40 inches water gage pressure drop to remove particulates and further condense gaseous compounds in the exhaust. The cleaned exhaust gas will then pass into a sub-cooler where further condensing of gaseous compounds and water vapor will occur in order to minimize the quantity of water vapor in the exhaust gas before further treatment. All condensed



NOTE: All numerical values shown are nominal

D.C. SLUDGE INCINERATOR
PROCESS FLOW DIAGRAM

Figure 1

water vapor and scrubber effluent from the wet cleaning portion of the process will be collected and routed to the head of the waste water treatment plant for cleaning in the normal plant process.

Under some conditions of temperature and humidity a white plume of water vapor will be evidenced if no further treatment is applied. Also, the District of Columbia Department of Sanitary Engineering sponsored independent tests on exhaust gases from similar furnaces at another installation in the U.S. and determined that further treatment is required to remove a small quantity of hydrocarbons present in the exhaust stream. Furthermore, the location of the plant near the geographic boundary with the State of Maryland created a desire to meet both Maryland's and D.C.'s emission standards, including those for visible emissions. Although steam vapor plumes (resulting from uncombined water) are specifically exempted from opacity regulations, the afterburner will also satisfy aesthetic desires to eliminate all visible plumes.

For these reasons the scrubbed and cooled gases are passed through a direct flame contact fume-furnace (utilizing auxiliary fuel) which is designed to burn any carry-over gaseous compounds from the exhaust gas stream and reheat it. The temperature will be raised sufficiently to ensure that no visible water vapor plume will be evidenced at the point where the cleaned gases are emitted to the atmosphere where they will quickly mix with the ambient air. This reheating also facilitates plume rise which aids in diffusion of pollutants. By exposing the total gaseous products of combustion to the flame of the afterburner, a 0.5 second detention time in the unit was determined to adequately complete the burning of any combustible compounds remaining in the exhaust. (See Figure 2).

RESEARCH FUME INCINERATOR
INCINERATION EFFICIENCY STUDIES
OF A.P.CO. IN-LINE DESIGN

NOMINAL TEST CONDITIONS

CONTAMINANT: TOLUENE
INLET CONC: 3000 PPM CARBON
INLET TEMP: 600° F.
FLOW RATE: 1380 SCFM
RESIDENCE TIME: 0.33 SEC.

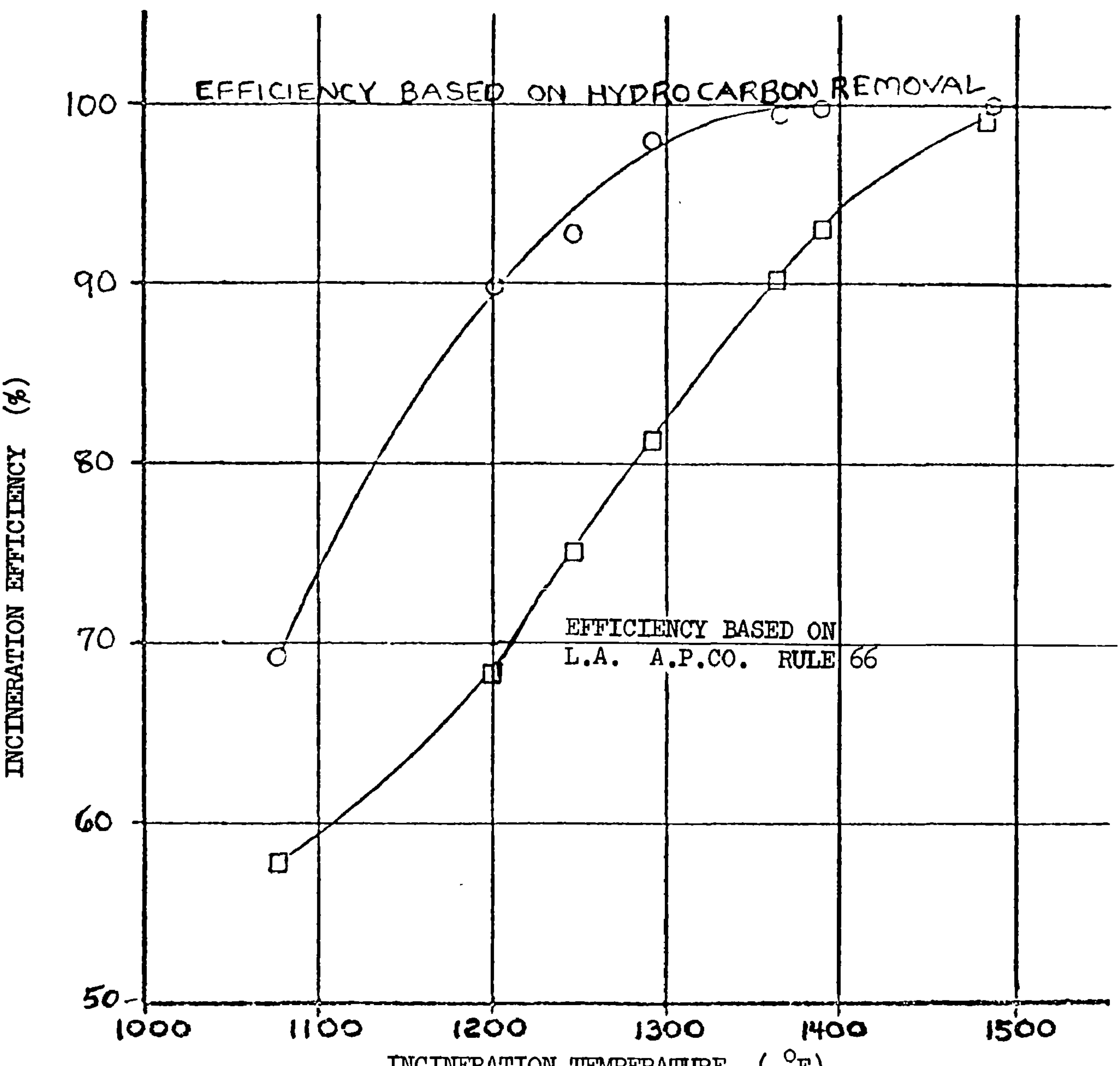


FIGURE 2

INCINERATION EFFICIENCY STUDIES OF AIR PREHEATER IN-LINE DESIGN OF DIRECT-FLAME FUME INCINERATOR

Ventilation exhaust air from the entire solids processing building is collected in an equalizing plenum from which the furnace combustion air is drawn in order that any odors entrained in the building ventilation air will be destroyed in the combustion process. Additional combustion air which may be required will be drawn into the system through a "one way" connection to a stack on the equalizing plenum above the incinerator roof level. In the event that the ventilation exhaust gas quantity exceeds the required furnace combustion air quantity, the excess will be diverted to one of the heat exchanger fume furnaces where any odors will be destroyed by direct flame contact.

There has been no operating by-pass capability provided in the air pollution control system. This makes it impossible to operate the furnaces without having the exhaust gases pass through the entire air pollution control equipment arrangement. An emergency relief has been provided for the protection of the plant personnel and equipment under extreme emergency conditions to prevent an in-plant catastrophy until normal shutdown procedures can be accomplished.

The residual ash is collected from the bottom of the furnaces for ultimate disposal at a landfill site or possibly for use as construction material. Transport of the ash will be by means of closed trucks or rail cars.

2.2.2 Costs

The system described is costly to install and will be costly to operate because of the power and fuel requirements. Total capital costs are estimated to be $21,250,000 and total operating costs at $3,737,000 per year.

The system represents the maximum limit of presently proven air pollution control technology and is expected to meet both the State of Maryland and the proposed District of Columbia emission standards for the process when tested with the procedures recommended by the Office of Air Programs of the Environmental Protection Agency. The total incinerator facility anticipated horsepower requirement is 5,400 under normal operating conditions and the electrical power is estimated to cost $378,000 annually, of which approximately $88,000 can be attributed to the fume-furnace afterburner operation for odor control and plume attenuation. The estimated annual consumption of No. 2 fuel oil in the sludge incineration process is estimated to cost $2,600,000, of which approximately $620,000 is attributed to the fume-furnace for odor control and plume attenuation. If natural gas were available, the estimated cost would be reduced by approximately 40 percent at present fuel prices. These annual costs are based on burning sludge at an average rate of 865,000 pounds of dry solids per day.

2.2.3 Incinerator Control

The incinerator furnaces will be controlled by a combination automatic and manual system with combustion air being automatically regulated by residual oxygen in the exhaust gas. This automatic system will be backed up by a manual system monitored by metering the carbon dioxide in the exhaust gas. In order to take full advantage of this refined control system, the design engineer will prepare an operating instruction manual and be available for initial and continued operator training to maintain maximum operator efficiency that is necessary with the normal employee promotions and attrition.

2.3 Design Parameters *

No. of furnaces	8 (1 is standby)
No. of furnaces on line	5-7 (depending on throughput)
Furnace diameter	25'
Stack diameter	5'
Stack height	110'
No. of hearths/furnace	12
Hourly capacity/furnace	
Maximum	6,860 #/hr (dry solids)
Average	5,150 #/hr (dry solids)
Minimum	3,430 #/hr (dry solids)
Exhaust gas residence time combustion chambers	2 sec minimum
@ Temperature of	1700°F
Exhaust gas residence time in fume-furnace afterburner	0.5 sec minimum
@ Temperature of	1500°F
Effluent flow rate through flue (75% excess air)	36,700 CFM
@ Temperature	520°F
@ Velocity	1860 FPM
Flow @ STP, dry	18,300 CFM
Excess air:	
Normal	75%
Minimum	50%
Maximum	150%

* Provided by Whitman, Requardt & Associates

Auxiliary fuel:		
Type		#2 Fuel oil or, if available, natural gas
Amount	Oil	240 gal/hr/furnace, and 78 gal/hr afterburner
		or
	Gas	32,800 $ft.^3$/hr/furnace, and 10,400 $ft.^3$/hr/ afterburner
Control Equipment		
Type (for particulates)		Venturi Scrubber
Pressure Drop		40" W.G., constant
Type (for moisture)		Subcooler
Type (for odor control & plume attenuation)		Direct flame afterburner

SECTION III - INCINERATOR EVALUATION

3.1 Introduction

The predicted levels of gaseous and particulate effluents from the various portions of the proposed incinerator are based upon the following:

a. Design parameters listed in the previous section.

b. Tests and/or evaluations by the designer of various system components similar to those proposed herein.

c. Results of sewage sludge incineration studies performed by the Environmental Protection Agency (Reference 1).

These predicted levels are listed in Table 3-1 below. The results of the mass emission determinations of the major effluents for the entire facility which are based on these levels are summarized in Table 3-2. Appropriate calculations to support these values are given in Supplement No. 1 of this Appendix.

TABLE 3-1, EMISSIONS PER FURNACE
(POUNDS PER MINUTE)

Location	NO_x	SO_2	Particulates
Furnace Outlet	0.2	1 *	8
Scrubber Outlet	0.2	0.1	0.024
Subcooler Outlet	0.11	0.02	0.02
Fume Furnace Outlet	0.11	0.11	0.04

* Per Reference 1, the sludge contribution to SO_2 is a negligibly small fraction of the auxiliary fuel oil contribution because sludge sulfur content is primarily in the form of non-combustible sulfates.

3.2 Emission Characteristics

3.2.1 Mass Emission Determinations

TABLE 3-2, QUANTITIES OF MAJOR EFFLUENTS

Effluent	Anticipated Concentration in stack @ STP, dry	Pounds/Day + 33%*	Tons/Year
NO_x	50 ppm	1085	197.4
Particulates			
Furnaces	0.009 grains/SCF (ASME Test Method)	237	43.3
Afterburner [(a)]		196	35.7
SO_2 Furnaces		202	36.7
Afterburner [(a)]		930	169
CO	← Essentially zero, see note (b) →		
Organic Compounds (PCB's, DDT, etc.)	← Essentially zero, see note (c) →		
Hg [(d)]	—	2.596	0.474
Pb [(e)]	—	2.133	0.390

* Values listed for average incineration rate. Tolerances reflect variations in sludge throughput rate.

Notes:

(a) Due to combustion of #2 fuel oil, limited to 0.5% S (July, 1975).

(b) Automatic combustion control for Oxygen is expected to provide for appreciably no CO. A CO_2 monitoring instrument in conjunction with manual control will provide a backup.

(c) The direct flame fume afterburner will destroy essentially all organic compounds (See Reference 1 and Figure 2).

(d) Weight of mercury in form of vapor or volatile compounds such as mercuric oxide is based on an Hg concentration of 3 ug per gram of sludge at Lorton, Va. (See Reference 1). It is assumed that Blue Plains sludge will have a similar concentration and that all the mercury in the sludge is emitted into the atmosphere.

(e) Weight of lead as part of lead compounds is based on a lead concentration of 9 mg/g in stack particulates at Lorton, Va. (See Reference 1). It is assumed that Blue Plains particulate emissions upstream from control equipment will have a similar concentration.

3.2.2 Emissions vs. Standards and Regulations

Federal

At the present time there are no Federal emission standards which apply to Sludge Incinerators. The standards expected to be proposed are as follows (Reference 2):

"1. Particulate emissions to the atmosphere are to be no more than 2.0 pounds per ton of solids fed to the incinerator. The feed rate is to be expressed on a dry basis.

2. Visible emissions shall be less than 10 percent opacity. (This does not include condensation effects of uncombined water)."

The predicted emissions from the Blue Plains incinerator plant are as follows:

$$\frac{\text{Particulate Output}}{\text{Dry Sludge Input}} = \frac{43.3 \text{ Tons/Year}}{158{,}000 \text{ Tons/Year}} = 0.55 \text{ lb/Ton} \left(\begin{array}{l}\text{Not including}\\ \text{fume furnace}\\ \text{auxiliary}\\ \text{fuel}\end{array}\right)$$

The No. 2 oil which is presently proposed as auxiliary fuel in the afterburner will increase the particulate emissions. Although auxiliary fuel effects were not included in the 2 lb/ton requirement and auxiliary fuel emissions are exempted per DC Regulation 8-3:607d the total Output/Input ratio was calculated to be $\frac{43.3 + 35.7 \text{ tons/year}}{158{,}000 \text{ tons/year (dry)}} = 1.0$ lb/ton

No visible emissions will occur on the basis of the design of the exhaust gas treatment system and afterburner. (Opacity would still be less than 10% if the afterburner were not incorporated in the design) There are no other Federal emission standards applicable to sludge incineration which are presently contemplated.

Local D. C. Regulations

(a) Present District of Columbia Regulations which apply to a new incinerator source are as follows:

Regulation	Subject	Requirement (Abbreviated)
8-3:607d	Incinerator Particulate Emissions	0.01 gr/scf, dry 12% CO_2, Max. 2 hr. avg.
8-2:706	Fuel Burning Particulate Emissions	Computes to be .065 #/min
8-2:711	Visible Emissions	20% opacity discounting uncombined water
8-2:715	Odors	No. 2 on Barneby-Cheney Scentometer
8-2:716	Test Methods	Particulates: ASME Test Code,PTC21-1941 ASME Test Code,PTC27-1957 Visible Emissions: Ringlemann Chart Odor: Barneby-Cheney Scentometer

The predicted emissions from the Blue Plains incinerator plant are as follows:

Particulates (Incineration with gas-fired afterburner):

0.009 gr/scf, dry, 12% CO_2,
Max 2 hr. avg. (43.3 Tons/Year)

Particulates (from oil-fired afterburner):

0.0195 lbs/min
(35.7 Tons/Year)

Visible Emissions: No visible emissions will occur on the basis of the design of the exhaust gas treatment system and afterburner

Odors: No odors will emanate from this plant on the basis of the ventilation system design, incineration temperatures and operation of fume-furnace (afterburner).

(b) Sulfur dioxide emissions resulting from burning fuel oil are to be limited by use of fuel oil containing not more than 0.5% Sulfur by weight per Regulation 8-2:704.

Sulfur dioxide emissions will be limited by the above requirement if natural gas is unavailable as a fuel for the incinerator and afterburner.

3.3 Effect of Emissions on Air Quality

3.3.1 Meteorological Background Information

The geographic area of this study is a tri-state area consisting of Montgomery and Prince George's Counties in Maryland; the Virginia Counties of Arlington and Fairfax; the independent Cities of Alexandria, Falls Church, and Fairfax; and the District of Columbia. The discussion in the paragraphs below provides the basis for determinations of pollutant concentrations which follow.

Metropolitan Washington is situated at the western edge of the Atlantic Coastal Plain, 35 miles west of Chesapeake Bay. The Blue Ridge Mountains rise to 3,000 feet about 50 miles to the west and affect Washington's weather by markedly warming and drying winds from the west. The coastal plain to the east is essentially flat. Although no topographic barrier exists between the area and Chesapeake Bay and the Atlantic Ocean, the city is too far inland to be affected by the summer sea breezes.

The terrain of the city itself varies from sea level to slightly over 400 feet. Bluffs along the Potomac River and Rock Creek, and to the southeast and east of the Anacostia River suggests some channeling of the airflow, but, generally, the terrain does not seriously impede the free movement of air about the city.

Surface winds as measured at the National Airport, which has an excellent exposure for wind measurements and which is also near the center of the metropolitan area, are most frequently from the northwest during the colder months and south and southwest during the warmer months. Wind roses for each season and the year are shown in Figures 3 and 4.

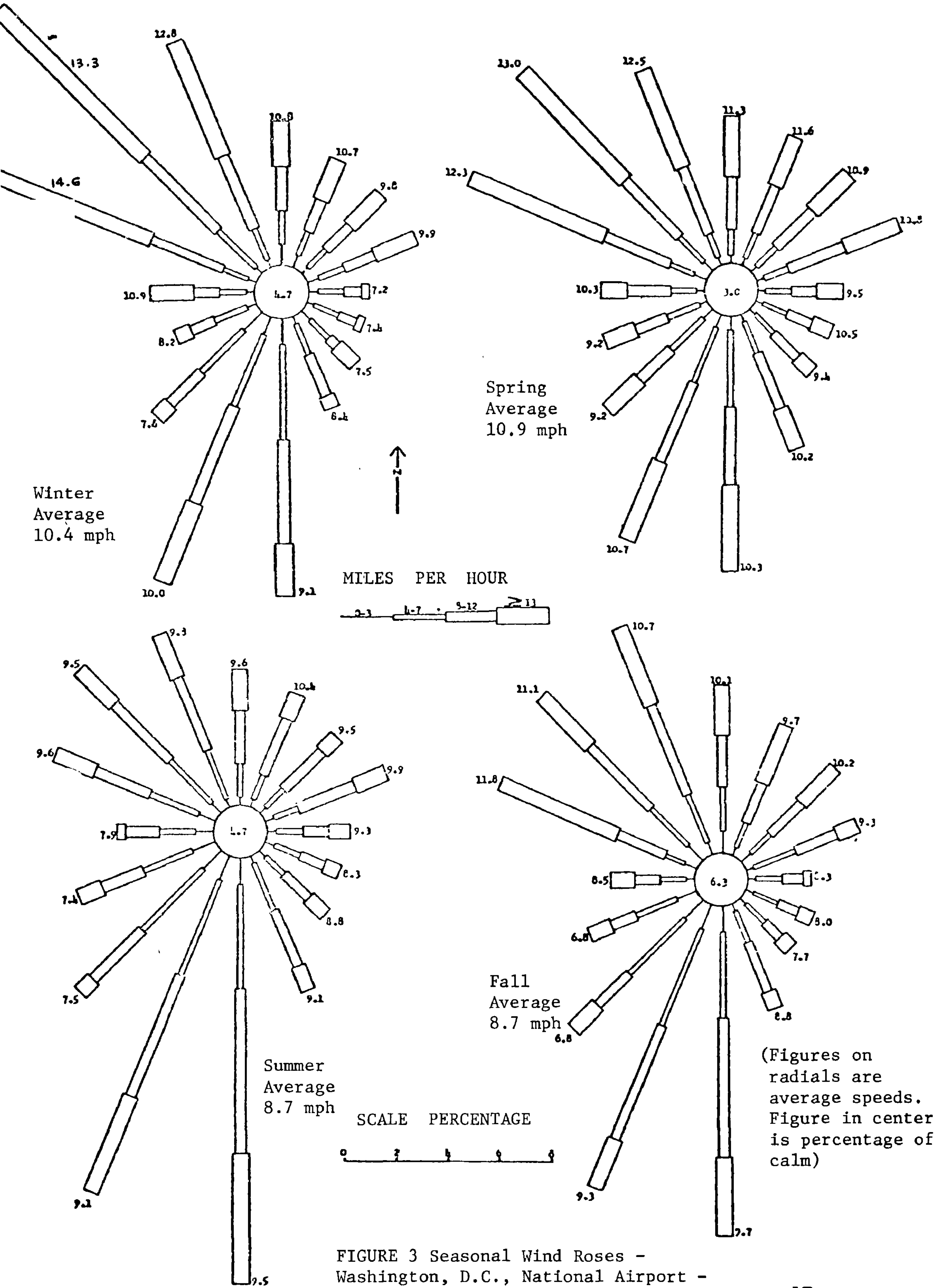


FIGURE 3 Seasonal Wind Roses - Washington, D.C., National Airport - 1951 - 1960

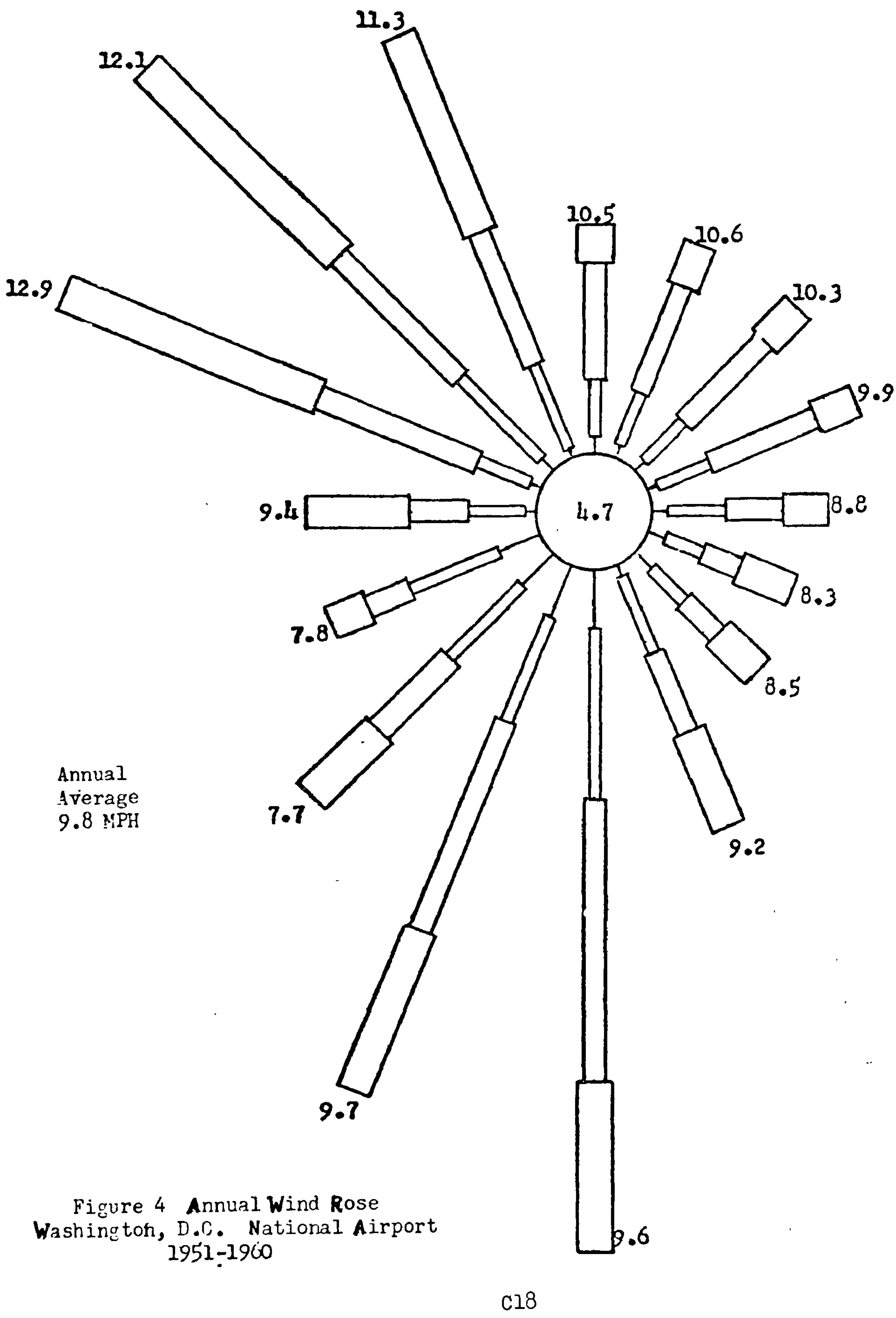


Figure 4 Annual Wind Rose
Washington, D.C. National Airport
1951-1960

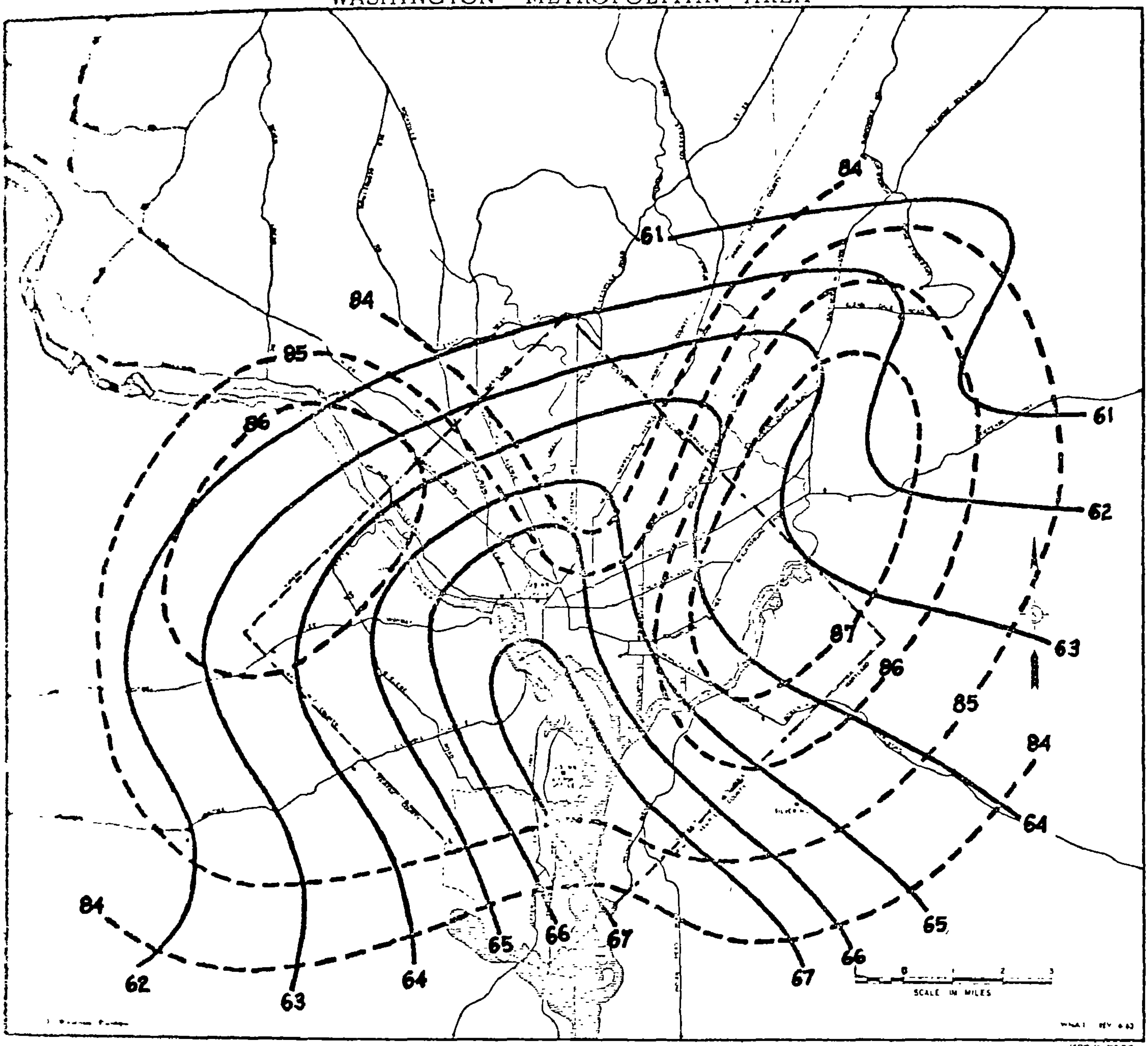
All meteorological elements are influenced to some extent by cities. There are several causes for the differences between urban and nearby rural climates. The reflection, radiation, and evaporation characteristics of the swamps, meadows, forests, and fields typical of rural areas are quite different from corresponding characteristics of the buildings and streets of asphalt, brick, concrete, and steel in the cities. The roughness of the surface varies between rural and urban areas. Winds are usually somewhat stronger in the rural areas. The combustion processes that take place in the city emit a sizeable quantity of heat. Finally, the dusts, gases, and vapors emitted in the city change the composition of the urban atmosphere.

Woollum has made detailed analyses of maximum and minimum temperatures at 13 to 29 points in the metropolitan Washington area. He has shown that minimum temperatures in rural areas average 4°F to 5°F cooler than those in the vicinity of the Washington National Airport. His studies show that maximum temperatures tend to be higher in the northwest portion of the District near the Potomac River and in the northeast portion along the Anacostia River. Figure 5 shows the results of some of his analyses.

An analysis of wind data at the Dulles International Airport, Washington National Airport, Andrews Air Force Base, Suitland and CAMP stations, Friendship International Airport and meteorological towers at Silver Hill and Tysons Corner conducted by the Division of Meteorology (then part of NAPCA) in 1967 did not reveal a consistent circulation that might be attributed to the variations in temperatures.

The nighttime stability in the city center should be less and inversions and stable layers more frequently elevated than in rural areas. Pollutants

WASHINGTON METROPOLITAN AREA



------ High Temperature

______ Low Temperature

Figure 5 Mean Summer (June, July, Aug.) Temperature, °F.

emitted at building-top level in the city would tend to accumulate somewhat above street level and then be brought to the surface the following morning. In rural areas, it would be somewhat easier to emit pollutants above the low-lying inversion, where they would be susceptible to better dispersion.

The microclimatology of the metropolitan Washington area shows the same urban influences as other major cities. It does not seem to have any unusual patterns which would contribute to particular zones of pollutant buildup.

3.3.2 Air Quality Determinations

a. Related to Mass Emissions

The potential impact of the mass emissions of NO_x, SO_2, and particulates upon the air pollution burden from sources within the District of Columbia is shown in Tables 3-3, 3-4, and 3-5 below. In order to facilitate an understanding of the magnitude of the problem, limiting conditions for emission projections are shown in these tables. The effects upon predicted air quality of this additional burden on the metropolitan area will be discussed shortly.

TABLE 3-3, NO_x BURDEN (D.C.), TONS/YEAR

Condition / Baseline*	Without Blue Plains Incinerator	With Blue Plains Incinerator (gas or oil-fired fume furnace)	Percentage Increase
Current estimate, Jan. 31, 1972	44,311 T/Y	45,509 T/Y	0.45%
Estimate for July 31, 1975, assuming 50% Stationary Source Control on Jan. 31, 1972	42,983 T/Y	43,181 T/Y	0.46%
Estimate for July 31, 1975, assuming 0% Stationary Source Control on Jan. 31, 1972	29,798 T/Y	29,996 T/Y	0.67%

* See D.C. Implementation Plan Jan. 1972

TABLE 3-4, SO_2 BURDEN (D.C.), TONS/YEAR

Condition / Baseline*	Without Blue Plains Incinerator	With Blue Plains Incinerator (gas-fired fume furnace)	With Blue Plains Incinerator (oil-fired fume furnace)	Maximum Percentage Increase
Current estimate, Jan. 31, 1972	57046 T/Y	57083 T/Y	57252 T/Y	0.36%
Estimate for July 31, 1975 with full control strategy	28523 T/Y	28560 T/Y	28729 T/Y	0.72%

* See D.C. Implementation Plan Jan. 1972

TABLE 3-5, PARTICULATES BURDEN (D.C.), TONS/YEAR

Condition / Baseline*	Without Blue Plains Incinerator	With Blue Plains Incinerator (gas-fired fume furnace)	With Blue Plains Incinerator (oil-fired fume furnace)	Maximum Percentage Increase
Current estimate Jan. 31, 1972	19575 T/Y	19618 T/Y	19654 T/Y	0.4%
Estimate for July 31, 1975 with full control strategy	4133 T/Y	4176 T/Y	4212 T/Y	1.9%

* See D.C. Implementation Plans of Aug. 1970 & Jan. 1972

The percentage increase in the pollution burden for the metropolitan area (as defined in paragraph 3.3.1) is even less than it is for D.C. Calculations based on emission inventory summaries given in the Implementation Plans for Virginia, Maryland, and the District of Columbia show the maximum percentage increase to be as presented in Table 3-6.

TABLE 3-6, MAXIMUM EMISSION INCREASE - D.C. & METROPOLITAN AREA, IN PERCENT *

Pollutant / Locale	NO_x	Particulates	SO_2
D. C.	0.45%	0.40%	.36%
Metropolitan Area	0.113%	0.165%	.085%

* Based on estimates of current emissions listed in Implementation Plans of Jan. 31, 1972. See Supplement No. 2

As can be seen from the above table, the output of NO_x, SO_2 and particulates by the proposed incinerator would be very small. To make an accurate quantitative estimate of their effect on ambient air quality is impossible because the magnitude of errors involved in modeling is much larger than the effect produced by this relatively small additional source.

b. Related to Diffusion Estimates and Statistical Studies

An alternative method of estimating effects of emissions on air quality was then considered. Diffusion estimates, using two contrasting sets of data, were made to estimate 1 - hour ground level concentrations downwind of the incinerator. Using statistical data these were then converted to long term (1 year) averages in order to permit evaluations against national standards. One hour averages were assumed so that minor short-term variations would be averaged out and large scale changes in the synoptic conditions would not have time to develop. The equations used are given in Supplement No. 3.

In the first case, an unstable atmosphere with a high wind was assumed in order to give high concentrations near the plant.

Specifically, the following was assumed:

Stability	B
Wind Speed	6 meters/second (13.4 mi./hr.)
Effective Stack Height	59 meters
Mixing Height	1500 meters

This yielded down wind values of:

Distance	Particulate	NO_x
250 meters	4.5 ug/m^3	.0097 ppm
500 "	8.6 "	.018 "
1000 "	3.6 "	.008 "
2000 "	1.04 "	.002 "

In the second case, a stable atmosphere with very light wind was assumed. This yielded a smaller maximum further from the plant.

Stability	D
Wind Speed	2 meter/second (4.5 mi./hr.)
Effective Stack Height	104 meters
Mixing Height	450 meters

Distance	Particulate	NO_x
250 meters	zero	zero
500 "	zero	zero
1000 "	.31 ug/m^3	.0007 ppm
2000 "	3.8 "	.0081 "
3000 "	4.9 "	.011 "
4000 "	4.7 "	.010 "

Certain meteorological conditions will produce higher concentrations than these for short time periods. Such conditions might be caused by strong turbulence which causes the plume to loop down to the ground; or by the break up of a low level inversion causing a fumigation. These higher levels of air pollution concentration will be of short duration, will not occur frequently, and when they do happen are expected to be confined to the plant boundary.

By considering the historical records of pollutant measurements, one can statistically relate the frequency distribution of measurements to various averaging times. This has been extensively studied by Larsen, who has reported on his findings in a number of publications. In "A Mathematical Model for Relating Air Quality Measurements to Air Quality Standards" (Reference 4) Larsen presents the following data which was extracted from a table of NO_x data taken in Washington, D. C. from 1962 to 1968.

TABLE 3-7 *

NITROGEN OXIDES CONCENTRATION (PPM) AT WASHINGTON, D. C. CAMP STATION

	Percent of time concentration is exceeded							
	.01	.1	1	10	30	50	70	90
Averaging Time								
5 min	1.00	.70	.38	.14	.07	.05	.03	.02
1 hr	.97	.71	.38	.14	.07	.05	.04	.02
8 hr		.54	.31	.13	.07	.05	.04	.03
1 day			.25	.12	.08	.06	.05	.03
1 mo				.10	.08	.06	.05	.04
1 yr						.07		

* The values given in the table are the measured concentrations exceeded a certain percent of the time. For example, the table shows that on 1% of the hours in the year, the one hour average of NO_x is greater than .38 ppm. Under these conditions, the annual mean is .07 ppm.

The meteorological parameters used above were chosen to give high ground level values of pollutants, but it is realized that worse conditions do exist from time to time. By making the assumption that conditions more extreme than the ones chosen will not occur more frequently than one hour every four days (or approximately 1% of the time) and that the distribution of pollutant concentration levels will be in ratios similar to the variations shown in Table 3-7 the annual mean local contribution of the incinerator can be estimated. Using this method, the annual contribution of NO_x will be a maximum of .003 ppm.

Similar calculations were made for annual contribution of particulates and sulfur dioxide using statistical data from Reference 4 that apply to those pollutants. Their contribution (along with NO_x) to values of annual concentrations are shown in Table 3-8 below.

TABLE 3-8, INCINERATOR POLLUTANT ANNUAL MEAN LOCAL CONTRIBUTION

Pollutant	Concentration*	Downwind Distance, Meters	Percent of Primary Std.	Percent of Secondary Std.
NO_x	.003 ppm	500	6.65%	6.65%
Particulates	1.4 ug/m^3	500	1.85%	2.3%
SO_2	.0025 ppm	400	12.5%	8.3%

* Too small to be measured directly

c. Summary

The two methods discussed above - one which considers the overall effect of the incinerator on the city and the other which looks at the local effects - show that the contribution of pollutants to the area's air will neither meaningfully deteriorate the overall air quality nor present any detrimental local problems. It is realized that the methods used to arrive at these conclusions are necessarily crude, but the state of the art has not yet advanced to the point where much more accurate answers are available. At this time, it is believed that any more complex modeling of the problem would only serve to compound the errors. Other assumptions could be made and other approaches used which could lead to equally proper, but different numbers. Properly calculated, they would be no more "right" or "wrong" than what is developed here, but only would show the difficulty at arriving at one set of exact answers. The important result is not the exact amount of pollutant at a particular point for a particular time, but an estimate of the magnitude of the effect of this incinerator. This has been done here and has shown that the expected effects on air quality will be very small.

3.3.3 Air Quality (Other Pollutants)

The proposed emission standard for mercury is 5 lb./24 hrs. Although this standard applies only to facilities producing mercury from ore and mercury cell chlor-alkali plants (see Reference 7), a comparison of the anticipated emissions from the Blue Plains incinerators against this proposed standard shows that it will be approximately ½ of the standard. Since the project area is not known to have plants such as those covered by the standard, it is anticipated that the small quantity of mercury compounds that may be emitted by the incinerator will have a negligible effect on any atmospheric concentrations of mercury compounds. Calculations show that such concentrations are expected to be well below 1 ug/m^3, which is sufficient to protect the public health from illness due to inhalation of mercury compounds. (see Reference 7).

Presently, no standards exist for emissions of lead from stationary sources, or for lead concentrations in the ambient air. Since the amount of lead emitted is even less than that of mercury, it is felt that its impact on air quality will also be negligible.

With respect to organic compounds in the gas stream, the direct-flame afterburner is designed to totally eliminate any possible emissions of these (see Section 2.2.1 and Figure 2).

3.4 General Considerations

3.4.1 Odor

A fume-furnace afterburner associated with each of the 7 operating incinerators has been incorporated in the design of the facility. The afterburner is intended to destroy any remaining odor-causing products which may have become trapped in the exhaust gas stream or in the exhaust air of the solids processing building. The combustion time/temperature relationship (0.5 seconds/1500°F) is sufficient to ensure destruction of any such substances. (Also see paragraph 2.2.1)

3.4.2 Noise

There is no equipment required by the sludge incineration process which offers any unusual noise potential and the normal equipment and operating noise will be contained in the building. The air-conditioned and enclosed operating room will offer protection for the plant operators from even the normal process equipment noise within the building.

3.4.3 Aesthetics

Aesthetic degradation of the environment will occur as a result of the appearance of four stacks (one for each pair of furnaces) protruding 20 ft. beyond the building profile. The operation of the sub-cooler and afterburner will be such as to remove visible-plume causing moisture and to reheat the exhaust gas stream to further ensure no visible water vapor plume. The particulate loading of the exhaust gas stream (aggravated by an oil-burning afterburner) will be sufficiently low that if no afterburner were used, a less than 10% opacity plume would result.

3.4.4 Living Organisms (See Reference 8)

The destruction of most pathogens is assured by the high temperatures in the incinerator, ranging from 300°F to 1700°F in the various hearths. The duration of burning of the sludge at these temperatures is approximately one hour. Any pathogens in the exhaust gas stream will be subjected to the same temperatures, with the incinerator design ensuring a residence time of at least 2 seconds at the maximum temperature of 1700°F. Thus, neither the gas effluent into the ambient air, nor the residue ash which is to be disposed of in a sanitary landfill, offer a potential source of any magnitude for contamination from living organisms.

3.4.5 Water Pollution

The entire quantity of evaporative cooling water and scrubber water required in the exhaust gas cleaning process will be returned to the head of the plant where it will receive the same treatment as the standard plant influent. The water discharged from the sub-cooler will be introduced into the plant effluent sewer at a point where it will be mixed thoroughly before it leaves the plant and no additional pollution load is anticipated from the mixing of the sub-cooler effluent with the normal plant effluent.

3.4.6 Thermal Pollution

The volume of process water from the cleaning and sub-cooling process associated with the sludge incineration will have a minimal effect on the overall plant effluent water temperature. If the total heat input is considered added to the normal plant effluent, it is anticipated that the total effluent temperature will be raised approximately 3°F. However, the dirty portion of the process water is returned through the plant cleaning process and it can be expected to receive some cooling. It is reasonable to expect that only the sub-cooler discharge heat will affect the normal plant effluent temperature. This effect is estimated to raise the effluent temperature approximately 2°F. before it enters the river.

3.5 Operation

The proper operation of the sludge incinerator with its manual and automatic controls will require well-trained operators. It will be necessary for the operators to be trained both initially and recurrently. To this end, the incinerator designer will prepare an operating manual.

Sufficient flexibility is incorporated in the incinerator design to permit shutting down of one furnace* without affecting normal operation (i.e. at average feed rate). If circumstances forced the shutting down of two furnaces* simultaneously, the minimum feed rate could still be maintained, as indicated below:

TABLE 3-9, FEED RATE, DRY SOLIDS

	3,430 #/hr (min)	5,150 #/hr (avg)	6,860 #/hr (max)
Number of furnaces normally operating	7 or 5[a]	7	7

* Since an eighth furnace is on standby, this actually represents the failure of one more furnace than stated.

a) If long-term operation at the minimum feed rate is anticipated, two furnaces would be deliberately shut down. For a similar operation of only short duration, all seven furnaces would continue to operate.

SECTION IV - FINDINGS AND CONCLUSIONS

4.1 General

It has been determined that the incineration process will result in various forms of environmental degradation. By every measure of acceptability - federal standard, local regulation, guideline, or engineering judgment - the degradation has fallen within acceptable limits. The obvious air pollution due to incineration has been quantified for every pollutant that is emitted in a predictably significant amount using the best available evaluation tools. The water quality and temperature effects on the Potomac and the general aesthetic, pathogenic, odor, and noise aspects were also evaluated. The solid waste residue in the form of ash was also considered. It is necessary that all of these forms of pollution be compared with those that result from other disposal means in order to ensure that the most rational decision in favor of the environment be made.

4.2 Mass Emissions

Mass emissions of the major pollutants, oxides of nitrogen, particulates, and sulfur dioxide, show potential percentage increases for the District of Columbia which are less than ½ percent. Those percentages for the metropolitan area are correspondingly reduced - by a factor of approximately 4 to 1. Trace, but predictable amounts of the toxic mercury and lead compounds may also be added to the atmosphere. Emissions of carbon monoxide and organic compounds will be essentially zero.

4.3 Air Quality

The mass emissions of the major pollutants (NO_x, particulates, and SO_2) were also related to air quality. The results show no meaningful degradation can be predicted for the immediate vicinity, the city, or the metropolitan area. Percentage degradation of ambient air, using primary and secondary air quality standards as a baseline, range downwards from 12½% - these at the local maximum points in the vicinity which are generally expected to occur within either the confines of the facility, or the air bases, or along the non-residential areas along the eastern shore of the Potomac River. The potential degradation at other locations rapidly falls off from the predicted maximum sites.

4.4 Costs

Both capital and operating expenditures for the proposed incinerator facility are high. This is attributable to the design of the equipment at the limits of present day incinerator technology and to the high levels of electrical and fossil fuel requirements. Future availability of natural gas could save an estimated 40 percent of fuel costs. Further savings could be effected by elimination of the afterburners from the design at the expense of ensuring total destruction of organic compounds, odors, and the total elimination of visible plumes.

4.5 Operation

Operation will require a reasonably high level of operator proficiency to complement the semi-automatic equipment. This is necessary to maintain optimum combustion as conditions vary. Personnel must also be capable of reacting quickly in emergency situations in shutting down and transferring incineration from on-line to standby furnaces.

4.6 Other

Preliminary information suggests the distinct possibility that the electrical power requirements for land disposal of sewage or sludge are significantly greater than the incinerator's electrical requirements. This is primarily attributable to the energy needed to pump the wastes for great distances. Such excess electrical power can be converted into units of pollution (for NO_x, particulates, and SO_2) per unit of power. The resulting air pollution burden must then be charged to the land disposal alternatives before fair trade-offs can be made. This is particularly important when considering the probability that PEPCO, whose generating stations are in the metropolitan area, is the most likely source of all required electrical power.

SUPPLEMENT NO. 1 - EMISSION CALCULATIONS

I. Nitrogen Oxides (NO_x):

a. Furnace emissions:

0.2 #/Min/Furnace, per Designer

By using the relationship that

$ug\ NO_x/m^3 = \frac{[ppm]}{5.32} \times 10^4$ (Federal Register, 4/30/71)

This is equivalent to 93 ppm, which is in agreement with EPA information on multiple-hearth incinerator capabilities (reference 1).

b. System emissions:

50 ppm per Designer

By using the same conversion factor as above, this is equivalent to 0.1073 #/Min/Furnace ≡ 28.2 tons/year/furnace, X 7 Furnaces = 197.4 tons/year.

II. Particulates:

a. Furnace emissions are 8#/Min/Furnace, per the Designer. The maximum collection efficiency of the scrubber is 99.8%, per the Designer. Therefore, emissions at the scrubber outlet are 0.016 #/Min/Furnace.

A more conservative efficiency, including a 50% safety factor, is 99.7%. Thus, emissions are 0.024 #/Min/Furnace = 6.2 tons/year/ furnace X 7 Furnaces = 43.3 Tons/Year.

Using appropriate conversion factors

$\frac{0.024\ \#/Min/Furnace}{18{,}300\ SCFM} = 0.009$ gr/SCF.

Efficiencies of 99.7% or greater are achievable with a 40" W.G. pressure drop scrubber, for a range of typical particle sizes.

c. Afterburner:

Emission factor = 15 #/10^3 gallons (Ref. 3)

1.3 gallons/Min/Furnace (per Designer) X 15 #/10^3 Gallons = 0.0195 #/Min/Furnace ≅ 5.1 tons/year/Furnace X 7 = 35.7 tons/year, total.

III. Sulfur Dioxide (SO_2):

a. 0.02 #/Min/Furnace, per Designer, ≡ 5.2 tons/year Furnace X 7 Furnaces = 36.7 tons/year.

b. Afterburner:

Emission factor = 142 (% sulfur) #/10^3 Gallons (Ref. 3).

D. C. regulations will require the use of 0.5% S fule on 7/1/75.

Therefore,

142 (0.5) X (1.3 gall/Min/Furnace) (per Designer) = 0.092 #/Min/Furnace ≅ 24.1 tons/year/Furnace X 7 Furnaces = 169 tons/year.

IV. Mercury (Hg):

Sludge burned in the Lorton, Virginia incinerator had 3 ug of Hg per 1g sludge. The Lorton, Virginia sludge incinerator is the nearest of the sludge incinerators tested by EPA (Ref. 1) to Blue Plains. It is anticipated that Blue Plains sludge will have a similar concentration of Hg. Since none of the Hg remained in the ash at Lorton, it appears that all of it was emitted through the stack.

Therefore,

5150 #/Hr sludge/Furnace X 3 ug/g sludge X 24 Hrs/Day

= 0.371 #/Day/Furnace = 0.068 tons/year/Furnace X 7

Furnaces = 0.474 tons/year.

V. Lead (Pb):

The Pb concentration is also based on the Lorton, Virginia study (Ref. 1). Particulates emitted at Lorton had a Pb concentration of 9 mg/g. It is assumed that the Blue Plains particulate emissions will have a similar concentration.

Therefore, using the 237 #/HR particulate emission value listed in Table 3-2 of this Appendix, 237 #/HR X (9 X 10^{-3}) = 2.133 #/Day/All Furnaces

Similarly,

43.3 tons/year X (9 X 10^{-3}) g/g = 0.3897 tons/year

SUPPLEMENT NO. 2 - AREA INCREASES IN EMISSIONS

The emission inventory summaries given in the various state Implementation Plans submitted January 31, 1972 are listed below for NO_x, particulates, and SO_2. These were used as a basis for computing maximum percentage increases to the metropolitan area pollution burden due to the Blue Plains incinerator assuming it were in operation now.

	NO_x, T/Y	Particulates, T/Y	SO_2, T/Y
Fairfax County, Virginia	23600	9400	- *
Montgomery County, Md.	41600	6700	66000
Prince George County, Md.	45600	8200	70900
Alexandria, Virginia	12000	1200	- *
Arlington County, Virginia	6600	2800	- *
Washington, D. C.	44300	19600	57000
Virginia	-	-	48000*
	173,700	47,900	241,900

* Total for Virginia Counties was obtained from 1972 Maryland Implementation Plan.

NO_x percentage increase = 197/173700 = 0.113%

Particulates percentage increase = 79/47900 = 0.165%

SO_2 percentage increase = 206/241900 = .085%

SUPPLEMENT NO. 3 - DIFFUSION CALCULATIONS

Diffusion calculations were made using the standard gaussian plume diffusion model assuming the plume is trapped under the stable layer aloft and reflected at the ground. The equation that represents this condition is:

$$\chi(x, o, z; H) = \frac{Q}{2\pi u \sigma_y \sigma_z} \left\{ \exp\left[-\tfrac{1}{2}\left(\frac{z-H}{\sigma_z}\right)^2\right] + \exp\left[-\tfrac{1}{2}\left(\frac{z+H}{\sigma_z}\right)^2\right] + \sum_{n=1}^{4}\left[\exp -\tfrac{1}{2}\left(\frac{z-H-2nL}{\sigma_z}\right)^2 + \exp -\tfrac{1}{2}\left(\frac{z+H-2nL}{\sigma_z}\right)^2 + \exp -\tfrac{1}{2}\left(\frac{z-H+2nL}{\sigma_z}\right)^2 + \exp -\tfrac{1}{2}\left(\frac{z+H+2nL}{\sigma_z}\right)^2\right]\right\}$$

χ = ground level concentration

Q = source strength

σ_y = dispersion coefficient (y - plane)

σ_z = dispersion coefficient (x - plane)

u = wind speed

z = height

H = effective stack height

n = number of reflections

L = mixing height

Values for σ_y and σ_z were as presented by Turner (1969) in the "Workbook of Atmospheric Dispersion Estimates" (Reference 5). Values for plume rise were calculated using a method described by Briggs (Reference 6).

REFERENCES

1. Report, Environmental Protection Agency, Task Force on Sewage Sludge Incineration, January, 1972.

2. Background Information for Proposed New-Source Performance Standards, February, 1972.

3. Compilation of Air Pollutant Emission Factors, February, 1972 (AP-42).

4. "A Mathematical Model for Relating Air Quality Measurements to Air Quality Standards", R. I. Larsen, PH.D., Environmental Protection Agency, November, 1971.

5. Workbook of Atmospheric Dispersion Estimates, D. B. Turner, Department of Health, Education and Welfare, Revised - 1970.

6. "Plume Rise", G. A. Briggs, E.S.S.A., TID-25075, Library of Congress Catalog Card Number: 72-603261.

7. Federal Register, Volume 36, No. 235, December 7, 1971.

8. "Microbiological Evaluation of Incinerator Operations", Mirdza L. Peterson and Fred J. Stutzenberger, Applied Microbiology, July, 1969.

APPENDIX D

SPRAY IRRIGATION

APPENDIX D

SPRAY IRRIGATION

Description

An alternative to advanced waste treatment and sludge incineration that will be considered in this Appendix of the impact statement is a land disposal system. Basically, this method involves conveying secondary effluent from an existing sewage treatment plant to a suitable site for disposal by spray irrigation. Hopefully, irrigated effluent would stimulate growth of agronomic crops and the wastewater would be renovated to the level of tertiary effluent through various biological and physical processes that naturally occur in the soil. The renovated wastewater can be returned to the natural ground water supply or collected in a series of underdrains or wells and transported to a centralized discharge point.

History

In 1962, Pennsylvania State University initiated a program to determine "(1) the feasibility of the year-round disposal of sewage effluent on land, (2) the degree of renovation of sewage effluent by means of biological, chemical, and mechanical processes in the soil, (3) the extent of conservation of water by returning it to the ground water supply, and (4) the effects of the application of effluent on soils, crops, trees, and wildlife."[1]

---

(1) R. R. Parizek et al., Waste Water Renovation and Conservation, The Pennsylvania State University Studies No. 23, University Park, Pennsylvania, 1967, p. 9.

Effluent was pumped from the joint University - Borough of State College Sewage Treatment Plant to spray irrigation sites located in the agronomy, forestry and gameland areas. The wastewater was distributed to sprinkler areas via a fixed aluminum pipe irrigation system. The sewage effluent was sprayed on both forest land and cleared agricultural cropland at rates ranging from one to six inches per week. During the winter months, research was conducted to determine the feasibility of winter operation. An extensive monitoring system was established to measure baseline conditions and the changes that later occurred in groundwater quality.

After two years of operation, the researchers reached the following major conclusions:

"1. With adequate information regarding the soil mantle and underlying rock structure, the safe disposal of effluent on land can be carried out under a wide variety of field conditions with proper management.

2. Irrigation of wastewater was accomplished in below freezing weather.

3. Effluent was renovated when applied at rates of one, two, or four inches per week from April to December on agronomic and forested areas. Ninety to ninety-five percent of the surfactants were removed during passage through one foot of soil. Phosphorous concentration was reduced by ninety-nine percent and nitrate by sixty-eight to eighty-two percent.

4. Approximately eighty percent of the water, when applied from April to December at the rate of two inches per week, was recharged to the groundwater reservoir...

5. The quality of water in sand-point and deep wells at the site showed no significant change...

6. The harvesting of agronomic crops contributed to the renovation of effluent through removal of nutrient constituents. Agronomic crops... are superior to forest crops which recycle some of the nutrients by redeposition of leaf and stem litter. At the same time, economic benefits were obtained in the form of increased yields ranging from seventeen to three hundred percent."[(2)]

Pennsylvania State University researchers have continued to investigate the spray irrigation treatment method. In a recent presentation to the Interstate Commission on the Potomac River, the Pennsylvania State University scientists stated that the "Living Filter" system continues to perform well. A representative of the Pennsylvania Department of Environmental Resources also spoke at the meeting and advised that the Pennsylvania State University spray irrigation operation was well-managed and well-located. He commented that some spray irrigation operations in the State were obtaining poor results and warned that the process was being applied without adequate consideration of soil, groundwater and wastewater factors.

---

(2) Ibid, p. 64.

In September of 1970, the Muskegon County Board and Department of Public Works published the results of their investigation of the feasibility of a lagoon treatment - spray irrigation system for wastewater treatment.(3) Muskegon County's research program consisted of six parts:

(a) An extensive analysis of the wastewater that would be treated in the proposed aerated-lagoon - spray irrigation-system.

(b) An in-depth review of the available literature concerning the effects of trace elements on soil and crops.

(c) A bench-scale test to determine the treatability of the combined municipal - industrial wastewater.

(d) Development of a simulation model to aid in predicting lagoon storage requirements and intra-system changes in water quality.

(e) A soil and groundwater investigation program to determine the feasibility of groundwater management.

(f) A study of possible agricultural - agronomic techniques that could be applied to the present project site.

The Muskegon County wastewater management system is designed to serve a 1992 population of 170,000 persons and an industrial flow of 24 mgd. The total design average flow for the system is 43.3 mgd. Wastewater will be collected at eleven points in the existing sewerage system and conveyed to a central pumping station. The wastewater is then pumped

---

(3) Engineering Feasibility Demonstration Study for Muskegon County, Michigan, Wastewater Treatment Irrigation System, U. S. Department of the Interior Federal Water Quality Administration, Water Pollution Control Series. Program #11010 FMY, September 1970, p. 1.

eleven miles through a 66-inch diameter force main to the treatment site. At the treatment site, the wastewater receives secondary treatment in three eight-acre aerated lagoons and is then discharged to one of two 850-acre storage lagoons. The main purpose of the storage lagoons is to contain wastewater so irrigation will not be necessary during rainy weather and freezing conditions. The 5.1 billion-gallon volume of storage lagoons also provides buffering capacity against hydraulic and biological shock loads. The lagoon effluent is chlorinated and then flows to one of two irrigation pumping stations for transmission to the irrigation machines. The irrigation machines apply the treated effluent to land where its high nutrient content is expected to stimulate the growth of agronomic crops. As the wastewater percolates through the soil, various physical and biological processes remove waterborne contaminants. The renovated wastewater is collected in a well-underdrain system which also controls the elevation of the groundwater table. The collected water is then discharged into the Muskegon River and Black Creek.

Advantages of Spray Irrigation Methods

The most important advantage of the spray irrigation wastewater treatment method is the high degree of water renovation obtained by this process. The Pennsylvania State University study previously discussed in this reported excellent removal of all contaminants except nitrate nitrogen. The study concluded that "average concentration of all constituents in the percolate were well below maximum permissible levels for potable water."[4]

(4) Parizek, op cit., p. 63.

The Muskegon County Wastewater Management system is designed to meet or exceed all present and anticipated future water quality standards of the Federal Government and the State of Michigan. The anticipated removal rates of the typical pollutants in the mixture of industrial, commercial and domestic wastes are as follows[5]:

Pollutant	Anticipated Performance: Influent	Effluent	Anticipated Removals (%)	Minimum Required Removals
BOD (mg/l)	250 500	4	98 99	85%
Suspended Solids (mg/l)	250 1000	4	98 99	90%
Phosphorous (mg/l)	5 3	0.5	90 83	80%
Total Nitrogen (mg/l)	20 40	5.0	75 87	None
Coliform Bacteria (Number/100ml)	$2\text{-}20 \times 10^6$	0	100	Reduce to 1,000
Pathogenic Viruses	Not measured, but known to be present in sewage.	0	100	None

Notes: 1. The two figures under Influent and Anticipated Removals represent the Muskegon-Mona Lake and the Whitehall-Montague Subsystems, respectively.

2. "Minimum Required Removals" are to satisfy Michigan Intrastate Water Quality Standards. They were supplied via informal communication with Mr. Ralph Prudy, Executive Secretary of the Michigan Water Resources Commission.

(5) The Muskegon County Wastewater Management System, Bauer Engineering, Inc., Chicago, Illinois, 1971, p. 11.

A second advantage of the land disposal method is that crop yields are usually stimulated by irrigation with nutrient-rich sewage treatment plant effluents. The productivity increase is related to the amount of rainfall at the irrigation site and the crop selected for cultivation. During periods of subnormal precipitation, yields increase dramatically, while only slight increases are recorded during periods of above average precipitation. Crop selection is thought to be particularly important if forested areas are irrigated. The Pennsylvania State University study found that spruce and oak stands did well, while irrigation actually retarded the growth of red pine.

Another advantage cited by advocates of spray irrigation systems is that this treatment method is less susceptible to shock loading than conventional treatment systems. Proponents of the spray irrigation method have also pointed out that a larger part of the capital cost involves land acquisition and that land values can be expected to appreciate rather than depreciate over time.

Finally, one further advantage of the spray irrigation method natural removal processes. The principle of disposing sewage over the land has been practiced for several thousand years. Unlike conventional sewage treatment methods, the fundamentals of this process are easily grasped and spray irrigation disposal methods can be expected to have widespread popular support among those who advocate "a return to nature."

Disadvantages of Spray Irrigation Methods

The most obvious disadvantage of the spray irrigation method is the enormous acreage required. At the irrigation site, land would be required to satisfy three demands -- irrigation, effluent storage, and border zones. The land required for irrigation is a function of the application rate. At two inches per week, the land demand is 129 acres per million gallons of effluent.

Effluent storage capacity is usually required to contain the wastewater flow during periods of rainy and freezing weather. The area required for effluent storage is a function of the climate and the depth of the storage lagoon. An area as large as fifteen percent of the irrigation area may have to be reserved for effluent storage.

Border zones and fences are required along the perimeter of the irrigation site to protect public health. Some tentative spray irrigation criteria have established sixty feet as the buffer zone width and six feet as the fence height. The amount of land required for border zones cannot be determined until the number of sites are established. If individual siting is employed, more acreage is required for buffer zoning. An area as large as one percent of the irrigation area may have to be reserved for this purpose.

Accepting the above discussion, the amount of land required to dispose of the flow generated in an average four-person home is provided by:

$$(129 \frac{\text{acres}}{\text{mg}}) (1.15)(1.01)(.000400 \text{ mg}) = 0.059933 \text{ acres}$$

or, 2,610.7 square feet

or, a 51-foot square.

Thus, an area approximately the size of a small backyard would be required to serve every home connected to a spray irrigation type wastewater treatment system.

Also, considerable attention must be given to the soil composition at the proposed irrigation site. The soil should be permeable, yet not permeable enough to allow the wastewater to pass quickly through. The soil should consist of grains that are not likely to swell with repeated water applications. It should contain some clay quantities because the naturally-charged clay particles tend to act as ion exchangers with certain ionic pollutants in the wastewater. The thickness of the various soil strata must be considered along with the nature and composition of the underlying bedrock. All of the factors described above serve to limit areas that can be considered as potential spray irrigation sites.

Groundwater characteristics at the spray irrigation site must also be investigated prior to final selection. If the local water table is high, an extensive underdrain or well system will be required to eliminate the possibility of soil saturation. An elaborate groundwater monitoring program must be initiated to guard against the possibility of contaminating groundwater supplies by sewage from leaking lagoons and by pollutants in the percolate. Finally, consideration must be given to the effects of supplemental flow on local streams. For example, possible flooding of downstream communities must be explored as a result of introducing additional flows to adjacent watercourses.

Land would be required not only for the disposal site, but also for the transmission system right-of-way. In some areas existing transportation line rights-of-way could be used, but at other places it would be necessary to displace homes and their occupants. The large pressure pipeline that would be required could not be built without some adverse environmental impacts.

A further disadvantage is that the transmission system pumps would consume large amounts of electrical power. Unless present power generation practices are improved, power requirements would have to be satisfied at the expense of non-renewable natural resources.

Also, while it may be ecologically sound to renovate wastewater naturally, it certainly is not hydrologically sound to transfer large blocks of fresh water from their point of origin to another watershed some distance away. Natural balances could easily be upset at both the source and the receiving watersheds.

Finally, it should be noted that, to date, there has been no large-scale demonstration of the long-range feasibility of spray irrigation systems. The Muskegon County Department of Public Works has been awarded an EPA Research and Development Grant to monitor water quality and soil chemistry during the initial five years of their system's operation. If this project reports favorable results, additional prototype spray irrigation systems could be constructed. However, the question of large-scale spray irrigation systems at this time would be premature. Additional research must be undertaken prior to implementing spray irrigation disposal techniques on a regional basis to ensure that land productivity will not be jeopardized by such systems.

Attached is a copy of "Tentative Design Criteria For Spray Irrigation For the Disposal of Sewage Effluents Which Have Received Secondary Treatment," which were prepared after a study of results obtained from prototype operation of these techniques at Pennsylvania State University.

March 1, 1967

TENTATIVE DESIGN CRITERIA FOR SPRAY IRRIGATION FOR THE DISPOSAL OF SEWAGE EFFLUENTS WHICH HAVE RECEIVED SECONDARY TREATMENT*

Note: These design criteria were drawn up after a study of results obtained from experimental work on a full plant scale with spray irrigation for disposal of sewage effluent by the Pennsylvania State University. The results of the Pennsylvania State University studies and conclusions reached and certain limits established are covered in the publications and letter listed at the end of these criteria.

Spray irrigation as covered under this design criteria is not to be considered as a treatment process, but only a means of disposing of sewage effluent which has received secondary treatment. For public health reasons, this method of disposal of effluent that has received primary treatment only will not be acceptable. Spray irrigation may be considered where adequate area of suitable land is available on watersheds of streams into which no sewage effluents can be discharged or where treatment by conventional methods is not adequate. Special precautions will be necessary in critical areas where no discharge, overflow, or runoff of sewage effluent is permitted on the watershed.

A. Area Requirements:

1. The maximum application rates in terms of depth of effluent are as follows:

   (a) 1/4 inch per hour
   (b) 1/2 inch per day or
   (c) 2 inches per week

   It should be understood that these are maximum rates and lower application rates may be necessary in some areas, due to soil characteristics.

2. Using a maximum of 2 inches per week, approximately 128 acres of spray area, plus the area to account for any storage, is required per MGD of effluent. For example, if there are 30 days of storage, the area required per MGD would be $128 \times \frac{365}{335} =$ 139.5 or approximately 140 acres.

3. The consulting engineer will be required to present a statement by a qualified soils consultant indicating the soil is adequate for a discharge rate in accordance with the requirements of A, 1 above. It will be the owner's responsibility to expand the spray

* Not less than 80% removal of BOD and suspended solids.

area or cease operation completely if ponding or runoff is experienced after the system has been put in operation.

4. Where it is necessary to provide several separate zones for spraying, then each zone will be dosed in sequence to prevent overloading any individual zone.

B. Location:

1. The irrigated area will be adequately enclosed with a suitable fence to keep out children and small domestic animals. The fence will be placed at least 60 feet beyond the normal projected spray area. It will be at least six (6) feet high, consisting of four feet of woven wire at the bottom, plus at least two strands of barbed wire at the top, spaced at one (1) foot intervals.

2. A distance of 400 - 600 feet from the fence of the enclosed irrigated area to the property lines of existing or proposed residences and highways is recommended. The best information available indicates the spray droplets will carry up to 180 feet in high winds. The responsibility will rest with the owners of the treatment facilities if there are any objections from adjacent property owners concerning the effluent spray.

C. Holding Requirements:

1. The owner will provide sufficient holding time to store all flow during periods when the ground is frozen or during rainy weather or when covered with snow or when the irrigation field cannot otherwise be operated. A minimum of 30 days holding time will be required. It is recommended that all storage be provided above a fixed water level to prevent complete draining of the holding pond. A 1½ to 2 foot residual water depth is considered necessary to prevent excessive growth of emergent weed vegetation.

2. Natural runoff from the drainage areas around or above will be excluded from the pond by adequate drainage ditches or bypasses. A pond similar to the approved stabilization pond will be satisfactory, but somewhat deeper depths will be permitted.

D. Chlorination:

1. Chlorination will be required with application between the holdi pond and the spray irrigation pump station. The required retent

time will be 30 minutes, with a chlorine residual of 2 mg/l in the effluent spray. The chlorinator will have capacity to apply 35 ppm to flow to be treated. Detention period will be based on rate of pumping to spray field, since this will represent maximum rate of flow through the tank.

E. Spray System Design:

1. The piping for the spray system will be permanent or built-in-place type.

2. The height of spray nozzles, pressure at spray nozzles, and spacing of laterals will be adequate to provide uniform distribution of the effluent over the area to be covered.

3. Automatic drain valves will be provided to prevent freezing of spray nozzles and distribution lines when the system or section of the system is not in operation.

F. Miscellaneous:
Miscellaneous equipment to be provided and conditions to be met.

1. Duplicate pumps will be provided for delivery to spray field, with the capacity of each pump sized to handle maximum rate of flow, plus an allowance to deplete stored volumes.

2. An approved metering device will be provided at the pump station, which will show the total flow and rates to the irrigation field.

3. The top of the chlorine contact tank and the wet well of the pumping station will be at least as high as the maximum holding pond surface elevation, to prevent flooding these units when the spray irrigation equipment is not in operation.

4. A control valve between the holding pond and the spray irrigation pump station will be required.

5. If the spray area does not contain trees and undergrowth, then grass sod will be necessary on the irrigation area.

6. Spray irrigation area should be as flat as possible; however, when it is necessary to locate the irrigation field on a slight slope in areas where discharge of sewage effluent is prohibited to the streams, special precautions should be taken to prevent seepage or runoff of sewage effluents to the stream. Dikes or terraces may be necessary, together with collection and return pumping equipment.

Source of Data Used: Penn State Studies #23

Unpublished paper titled, "Waste Water Renovation and Conservation Research", by M. A. Farrell, Coordinator, Institute of Science and Engineering, the Pennsylvania State University.

Engineering Research Bulletin B-93, titled "Removal of Phosphorous from Municipal Sewage Plant Effluents", by John B. Nesbitt, Professor of Civil Engineering, the Pennsylvania State University.

Letter dated October 19, 1966 from John B. Nesbitt, Professor of Civil Engineering, The Pennsylvania State University, University Park, Pennsylvania.

APPENDIX E

SUMMARY AND CONCLUSIONS OF TECHNICAL REPORT #35, WATER RESOURCES - WATER SUPPLY STUDY OF THE POTOMAC ESTUARY

SUMMARY AND CONCLUSIONS

FROM

A WATER RESOURCE-WATER SUPPLY STUDY

OF THE

POTOMAC RIVER ESTUARY

Prepared for the Progress Meeting of April 29, 1971
of the
Potomac Metropolitan Area Enforcement Conference

Chesapeake Technical Support Laboratory
Water Quality Office, Environmental Protection Agency

CHAPTER II

SUMMARY AND CONCLUSIONS

A detailed study of the interrelationships among wastewater discharges, water supply withdrawals, freshwater inflow, and water quality in the Potomac Estuary was undertaken in November 1969. This study had two purposes: (1) to refine the allowable oxygen demanding and nutrient loadings previously established for Zones I, II, and III of the upper Potomac Estuary and (2) to determine the feasibility of using the estuary as a municipal water supply source. The latter study was conducted in cooperation with the U. S. Army Corps of Engineers. The study findings as related to wastewater management are presented below:

1. The Potomac River Basin has a drainage area of 14,670 square miles. The average discharge rate of the Potomac River at Great Falls is 10,780 cubic feet per second (cfs) with a minimum of 610 cfs and a maximum of over 484,000 cfs.

2. Of the present 3.3 million population in the Potomac River Basin, 2.8 million live within the study area which encompasses the entire Washington metropolitan region.

3. The present municipal water use within the study area is 370 mgd with 72 percent (265 mgd) supplied from the Potomac River above Washington. The industrial water use is 2,750 mgd with cooling water for electric power production accounting for 99 percent.

4. Recreational facilities on or near the Potomac Estuary include a national park, three state parks, seven fish and game areas and 226 county recreational sites. A recent study by the Bureau of Outdoor Recreation indicated that the recreational potential of the 637 miles of shoreline has barely been developed.

5. In 1969, approximately 17-million pounds of fish, crabs, clams, and oysters were taken from the Potomac tidal system with a dockside value of some $4.7 million. A study in 1961 indicated that about $0.6 million was spent during 6 months of sport fishing in the Potomac Estuary. There are approximately 95 marina facilities in the tidal Potomac which accommodate over 5,200 recreational watercraft.

6. Effluents from the 18 major wastewater treatment facilities and combined sewer overflows, with a total flow of 325 mgd, contribute 450,000, 24,000, and 60,000 lbs/day of ultimate oxygen demand (UOD*), phosphorus, and nitrogen respectively to the waters of the upper Potomac Estuary.

7. Under low-flow conditions, the ultimate oxygen demand, phosphorus, and nitrogen loadings from the upper basin and local runoff were estimated as 66,000, 1,000, and 2,300 lbs/day, respectively.

8. The major sources of nutrients and ultimate oxygen demand in the Potomac Estuary are the local wastewater discharges. Under low-flow conditions approximately 88, 90, and 96 percent of the ultimate oxygen demand, nitrogen, and phosphorus are from treated waste effluents.

* UOD - Ultimate Oxygen Demand is defined as the sum of 1.45 times the 5-day biochemical oxygen demand and 4.57 times the unoxidized nitrogen.

At median freshwater inflows, approximately 62, 60, and 82 percent respectively are from these wastewater discharges.

9. Since the first sanitary surveys in 1913, the water quality of the upper Potomac Estuary has generally deteriorated. This is attributable to the increased pollution originating in the Washington area.

10. Fecal coliform densities have recently proved an exception to the general degradation as shown by the water quality indicators. Since the summer of 1969, the high fecal coliform densities previously found near the waste discharge points have been significantly reduced by continuous wastewater effluent chlorination. At present, the largest sources of bacterial pollution in the upper estuary are from sanitary and combined sewer overflows, where at times about 10 to 20 mgd of untreated sewage enters the estuary because of inadequate sewer and treatment capacities.

To achieve the adopted fecal coliform water quality standards, there must be both continuous disinfection of wastewater effluents and elimination or drastic reduction in overflows from sanitary and combined sewers.

11. The most pronounced effect of thermal discharges is in the Anacostia tidal river where a five-degree rise above ambient water temperature frequently occurs and readings as high as 33°C 91.4F have been recorded during the summer months.

12. Since 1938, dissolved oxygen levels in the upper estuary had been decreasing. A slight upward trend occurred in the early 1960's

due to the provision of a higher degree of wastewater treatment. However, with increasing population, the amount of organic matter discharged has increased to a record high in 1970 resulting in a critical dissolved oxygen stress in the receiving water. In recent years, dissolved oxygen concentrations of less than 1.0 mg/l have occurred during low-flow, high-temperature periods.

13. Mathematical model simulation of the dissolved oxygen budget including carbonaceous, nitrogenous, benthic, and algal demands indicate that the nitrogenous demand is the greatest cause of dissolved oxygen deficit in the critical reach near the wastewater discharges and that algal growths have the greatest effect on DO from Piscataway to Indian Head, at times depressing it below 5.0 mg/l.

14. On the average, approximately 3-billion pounds per year of sediments enter the Potomac Estuary of which 2.2-billion pounds per year originate in the upper Potomac River Basin. The sediment yield from the Washington area on a lbs/sq mi/yr basis is about seven times greater than that from the upper basin.

15. Since 1913, the wastewater discharge quantities have increased over sevenfold from 42 to 325 mgd, the phosphorus load increased 22-fold from 1,100 to 24,000 lbs/day; nitrogen ninefold, from 6,400 to 60,000 lbs/day; and carbon approximately twofold, from 40,000 to 100,000 lbs/day. When ecological plant successions from a balanced toward an unbalanced system (primarily one dominated by blue-green algae) are related to wastewater loading trends, it can be concluded that the

ecological successions are the result of increases in nutrients. Moreover, it appears that the ecological changes are due primarily to the large increases in phosphorus and nitrogen.

16. In recent years, large populations of blue-green algae, often forming thick mats, have been observed in the Potomac Estuary from the Potomac River Bridge (Route 301) to the Woodrow Wilson Bridge during the months of June through October. In September of 1970, after a period of low-stream flow and high temperatures, the algal mats extended upstream beyond Hains Point and included the first nuisance growth within the Tidal Basin. The effects of the massive blue-green algal blooms in the middle and upper portions of the Potomac Estuary are (1) large increases of over 490,000 lbs/day in total oxygen demand, (2) an overall decrease in dissolved oxygen due to algal respiration in waters 12 feet and greater in depth, (3) creation of nuisance and aesthetically objectionable conditions, and (4) reduction in the feasibility of using the upper estuary as a potable water supply source because of potential toxin, taste, and odor problems.

17. To reduce the effects of excessive algal blooms on water quality and designated beneficial uses, it has been determined that during the summer months, the standing crop should be reduced to a minimum of 75 to 90 percent of the current level or to a chlorophyll a concentration at or below 25 ug/l.

18. From six independent methods of analysis, it appears that if the upper concentration limit of inorganic nitrogen is maintained between 0.3 and 0.5 mg/l as N and the upper limit of total phosphorus at

0.03 to 0.1 mg/l as P, the algal standing crop can be maintained below nuisance levels under summer conditions. The lower limits of nutrient concentration apply to the embayments and middle portion of the estuary where growing conditions are more favorable, whereas the higher concentrations are applicable to the upper portion of the estuary where lack of light penetration limits algal growth.

19. Significant accumulations of various heavy metals in sediments have been detected near the major wastewater discharges. A study of the possible long-term toxic effects of these heavy metals on the biota of the Potomac Estuary, especially shellfish, is essential.

20. Population and water supply needs have been projected as follows:

		Water Supply Needs		
Year	Population	Yearly avg. (mgd)	Maximum Month (mgd)	Maximum Daily (mgd)
1969	2,700,000	370	470	660
1980	4,000,000	570	720	1000
2000	6,700,000	1010	1310	1820
2020	9,300,000	1570	2040	2820

21. Even with the seven proposed upper Potomac River Basin reservoirs operational, the following withdrawals will be required from the estuary or from direct wastewater reuse to meet the water supply requirements:

Low-flow Characteristics Before Water Supply Diversion		Withdrawal from the Potomac Estuary or from Direct Reuse*		
Recurrence Interval (years)	Minimum Monthly Fresh Inflow (mgd)	1980 For a 720 mgd Need (mgd)	2000 For a 1310 mgd Need (mgd)	2020 For a 2040 mgd Need (mgd)
5	1300	none	210	940
20	1170	none	340	1070
50	910	none	600	1330

* Withdrawal based on minimum 30-day low flow concurrently with a maximum 30-day water supply withdrawal and a 200 mgd minimum base flow over Great Falls into the estuary.

22. The projected wastewater volumes and loading characteristics before treatment are as follows:

Year	Flow (mgd)	BOD (lbs/day)	Nitrogen (lbs/day)	Phosphorus (lbs/day)
1969	325	483,500	63,500	27,300
1980	475	823,500	95,600	43,100
2000	860	1,463,500	155,700	70,300
2020	1,340	2,195,000	215,600	97,400

23. To aid in determining the allowable pollutant loadings from wastewater discharges, mathematical models have been developed and verified for predicting (1) phosphorus transport, (2) nitrogen transport and assimilation, (3) effects of benthic, carbonaceous, and nitrogenous oxygen demand, including the effects of algal photosynthesis

and respiration on the dissolved oxygen budget, and (4) chloride and total dissolved solid intrusions from the Chesapeake Bay, and their buildup as a result of water supply withdrawals from the estuary.

24. Based upon the study of projected wastewater quantities and the recently adopted metropolitan Washington wastewater treatment implementation schedule, the following can be concluded:

(1) Between the years 1980 and 2000, the Potomac (Dulles) Interceptor, with its current capacity of 65 mgd, will be overloaded.

(2) To provide for future wastewater collection and treatment facilities in areas currently projected to be served by the Potomac Interceptor, either the capacity of the interceptor would have to be significantly increased or additional wastewater treatment facilities constructed on the Potomac River above Washington.

(3) With the Blue Plains wastewater treatment capacity limited to 309 mgd, a need exists not only for one or more facilities to serve the Anacostia Valley but also to serve a portion of the upper Potomac area currently served by Blue Plains via the Dulles Interceptor.

(4) Large wastewater volumes are projected in the Occoquan and Pohick watersheds in the Virginia counties downstream from Washington, indicating a need for long-range water resources planning in this area.

25. Three basic alternative wastewater treatment systems were investigated to determine the effects of the discharge locations on

receiving water quality including chloride and total dissolved solid intrusions, as follows:

(1) Alternative I consisted of the following plants: Pentagon, Arlington, Blue Plains, Alexandria, Piscataway (also serving Andrews Air Force Base), Lower Potomac (serving Pohick, Accotink, Dogue, and Little Hunting Creek watersheds including Fort Belvoir), Mattawoman, Neabsco (serving the Occoquan watershed), and Port Tobacco.

(2) Alternative II consisted of the nine treatment plants as in Alternative I plus a facility serving the Anacostia Valley and located just above the Maryland-D. C. Line, and

(3) Alternative III consisted of the same facilities as Alternative II plus an upper Potomac plant discharging near Chain Bridge and serving the upper Potomac region.

Two other systems designated as Alternatives IV and V were also investigated. These were identical to III, except that for Alternative IV, all effluents were assumed to be discharged into the main channel of the Potomac; while for Alternative V, all effluents were assumed to be conveyed downstream to a common discharge point below Indian Head, Maryland.

26. Data from the chloride, total dissolved solids, and other simulations where the estuary was used as a potable water supply source indicate the following:

(1) The position of the salt wedge with respect to intrusion from the Chesapeake Bay is a function of (a) duration and magnitude

of any selected flow, (b) location of the wastewater treatment facility discharges, and (c) consumptive losses in the water distribution system.

(2) Even with no water supply withdrawals from the estuary, for comparable flow conditions, intrusion of chlorides and total dissolved solids from the Chesapeake Bay will occur farther upstream in the future as a result of the greater percentages of wastewater discharged downstream into the salt wedge and the projected increases in consumptive loss, with the latter having the most pronounced effect.

(3) The number of days during which the estuary can be used for water supply depends upon (a) the position of the wedge prior to the withdrawal, (b) magnitude of the withdrawal, (c) freshwater inflow during withdrawal, (d) location of the wastewater discharges, and (e) the increase in chlorides and total dissolved solids as a result of water use.

(4) The maximum possible number of days that the estuary could be used for a water supply source was determined by using a total dissolved solids concentration in the blended water of 500 mg/l maximum as a criterion since this parameter was determined to be more critical than chlorides. TDS water use increments* of 40 and 240 mg/l

* Water use increment is the amount that the concentration of TDS or any other parameter is increased from the point of water intake to the point of discharge as a result of water supply treatment, municipal use, and wastewater treatment.

were applied at both the upstream and downstream location extremes of the saltwater wedge to give the results in the table below:

Alternative I

Maximum Days of Use of Estuary

Year	Water Withdrawal From Estuary (cfs)	Upper Position of Wedge Water Use Increment 40 mg/l	Upper Position of Wedge Water Use Increment 240 mg/l	Lower Position of Wedge Water Use Increment 40 mg/l	Lower Position of Wedge Water Use Increment 240 mg/l
1980	500	>166	>166	>166	>166
2000	1250	90	35	140	45
2020	2000	45	15	95	20

(5) For the year 2020 and using the upper position of the wedge (as observed in early September 1966--the lowest flow on record), the number of days that the estuary can be used as a water supply and yet maintain a maximum 500 mg/l total dissolved solids standard in the blended water is given below as a function of freshwater flow before water supply diversions:

Maximum Days of Use of Estuary

Freshwater Flow (cfs)	Alternative I Water Use Increment 40 mg/l (days)	Alternative I Water Use Increment 240 mg/l (days)	Alternative V Water Use Increment 40 mg/l (days)	Alternative V Water Use Increment 240 mg/l (days)
400	45	15	18	18
1100	>166	42	>166	41
1800	>166	>166	>166	>166

(6) Since the projected water supply needs for the year 2020 cannot be met completely either by withdrawals from the estuary or

from the seven proposed upper basin reservoirs for drought periods extending over a month, both sources will eventually be needed to meet the future water requirements for the Washington metropolitan area. It appears that an increase of approximately 860 cfs (from 940 to 1800 cfs) in the Potomac River discharge at Washington will be required to maintain an acceptable blended water with respect to total dissolved solids for a 240 mg/l water reuse increase. If the increase is less than 240 mg/l, the flow regulation requirements will decrease.

(7) While other aspects of water supply requirements such as viruses and carbon chloriform extractables need to be considered in more detail, it appears that the estuary can be used as a supplementary water supply source if wastewater discharges and water supply withdrawals are subjected to adequate treatment.

27. Direct reuse of the renovated wastewater is another solution to meet water supply needs. This alternative has numerous advantages over withdrawals from the estuary because:

(1) Any need for consideration of salt intrusion from the Chesapeake Bay for water supply purposes is eliminated,

(2) Localized runoff and combined sewer overflows will not degrade the high quality renovated water,

(3) The need for flow regulation from upstream reservoirs to meet the projected Washington area water supply requirements is reduced to a total flow of approximately 1100 cfs (before water supply diversion) or an increase of about 150 cfs above unregulated conditions.

Excluding the psychological objections to treated wastewater reuse and the problems of physical transport of the wastewater to the water intake, the major disadvantage, especially from the technical viewpoint, would be the need to maintain the present maximum total dissolved solids buildup of 140 mg/l through the water supply treatment, water use, and wastewater renovation processes whenever more than 80 percent of the water supply is taken directly from renovated wastewater.

28. When the water resource needs of the entire basin are considered, the long-range solution to the water supply-wastewater disposal problem may initially be a combination of water supply withdrawals from the estuary and flow regulation, with direct reuse becoming increasingly feasible by early in the 21st Century.

29. The maximum allowable ultimate oxygen demand loadings have been determined as given below for various zones and subzones of the upper estuary for a 29°C temperature, a freshwater inflow after water supply diversion of 300 cfs, a DO of 6 mg/l in the treated effluent, and based upon maintaining 5 mg/l DO in the receiving waters.

MAXIMUM UOD LOADINGS FOR POTOMAC ESTUARY

Zone		Allowable UOD* (lbs/day)
I-a	(Upstream from Hains Point)	4,000
I-b	(Anacostia River)	3,000
I-c	(Hains Point to Broad Creek)	75,000
II	(Broad Creek to Indian Head)	190,000
III	(Indian Head to Smith Point)	380,000

* These loadings are the maximum allowable loadings for each zone assuming adjacent zones are loaded to their maximum capacities.

30. For the three freshwater inflows (before water supply withdrawal) investigated, i.e., 1800, 1100, and 400 cfs, the maximum UOD loadings were not affected significantly except for Alternative III which included a treated waste discharge in Zone I-a near Chain Bridge. When the DO in the effluents in mathematical model simulations was decreased from 6.0 to 2.0 mg/l, the most pronounced effect was in Zone I-c in which the UOD loading decreased from 75,000 to 56,000 lbs/day.

31. Allowable UOD loadings for the Piscataway and Gunston Cove embayments have been developed for the projected wastewater volumes and conditions specified in Number 29 and are given below:

MAXIMUM UOD LOADINGS FOR PISCATAWAY CREEK AND GUNSTON COVE

Piscataway Creek		Gunston Cove	
Wastewater Flow (mgd)	Maximum UOD Load (lbs/day)	Wastewater Flow (mgd)	Maximum UOD Load (lbs/day)
24	10,000	50	7,000
49	11,000	103	11,000
79	12,000	170	16,000

32. Since nitrification (the conversion of ammonia nitrogen to nitrate nitrogen) has little effect on the oxygen resources of the estuary at temperatures below 15°C, nitrogen removal from the wastewater effluents to meet DO standards will be required whenever the water temperature is above 15°C, usually during the months of April through October.

In order to prevent formation of sludge deposits, to eliminate objectionable floating matter, and to prevent low DO concentrations during periods of ice cover, a minimum of 70-percent UOD removal and an effluent concentration of less than 15 mg/l suspended solids are required year-around for all discharges.

33. Using an average freshwater inflow of 300 cfs to the Potomac Estuary after water supply diversions, the allowable loadings of phosphorus by zones were determined based on maintaining an average maximum of 0.067 mg/l as P in Zones I and II, and 0.03 mg/l as P in Zone III for algal control. The allowable loadings are presented below:

MAXIMUM PHOSPHORUS LOADINGS FOR POTOMAC ESTUARY

Zone		Allowable Phosphorus (lbs/day)
I-a	(Upstream from Hains Point)	200
I-b	(Anacostia River)	85
I-c	(Hains Point to Broad Creek)	900
II	(Broad Creek to Indian Head)	1500
III	(Indian Head to Smith Point)	2000

34. Allowable phosphorus loadings for the Piscataway and Gunston Cove embayments for phosphorus concentration in the receiving waters of 0.03 mg/l as P are shown below as a function of wastewater flow:

PHOSPHORUS LOADINGS TO EMBAYMENTS

Piscataway Creek		Gunston Cove	
Wastewater Flow (mgd)	Maximum Phosphorus Load (lbs/day)	Wastewater Flow (mgd)	Maximum Phosphorus Load (lbs/day)
24	35	50	35
49	50	103	60
79	65	170	140

35. To prevent excessive algal growth and to enhance the water quality in the upper and middle reaches of the estuary, it appears that it will be necessary to remove phosphorus on a continuous or a year-around basis for discharges into the upper estuary. Moreover, the control of at least 50 percent of the phosphorus load originating in the upper Potomac River Basin appears necessary if the aforementioned phosphorus criteria are to be achieved. To accomplish this reduction, the current phosphorus loading from all wastewater discharges in the upper Potomac River Basin must be decreased from 6100 to 700 lbs/day.

36. Using a freshwater inflow of 300 cfs and average maximum inorganic nitrogen concentrations of 0.5, 0.4, and 0.3 mg/l in Zones I, II, and III, respectively, for algal control, the maximum nitrogen loadings for warm temperature conditions were determined as follows:

NITROGEN LOADINGS FOR POTOMAC ESTUARY

Zone		Allowable Total Nitrogen (lbs/day)
I-a	(Upstream from Hains Point)	1000
I-b	(Anacostia River)	300
I-c	(Hains Point to Broad Creek)	3400
II	(Broad Creek to Indian Head)	5800
III	(Indian Head to Smith Point)	9000

37. Allowable total nitrogen loadings for the Piscataway and Gunston Cove embayments based upon maintaining 0.3 mg/l of inorganic nitrogen under warm temperature conditions and for varying wastewater flows follow:

NITROGEN LOADINGS TO EMBAYMENTS

Piscataway Creek		Gunston Cove	
Wastewater Flow (mgd)	Maximum Nitrogen Load (lbs/day)	Wastewater Flow (mgd)	Maximum Nitrogen Load (lbs/day)
24	120	50	130
49	170	103	270
79	270	170	460

38. Considering the present difficulty in controlling nitrogen in the upper basin and its transport characteristics in the estuary, it appears that the need for nitrogen removal for algal control at wastewater treatment plants will be limited to those periods when the water temperature exceeds 15°C, normally from April through October. With the large projected increases in nitrogen from wastewater discharges, there may be a need for year-around nitrogen control by the year 2000.

39. Because of the lack of transport and assimilative capacity in the upper portions of small tidal embayments and also because of ideal algal growing conditions, maximum concentrations of UOD, phosphorus and nitrogen in effluents discharged to these areas should be less than 10.0, 0.2, and 1.0 mg/l, respectively. A detailed analysis for each embayment is required to determine the minimum cost of either extending the discharge outfall to the main channel of the Potomac or discharging within the embayment and providing a very high degree of wastewater treatment, approaching ultimate wastewater renovation. Unless this high degree of removal is provided, effluents from Alexandria, Arlington, Piscataway, and the Lower Potomac facilities should be discharged into the main channel of the Potomac Estuary.

40. The present worth cost of additional wastewater treatment from the year 1970 to 2020, including operation, maintenance, and amortization costs, has been estimated to be $1.34 billion with a total average annual cost of $64.8 million. The unit treatment processes assumed include activated sludge, biological nitrification-denitrification, lime clarification, filtration, effluent aeration, and chlorination.

41. The cost of wastewater treatment on a per capita basis is as follows:

Item	1970-1980	1980-2000	2000-2020
Average Population	3,350,000	5,350,000	8,000,000
Initial Capital Cost/Person/Year	$17.0	$ 4.90	$ 7.30
Operation and Maintenance Cost/Person/Year	$ 7.50	$ 8.60	$ 9.10
Total Cost/Person/Year	$24.50	$13.50	$16.40

APPENDIX F

PRIOR DISTRICT OF COLUMBIA SEWERAGE SYSTEMS AND EXISTING WATER POLLUTION CONTROL FACILITIES

APPENDIX F

PRIOR DISTRICT OF COLUMBIA SEWERAGE SYSTEMS AND
EXISTING WATER POLLUTION CONTROL FACILITIES

1. Prior Systems

The following is a chronology of major events in the development of the District of Columbia's sewerage system from its beginning to present.

1810 - Sewers and culverts built to drain streets, with discharges to the nearest convenient water courses.

1840's - First sanitary connections made to the storm system, probably about the time the first interior piping of water in houses occurred.

1858 - Corporation permitted connections to sewers but required strainers to keep solids from passing into the sewers.

Civil War - Epidemics of smallpox and malaria which took the lives of thousands of persons in the District.

1871 - 74 - Approximately 80 miles of sewers built to convey wastes to the marshes along the Potomac and Anacostia Rivers.

1889 - The Potomac River was so obnoxious that President Harrison appointed a Board of Engineers to study the situation and recommend steps to be taken to provide the City with an adequate sewerage system.

1890 - Engineers report issued recommending system of interceptors be constructed to convey the sanitary flows and that of light rains to a point of discharge on the Potomac just upstream from the southern end of Bolling AFB. They also recommended that no further areas be served by combined sewers.

1919 - The District acquired the present treatment plant site at Blue Plains in anticipation of the need for a treatment plant.

Early 1930's - The situation became similar to that existing in the 1890's and a second Board of Engineers was hired to report on sewerage and sewage disposal for the District.

1933 - Report completed which recommended construction of a 130 mgd primary type treatment plant.

1935 - Construction of the plant began.

1938 - Plant completed and placed into operation with units consisting of grit removal, grease separation (now eliminated), and plain sedimentation. Sludge removed by these processes was treated by digestion, elutriation, and dewatering and then used as a soil conditioner by various parties.

1949 - Plant expanded to 175 mgd.

1953 - 55 - Chlorination facilities and a drying and incineration plant constructed for the disposal of sludge.

1954 - Comprehensive agreement executed with WSSC to provide for capacity in the plant to treat their flows.

1954 - Third Board of Engineers engaged to recommend a construction program to provide an adequate sewerage system to handle flows to the year 2000.

1957 - Construction of initial secondary units at the treatment plant.

1957 - Replacement and additional screens installed at main pumping station.

1958 - Additional secondary units added at the treatment plant.

1959 - Intercepting sewer constructed from Main Pumping Station to Poplar Pumping Station.

1960 - Intercepting sewer and additional pumping capacity constructed adjacent to existing Main Pumping Station.

1961 - Potomac River System "Project C" under construction.

1961 - Secondary treatment capacity increased to 240 mgd rate.

1962 - Joint East Side Relief Sewer, Anacostia River Force Main and Gravity Sewer constructed.

1963 - Additional sludge thickening tanks constructed.

1963 - Miscellaneous improvements at treatment plant.

1964 - Section 4 of Upper Potomac Relief Sewer constructed.

1964 - "Project C" intercepting sewer extended to Northwest D.C.

Projects initiated since 1964 are discussed in detail in the text of this report which follows.

2. <u>Existing D.C. Water Pollution Control Facilities</u>

The facilities at the WPCP include Raw Sewage Pumping, Grit Removal, Prechlorination, Primary Sedimentation Tanks, Aeration Tanks and Final Sedimentation Tanks. Sludge removed through these processes is treated by Prethickening, Anaerobic Digestion, Elutriation and Dewatering before stockpiling on the plant site. A more detailed description of these project features is given later in this Appendix. Three incinerator systems were installed in 1952 which have a total capacity of 579 tons per day of filter cake with 70% moisture content. Operation of these have not been required because it has been possible to dispose of the sludge cake by mixing it with soil at the plant site and allowing it to be removed for use as loam. In January 1972, the stockpiled sludge totaled approximately 176,000 cubic yards.

The Raw Sewage Pumping Facilities were expanded from 320 to 817 mgd in 1969 - 71 by the construction of a new Raw Sewage Pumping Station under EPA Construction Grants Project WPC-DC-20. The facility will possess adequate capacity to accommodate flows for the 309 mgd plant plus excess flow from the District's combined sewer system.

The treatment facilities are designed to handle an average daily flow of 240 mgd. Peak rates of flow are limited to 300 mgd due to hydraulic restrictions within the plant. Flows in excess of this rate are bypassed to the Potomac River after receiving primary sedimentation. The units are designed so that a negligible loss in efficiency occurs when they are hydraulically overloaded for a short period time (1 - 2 hours). However, flows of 300 mgd are sustained through the plant for periods of 18 hours or more which considerably reduce the treatment received by the wastes. Flows to the plant are tabulated in Table F 1 of this Appendix.

The existing wastewater treatment units are generally in good condition and can be included in the expanded plant provided their average and peak flow rates are reduced to within recommended values. Many of the sludge processing units are generally in poor condition (with the exception of the gravity thickeners) and will not be utilized in upgrading and expanding the plant.

Table F 2 presents a summary of prior EPA construction grants projects within the District of Columbia.

3. Existing Facilities

Presented below is a synopsis of the major treatment elements that constitute the existing D.C. Water Pollution Control Plant. A general layout of existing water pollution control facilities is presented in Figure F 1.

A. Aerated Grit Chambers

Number of Chambers	4
Year Constructed (year converted)	1935 (1958)
Chamber width, ft.	20.5
Chamber length, ft.	75
Total Volume, cu. ft.	50,500
Detention time @ 300 mgd	2.5 min.

B. Primary Sedimentation Tanks

Number of Tanks	16
Year Constructed	12 in 1935 4 in 1946
Diameter, ft.	106
Average water depth, ft.	14
Total surface area, sq. ft.	141,200
Total volume, cubic ft.	1,978,000
Detention time, hrs @ 300 mgd	1.18
Surface settling rate gpd/sf @ 300 mgd	2125

The capacity of the tanks are hydraulically limited to 300 mgd since the effluent weirs become flooded beyond this flow. This limitation is caused by restricted capacity of the line between these tanks and the aeration basins. When flow rates do exceed 300 mgd, primary settled sewage is bypassed directly to the Potomac River.

C. <u>Aeration Basins</u>

Number of tanks	4
Year Constructed	2 in 1956
	1 in 1957
	1 in 1962
Number of channels each tank	4
Channel length, ft.	460
Channel width, ft.	29
Average liquid depth, ft.	15
Total effective volume, cubic feet	3,080,000
Detention time, hrs. @300 mgd	1.84

D. <u>Secondary Sedimentation Tanks</u>

Number of tanks	12
Year Constructed	6 in 1956
	4 in 1957
	2 in 1962
Number of channels each tank	4
Length of tank, ft.	250
Width of tank, ft.	80
Liquid depth, ft.	12
Total Surface area, sq. ft.	237,000
Total volume, cubic feet	2,772,000
Settling Rate, gpd/sq. ft. @300 mgd	1266
Detention period, hrs @300 mgd	1.66

E. Aeration Blower Equipment

Numbers of Blowers	4
Year Constructed	1956
Capacity each blower, cfm	40,000

F. Sludge Thickening Tanks

Number of Tanks	6
Year Constructed	4 in 1958
	2 in 1963
Diameter, ft.	65
Sidewall liquid depth, ft.	10
Total surface area, sq. ft.	19,900
Total volume, cu. ft.	199,000

These units are operating at more than double accepted loadings which cause serious loss of BOD and SS into the thickness overflow resulting in excessively high recycled loads to the primary and secondary units.

G. Sludge Digestion Tanks

Number of tanks	12
Year Constructed	8 in 1935
	4 in 1946
Diameter, ft.	84
Operating Sidewall water depth, ft.	22
Total tank volume, cu. ft.	1,761,000

The tanks are in satisfactory condition and could be used in the future, however, the mixing systems in several should be replaced with more reliable ones.

H. Elutriation Tanks

Number of batteries	2
Year Constructed	1 in 1935
	1 in 1958
Number of tanks/battery	2
Length of tank, ft.	70
Width of tank, ft.	32
Depth of tank, ft.	11.75
Total volume, cu. ft.	100,000
Total surface area, sq. ft.	8,900

In 1968, these units were operated at more than three times normally accepted loadings, resulting in overflow of excessive quantities of BOD and suspended solids in the plant effluent.

I. Sludge Dewatering Facility

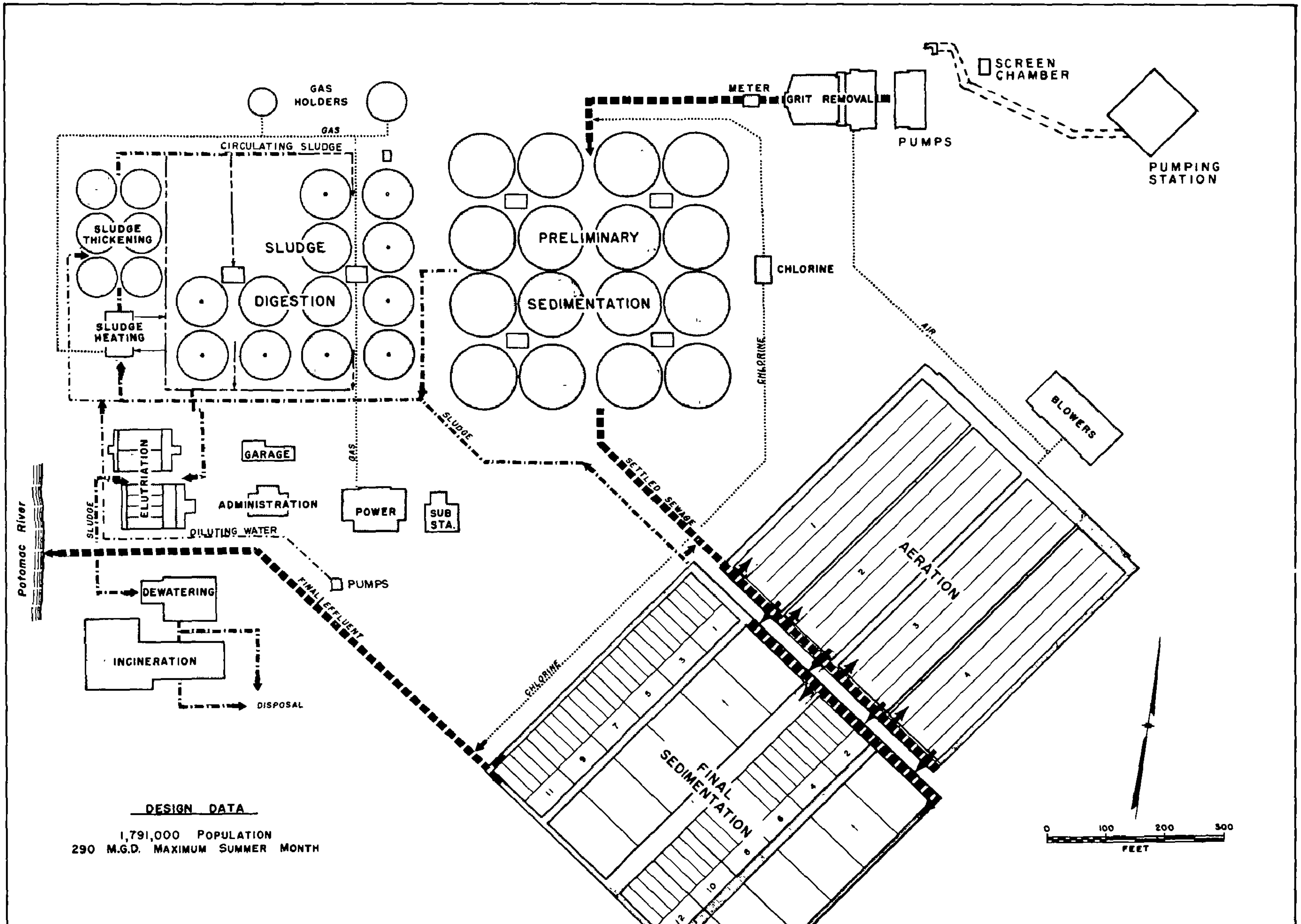
Year Constructed	1935
Number of vacuum filters	4
Total filtration capacity, sq. ft.	2,000

The filters were renovated about 1959, but are becoming a continual maintenance problem due to the difficulty of obtaining replacement parts.

J. Sludge Drying and Incineration Facility

Year	1952
No. flash drying and incinerator units	3
Total Drying capacity, tons per day, wet	549
Total incinerator capacity, tons per day, wet	570

These facilities have not been operated except for a few months immediately after installation since it has been possible to dispose of the sludge cake by mixing it with soil on the plant site and allowing it to be removed for use as a loam which has resulted in substantial savings.



WATER POLLUTION CONTROL PLANT
Figure F1 FLOW DIAGRAM

TABLE F-1

Avg. Plant Performance
D. C. Water Pollution Control Plant

Period	Avg. Flow mgd.	Effluent to River lb/day		Removal Efficiency %	
		BOD	SS	BOD	SS
FY 1966	211	63,000	65,000	79	78
FY 1967	220	66,000	58,000	77	81
FY 1968	232	89,000	107,000	71	72
FY 1969 (4th qtr)	248	128,000	153,000	69	57
FY 1970	253	103,000	102,000	72	72
7/70	270	104,000	81,000	72	78
8/70	265	95,000	95,000	75	77
9/70	259	100,000	107,000	74	72
10/70	245	108,000	95,000	75	76
11/70	252	116,000	92,000	75	78
12/70	248	115,000	119,000	73	71
1/71	255	102,000	80,000	77	80
2/71	269	105,000	72,000	80	86
3/71	262	153,000	89,000	71	78
4/71	252	130,000	88,000	73	76
5/71	264	126,000	85,000	73	79
6/71	273	114,000	95,000	75	76
7/71	279	130,000	88,000	71	72
8/71	287	138,000	94,000	71	78
9/71	284	140,000	99,000	70	73
10/71	291	161,000	96,000	65	71
11/71	279	168,000	91,000	70	74
12/71	272	137,000	88,000	70	73

TABLE (F 2)

PRIOR EPA CONSTRUCTION GRANTS PROJECTS IN THE DISTRICT OF COLUMBIA

Project	Description	Total Eligible Project Cost	Federal Grant
Projects Completed			
WPC-DC-1 Blue Plains	Blue Plains plant (1st stage) Secondary Treatment	$6,080,778	$ 250,000
WPC-DC-2 District of Columbia	Main Pumping Station	304,596	91,378
WPC-DC-3 District of Columbia	Intercepting sewer and Pumping Station	2,399,308	250,000
WPC-DC-4 District of Columbia	Blue Plains plant (2nd stage)	1,107,616	250,000
WPC-DC-5 District of Columbia	Blue Plains plant (3rd stage)	2,229,415	250,000
WPC-DC-6 Lorton Reformatory	Pumping Station with force main, interceptors, and a secondary type sewage treatment plant	635,648	190,694
WPC-DC-7 Glen Dale	Intercepting sewer, syphon, and appurtenances	86,119	25,146
WPC-DC-8 District of Columbia	An intercepting sewer, including a syphon across Anacostia River between Main Pumping Station and Poplar Point Pumping Station	826,823	248,047
WPC-DC-9 District of Columbia	Pumping station and intercepting sewer	1,597,871	250,000
WPC-DC-10 District of Columbia	Additions to Blue Plains plant	1,412,128	423,638
WPC-DC-11 District of Columbia	Force main and interceptor relief sewer	2,251,826	600,000
WPC-DC-13 District of Columbia	Additions to D.C. treatment plant	448,066	134,419
WPC-DC-14 District of Columbia	Additions to D.C. treatment plant	346,508	103,952
WPC-DC-15 District of Columbia	Intercepting sewer	217,754	65,326

TABLE F 2 (CON'T)

PRIOR EPA CONSTRUCTION GRANTS PROJECTS IN THE DISTRICT OF COLUMBIA

Project	Description	Total Eligible Project Cost	Federal Grant
WPC-DC-16 District of Columbia	Upper Potomac Relief Sewer	$ 2,469,982	$ 600,000
WPC-DC-17 District of Columbia	Intercepting Sewer and Pumping Station	1,748,800	517,590
	TOTAL	$24,163,238	$4,250,190
Construction Completed But Not Closed Out			
WPC-DC-19 District of Columbia	Outfall Relief Sewer	3,508,000	758,740
Projects Under Construction			
WPC-DC-12 District of Columbia	Potomac Force Mains Relief Sewer	8,265,787	600,000
WPC-DC-18 District of Columbia	Upper Potomac Interceptor Relief Georgetown Area	3,086,000	760,700
	TOTAL	$11,351,787	$1,360,700
	TOTAL ALL PROJECTS	$39,023,025	$6,369,630

APPENDIX G

PERTINENT CONTRACTS CONCERNING WASTEWATER TREATMENT IN THE METROPOLITAN WASHINGTON AREA

1. Memorandum of Understanding

2. October 1971 Agreement Concerning Interim Wastewater Treatment

3. The 1954 Agreement with WSSC

4. The 1967 Agreement with WSSC for Use of the Potomac Interceptor

MEMORANDUM OF UNDERSTANDING

THE ATTACHED COPY OF THE ORIGINAL
MEMORANDUM OF UNDERSTANDING WAS
PREPARED BY THE MIDDLE ATLANTIC
REGION OF THE FWQA, 918 EMMET STREET,
CHARLOTTESVILLE, VIRGINIA 22901

OCTOBER 10, 1970

MEMORANDUM OF UNDERSTANDING
ON
WASHINGTON METROPOLITAN REGIONAL
WATER POLLUTION CONTROL PLAN

The District of Columbia has determined that the requirement for a high quality effluent to comply with the water quality standards established pursuant to Public Law 89-234 (Federal Water Quality Act of 1965), and site limitations due to the objection of the Department of the Interior to the reclamation of submerged lands adjacent to the Blue Plains plant, imposes a limitation on capacity for treatment at that site of 309 million gallons per day. In addition, the limitatio at Blue Plains is determined by flows in the Potomac River and their relationship to current levels of waste treatment technology. However, as construction of the additional and improved treatment facilities proceeds, as further technological advances become known and available, and as experience is acquired in the enlarged plant it may be that additional capacity can be provided. Studies in that connection will be continued. The District of Columbia agrees, subject to the availability of funds, to develop the plant to the 309 mgd level now and make part of the capacity available to Maryland and Virginia jurisdictions now served by the facility in accordance with the following terms:

1. Work will proceed on the following schedule:

A. Primary and sludge processing facilities:

1. Preliminary plans completed	2/1/69
2. Final plans completed	
(a) Primary	8/1/70
(b) Sludge Processing	1/1/71
3. Financing arranged	10/21/70
4. Start construction	2/14/71
5. Finish construction	5/19/73

B. Secondary facilities, including equipment for chemical feed to the biological secondary process to achieve at least 90% BOD removal and about 90% phosphorous removal.

1. Preliminary plans completed	2/1/69
2. Final plans completed	7/1/71
3. Financing arranged	7/1/71
4. Start construction	10/11/71
5. Finish construction	11/1/74

C. Advanced waste treatment facilities capable of limiting BOD maximum loading to 12,700 lb./day, phosphorous maximum loading to 560 lbs./day, and nitrogen maximum 6,130 lbs./day in the treatment plant effluent.

		BOD and P	N
1.	Preliminary plans completed	Mar. 1972	Aug. 1974
2.	Final plans completed	Mar. 1973	Aug. 1974
3.	Financing arranged	Mar. 1973	Aug. 1974
4.	Start construction	July 1973	Dec. 1974
5.	Finish construction	July 1976	Dec. 1977

2. The allocation of the 309 mgd capacity of the Blue Plains treatment plant when completed is initially as follows:

District of Columbia	135 mgd
Potomac Interceptor	18 mgd
Washington Suburban Sanitary Commission	148 mgd
Virginia (Pimmit Run Interceptor)	8 mgd
	309 mgd

It is recognized that the population projections of the Maryland National Capital Park and Planning Commission for the WSSC service area indicate a WSSC need for 175 mgd of capacity in 1980. Every effort will be made to provide for these flows, but in the event that this is not feasible, an initial capacity of 148 mgd, (in addition to Washington Suburban Sanitary Commission's share of the Potomac Interceptor flow) which is expected to be adequate until 1977, will be provided.

3. Capital costs for the Blue Plains treatment facility, after deducting federal grants, will be shared by the District, WSSC, and Virginia (Pimmit Run only) in proportion to the initial allocations in the plant as set forth in paragraph 2 above.

4. Plans will proceed on the basis that federal funds, in the maximum amount provided by applicable legislation (currently amounting to 55% of the estimated cost of each portion of the work described in paragraph 1 above), will be awarded upon certification by the District of Columbia that all local contributions determined in accordance with paragraph 3 above are committed and available on request. The intent of this provision is that the District of Columbia will not finance the WSSC and Virginia (Pimmit Run only) shares. The Washington Suburban Sanitary Commission and Fairfax County (Pimmit Run only) will obligate their share of each project prior to the award of contracts. Funds will not be transferred, however, until required to make progress payments.

5. It is recognized by all parties that the proposed Blue Plains expansion will not be adequate to serve all future flows from the areas presently tributary to the Blue Plains facility and that all jurisdictions must plan immediately to provide adequate treatment for flows in excess of those that can be accepted in the Blue Plains regional treatment facility. Therefore, the appropriate parties

will provide another regional plant or plants in which one or more of the parties may participate. The District shall be entitled to purchase capacity in such plant or plants on the same basis as provided for herein. Upon agreement of the parties involved at such time, the District's required capacity at the additional regional plant or plants may be provided by the payment therefor, and an exchange of such paid for capacity for such other party's capacity at Blue Plains.

6. The District of Columbia recognizes that to meet its ultimate requirements, it must provide treatment for District of Columbia sewage in excess of the 135 mgd cited in paragraph 2 above, at at least 65 mgd* of Potomac Interceptor sewage. WSSC has retained consultants to advise it as to an overall sewerage plan including sewage treatment plant sites and capacities. This report is to be completed by February 1971, but in recognition of the extant problem and its projected needs, the WSSC has already formulated a projected schedule for site selection, design, and construction of an additional regional plant and will pursue its completion subject to the availability of funds and the operation of the applicable provisions of Maryland law. The District of Columbia and Virginia will be invited to participate in financing a portion of the cost of the additional regional plant in proportion to their allocated flow to the total plant capacity in the same manner as provided in paragraph 3 above. Each participant will be entitled to use, upon completion of the construction and placing of the plant into service, that capacity allocated and paid for. The maintenance and operating costs as well as the cost of all pipelines, pumping stations, etc. shall be shared by all participants in the same manner as Blue Plains. Should the District of Columbia or Virginia undertake to construct additional regional sewage treatment facilities, the same conditions as described above will apply.

7. All parties will make an annual evaluation and five-year projection of sewage flows. In the event projected flows exceed the available capacity, the cooperating parties agree to plan and construct the facilities necessary to accommodate the anticipated flows.

*Based upon design projection as follows:

Jurisdiction	Equivalent Population	Average Daily Flow Plus Infiltration Allow.
Virginia - Fairfax Co.	176,250	22.05 mgd
- Loudoun Co.	143,100	17.93 mgd
- Dulles Intern. Airport	20,000	3.75 mgd
Maryland - WSSC	172,500	21.57 mgd
Total	511,850	65.30 mgd

8. The proposed schedule for the regional plant mentioned in paragraph 6 above follows:

Preliminary report completed	February 1971
Site selection	March 1971
Participants' capacities allocated	June 1971
Preliminary plans completed	June 1972
Site purchase completed	March 1973
Final plans completed	January 1974
Start construction	September 1974
Complete construction	June 1977

9. There are extant agreements between and among the parties hereto and others with respect to the transmission and treatment of sewage at D. C. facilities and payment therefor. Nothing herein contained shall in any way abrogate or modify such agreements.

10. The foregoing provisions of this Memorandum of Understanding reflect the parties' firm desire and intention to upgrade the Blue Plains Plant, establish another regional plant, and to take other measures directed toward early achievement of the water quality standards as established under the Federal Water Quality Act of 1965. Interim actions with respect to treatment and collection will be taken by the parties responsible to prevent further degradation of water quality during the upgrading and expansion of Blue Plains, enabling normal incremental increase in flows to be accommodated and system reinforcements to proceed. Commencing immediately, the following actions will be investigated, tested and then applied as ascertained to be advantageous to the goal.

1. Use of polyelectrolytes or other precipitating chemicals.
2. Installation of selected advanced processes at an earlier date.
3. Use of micro-strainers.
4. Use of special polymer to increase flow capacity at flow bottlenecks.
5. Selected construction to diminish hydraulic bottlenecks.
6. Chlorination at pumping facilities and other up-sewer locations.
7. Oxygenation or other treatment in-sewer.
8. In stream aeration.
9. Minimize peak discharges through use of storage facilities or by other means.
10. Use of additional treatment processes during critical flow season.
11. Use of separate small treatment plants on an interim basis.
12. Reduction of storm water flows in sanitary sewers.
13. Control infiltration.
14. Diversion of sewage flows from Blue Plains to other treatment facilities.
15. Improve sewage collection facilities to prevent raw sewage overflows.

Such interim actions which are listed above are not exclusive of any other measure which may also be found advantageous, nor is the list intended to reflect a sequential basis of test and application, but rather one or more actions may be undertaken concurrently. The costs of any such interim measure which is not part of or does not have permanent utility in the completed, upgraded plant construction or operation thereof, shall be paid for by the party or parties whose interim flow increase is accommodated thereby. The parties to this Memorandum of Understanding are District of Columbia, Washington Suburban Sanitary Commission and Fairfax County.

Executed for the parties as follows:

District of Columbia

By: /S/ Norman E. Jackson Date: 9/23/70

Washington Suburban Sanitary Commission

By: /S/ Salvatore Barranca Date: 9/23/70

Fairfax County, Virginia

By: /S/ G. J. Kelley Date: 10/1/70

The United States Department of the Interior, District of Columbia and the States of Maryland and Virginia by their representatives have also participated in the discussions which preceded and led to the formulation of this Memorandum of Understanding, and they execute the same to indicate that fact.

United States Department of the Interior

By: /S/ Fred J. Russell Date: 10/7/70
Under Secretary

District of Columbia

By: /S/ Malcolm C. Hope Date: 9/24/70

State of Maryland

By: /S/ Thomas D. McKewen Date: 9/24/70

State of Virginia

By: /S/ Noman M. Cole, Jr. Date: 10/7/70

Virginia's concurrence is subject to the reservations and clarifications in the letter from N. M. Cole to Norman Jackson dated October 7, 1970, which is attached.

COPY OF A LETTER FROM Noman M. Cole, Jr. to Norman E. Jackson
ON VIRGINIA STATE WATER CONTROL BOARD LETTERHEAD

Mr. Norman E. Jackson, Director
Department of Sanitary Engineering
Government of the District of Columbia
415 - 12th Street, N. W.
Washington, D. C.

Subject: Memorandum of Understanding on Washington Metropolitan Regional Water Pollution Control Plan

Dear Mr. Jackson:

The State of Virginia signs the Memorandum of Understanding concerning the Blue Plains Treatment Plant subject to the following clarifications and reservations:

1. The construction effort described in the schedules given in paragraphs 1A and 1B of the subject memorandum should not result in a monthly discharge of BOD to the Potomac River from the Blue Plains Plant of more than shown on the attached curve. This curve was provided by Mr. Paul Freese of your office as a clarification of the plant performance which will have to be achieved during this portion of the construction effort.

2. With regard to the schedules (see paragraphs 1B and 1C) for installation and completion of secondary and advanced waste treatment (AWT) facilities for very high degrees of BOD and phosphorous removal, our signature does not mean we concur with such a schedule. In our opinion, it represents unnecessary delays in the start of construction and completion of facilities which are vital to clean up the algae problem in the Potomac. As presently proposed, construction of vital AWT facilities would not begin for another 3 years, and would not be completed for approximately 6 years. In this regard, we note that modifications of Virginia treatment plants are proceeding on schedules which will complete such AWT facilities by 1973.

   We have listened to the rationale for such delays at the Blue Plains Plant; and when we compared your proposal to what other technologies in this country are able to accomplish, we can only conclude that unimaginative approaches and inadequate funds have been used. In a country which can start and complete construction of large aircraft carriers, large transport aircraft, and missile projects in an ~4 year period and which has gone from the earth to the moon in 9 years, we see no reason why the advanced waste treatment facilities for very high degrees of BOD and phosphorous removal at the Blue Plains Plant should take 6 years.

In this regard, Virginia communities have, on a comparative economic basis, shouldered their responsibility for cleaning up the river of our Nation's Capital by the end of 1973 and we are disturbed to see that the District of Columbia has not seen fit to do likewise. Accordingly, we suggest that more imaginative and accelerated approaches be taken to accomplish the design and construction so that such facilities are completed no later than March 1974 (e. g., 3-1/2 years from now) and that the necessary funds be requested to accomplish this goal.

3. We do not understand why Virginia treatment plants have to install AWT facilities to remove nitrogen by 1973 and the Blue Plains Plant not until the very end of 1977. This is of particular concern since (a) the technology of nitrogen removal developed to date is such that the performance and reliability of such removal systems have had limited success and are very dependent on such things as seasonal weather conditions, etc., and (b) data from the Tahoe Plant and Lake Washington indicate that very high degrees of BOD and phosphorous removals in their areas are sufficient to solve the algae problem. Accordingly, it would appear more reasonable if everyone had to remove nitrogen by the same date as Blue Plains and possibly by then the technology for its removal would be better defined from information generated by the FWQA research program and may even show that its removal is not essential.

4. The meaning of the second sentence of paragraph 10 is not clear and can be read several different ways. In discussions with Mr. Freese and Mr. W. L. Rogers of Interior, it is understood to mean the following:

   Normal incremental increase in flow to plant shall only be allowed if the interim actions with respect to treatment and collection are such that there is no further degradation of water quality in the Potomac (i.e., no more than 100,000 lbs. of BOD per day as measured on a monthly average) between now and January 1, 1973. After that date, the BOD load to the river shall be as shown on the attached figure.

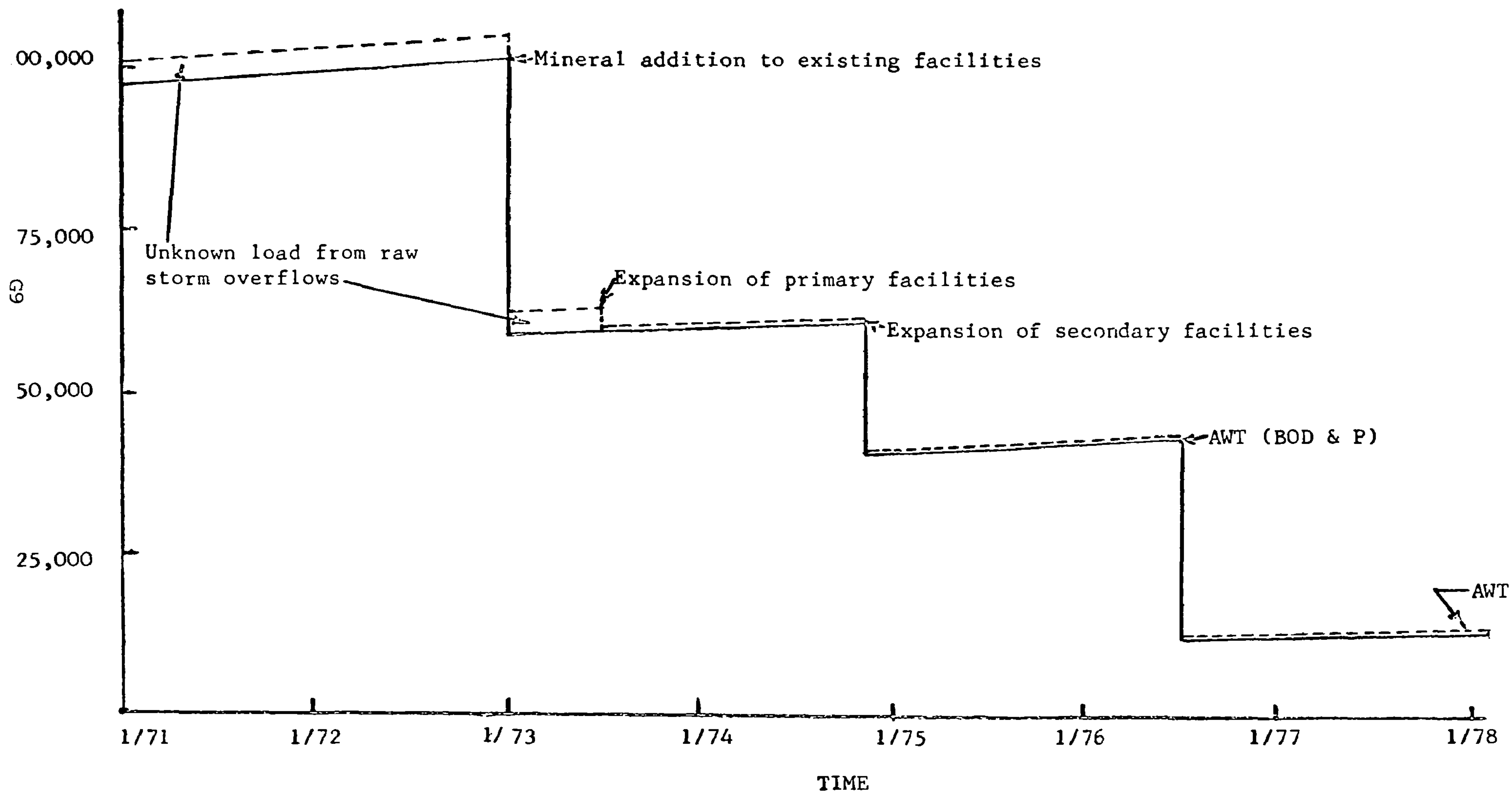
Subject to the above reservations and clarifications, Virginia concurs with the subject Memorandum of Understanding.

Sincerely yours,

/S/ Noman M. Cole, Jr.

Noman M. Cole, Jr.
Chairman
Virginia State Water Control Board

PROJECTED BOD LOADING TO POTOMAC RIVER FROM BLUE PLAINS TREATMENT FACILITY



Presented to Virginia SWCB
at 10/2/70 by P. V. Freese

AGREEMENT

BLUE PLAINS INTERIM TREATMENT PROGRAM

IMPLEMENTATION OF PARAGRAPH # 10 OF THE OCTOBER 1970 MEMORANDUM OF UNDERSTANDING BY THE D. C., FAIRFAX COUNTY AND WSSC

October 18, 1971

PROBLEM

The present pollutant load to the Potomac River from the Blue Plains Plant varies from 95,000 to 153, 000 pounds per day on the basis of monthly average figures. Overflows of sewage from the sewer system contribute an additional loading of up to 25,000 pounds per day. At the time of drafting the Memorandum of Understanding, it was anticipated that the average BOD loading to the river would not exceed 100,000 pounds per day. This understanding was stated in a conditional statement appended to the Memorandum by the State of Virginia. It is evident, therefore, that during months of high flow present pollutant loads are exceeding those anticipated.

SUMMARY OF AGREEMENT TO SOLVE PROBLEM

Basic agreement on an interim treatment program and on the temporary closing of the Georgetown Gap has been reached by the District of Columbia, WSSC, and Fairfax County.

The temporary closing of the Georgetown Gap and the interim treatment program at the Blue Plains Plant are expected to reduce the total pollutant load to the river to approximately 100,000 lbs per day of

BOD_5 or even less, hopefully. It is expected that this program will be accomplished within the next 7 to 9 months. In essence, this should start the Potomac River back on the long road to recovery and reclamation and, thus, prevent further degradation of the river -- ie., the objective set forth in paragraph #10 of the October 1970 Memorandum of Understanding.

It is expected that the overall interim program will allow some nominal additional flows to the plant between now and 1975 when the major upgrading of treatment and expansion of plant capacity to 309 MGD is expected to be completed. At that time, the pollutant discharge to the Potomac should be on the order of 12,000 lbs per day of BOD_5 and 600 lbs per day of phosphorous. These latter pollutant loads from Blue Plains are the loads EPA has determined as necessary to upgrade, protect, and preserve the Potomac River.

Thus interim treatment will provide for continued reduction in the BOD load to the Potomac River from the Blue Plains Plant from a peak of 155,000 pounds per day in fiscal year 1956 to approximately 100,000 pounds per day in fiscal year 1973.

If for some unforeseen or unexpected reason the planned interim program is not as successful in reducing the pollutant loads, then either (a) additional interim treatment steps must be taken at the plant or (b) additional flows restricted until the expanded and upgraded modifications are completed at the plant.

The interim treatment will involve the use of chemical additives to supplement the present biological treatment process and therefore improve the treatment plant's ability to remove pollutants from sewage before the treated effluent is discharged into the river. This interim program should also have the additional side benefit of removing over half of the phosphorus since the chemical additives to be used will not only improve removal of the BOD_5 pollutant but also help remove the phosphorus pollutants. The additional sludge generated by the interim treatment program is to be removed and disposed of by the State of Maryland.

The estimated annual cost for the interim treatment program is approximately $5 million. The approximate share of this cost for D. C., WSSC, and Fairfax County is $1.950 million, $2.880 million, and $0.170 million respectively, which is proportional to incremental increases in flows above the design capacity of the plant.

Specific details of the agreements are attached herein.

POINT OF AGREEMENT # 1

Agreement on an interim treatment program at the Blue Plains Plant and on a plan for temporary closing of the Georgetown Gap has been reached by the D. C., WSSC, and Fairfax County. The interim treatment program at the Blue Plains Plant and the temporary closing of the Georgetown Gap are expected to reduce the total BOD pollutant load to the Potomac River from the D. C. sewage system to approximately 100,000 lbs per day of BOD or even less, hopefully. Thus, this program should meet the objectives set forth in paragraph #10 of the October, 1970 Memorandum of Understanding.

The estimated cost for the interim treatment program is approximately $5 million annually. The users of the Blue Plains Plant have agreed to pay the expenses for such interim treatment on the basis of projected incremental increases in flows between January 1969 (when total flow to the plant was 240 mgd) and December 1974 (when the advanced waste treatment plant is planned to be completed). The flows and percentages to be used are as follows:

	DC+PI	WSSC	VA	TOTAL
Jan 69 Flow, mgd	129	105	6	240
Jan 75 Flow, mgd	152	139	8	299
Increase, mgd	23	34	2	59
Percentage	39.	57.6	3.4	100.0

(PI - Potomac Interceptor)

The intent of this provision is that the District of Columbia will not finance the WSSC and Virginia (Pimmit Run only) shares. The Washington Suburban Sanitary Commission and Fairfax County (Pimmit Run only) will obligate their share of the cost prior to award of annual contracts. Funds will be transferred monthly as required to pay for supplies, materials and services. Costs attributable to Potomac Interceptor users, determined by the above method, will be recovered by upward adjustment of sewer charges. All charges for interim chemical treatment are separated and in addition to present charges.

In the event that the pollutional load to the Potomac River is reduced to less than 100,000 pounds of BOD per day during the period of interim chemical treatment, the method for determining payment by the participating jurisdictions will be renegotiated (to be formalized in a supplemental agreement) to reflect the upgrading of the total flow.

It is expected that this program will allow some nominal increases in flows to the Blue Plains Plant between now and January 1975. These increases are specifically defined elsewhere in this agreement and are subject to the interim treatment program reducing the pollutant load to the river to approximately 100,000 lbs per day of BOD.

If for some unforeseen or unexpected reason the planned interim treatment program is not as successful in reducing the pollutant loads, then either (a) additional interim treatment steps must be taken at the plant or (b) additional flows restricted until the expanded and upgraded modifications of the Blue Plains Plant are completed. If such a situation should arise, the parties will meet at that time to decide on the specific course of action to handle such a problem.

POINT OF AGREEMENT 2.

The Washington Suburban Sanitary Commission will be permitted to make three additional connections to the D. C. System.

1. A connection to the Rock Creek sewer will be permitted. Sewage from the City of Rockville now being pumped to Cabin John valley will be transferred to Rock Creek, thus alleviating overflows into Cabin John Creek. Flows at this connection will be restricted to a peak rate of two (2) mgd.

2. A temporary connection of WSSC's proposed Anacostia force main to the District of Columbia's Anacostia force main and gravity sewer approximately 500 feet below the Penn-Central railroad crossing of the Anacostia River will be permitted. Flows at this connection will be restricted to a peak rate of thirty (30) mgd. Upon completion of the advanced waste treatment plant at Blue Plains or the WSSC force main to that plant, whichever occurs first, this connection shall be removed at WSSC's expense.

3. A temporary connection of WSSC's proposed Cabin John relief sewer to the Potomac Interceptor will be permitted. Flow through this connection will be limited to a peak rate of one (1) mgd either by the physical size of connection or by a control device. This increase in Potomac Interceptor flow is chargeable to the WSSC increase of 34.0 mgd as

shown in Points of Agreement #1 and #3. Upon completion by the District of Columbia of the Upper Potomac Interceptor Relief Sewer through Georgetown and the advanced waste treatment plant at Blue Plains, a larger flow may be negotiated

Connection 2 above will not be permitted prior to completion of the additional primary facilities now under construction at the Blue Plains Plant. WSSC will install and maintain on each of these connections a meter approved by the District of Columbia. Monthly meter readings will be furnished to the District of Columbia and to the Maryland Department of Health and Mental Hygiene. The meters will be available to the District for inspection. In the case of a malfunction WSSC shall repair the meter within thirty (30) days. Flow estimates during such period may be made by WSSC, subject to the District's approval.

POINT OF AGREEMENT # 3

Incremental increases in flow shall not exceed the following until the major modifications at the Blue Plains Plant are completed by January, 1975.

	D. C.	WSSC	VA*	PI
Annual increase, mgd	1.5	5.66	0.33	2.33
Total increase between 1/69 and 1/75	9.0	34.0	2.0	14.0**

* Pimmit Run Only

** A separate agreement among WSSC, D. C. and the Virginia localities must be made for this for the breakdown of this flow allotment.

The primary responsibility for ensuring that the above flow increases are not exceeded rest with the governing bodies of the WSSC, Fairfax County and the Loudoun County Sanitation Authority. To assist in the monitoring of these flows so as to ensure that the increases from suburban areas are within the required limits, the District of Columbia will submit a monthly flow report to each of the above parties. This report will show the actual flow (or best estimate) versus the flow limit increases established herein. In addition, the District of Columbia will also provide the above parties with monthly reports covering the following data on the Blue Plains Plant performance, eg. total flow, breakdown of total flow by jurisdiction, total pounds of BOD discharged to the river on a monthly average, etc. These reports will also be forwarded to enforcement agencies of the states of Maryland and Virginia who will assist D. C. to the maximum extent of their laws to prevent jurisdictions within their states from exceeding the allowable flow increases covered herein.

To facilitate the monitoring of flows, WSSC, Fairfax County and the Loudoun County Sanitation Authority will provide D. C. each month with any data it needs to compile the above flow information.

POINT OF AGREEMENT # 4

The District of Columbia agrees that it will initially bear the cost of the capital improvements necessitated by and the result of the interim chemical treatment program, the costs to be ultimately included in the permanent expansion of the plant and therefore eligible for the approved Federal Grant. Construction will be commenced as expeditiously as possible and will be placed in operation no later than May 15, 1972. The District of Columbia agrees to operate the interim processes at the treatment plant and will fully comply with the requirements of this agreement and the Memorandum of Understanding. The District further agrees to construct a temporary pumping station and pipeline from about 36th Street, N.W. to 30th Street, N. W. to provide additional capacity of approximately two (2) mgd until the Upper Potomac Interceptor Relief Sewer (Georgetown Gap) is completed. The District will fund the construction and will recover the costs by increasing user charges.

It is agreed that the D. C. will move without further delay to complete the UPIR Sewer, thereby eliminating permanently sewage overflows in the Georgetown waterfront area.

POINT OF AGREEMENT # 5

The Washington Suburban Sanitary Commission agrees to proceed immediately with the designation of the site (or sites) and the preparation of plans for the expansion of regional water pollution treatment capabilities in accordance with the Memorandum of Understanding. Connection of the WSSC proposed Anacostia force main to the D. C. Anacostia force main and gravity sewer will be permitted when said site (or sites) for such a system has been designated and approved by the appropriate jurisdictions.

POINT OF AGREEMENT # 6

The State of Maryland, operating through the Maryland Environmental Service, will provide for the disposal of all sludge resulting from interim chemical treatment of sewage at the Blue Plains Plant.* This service shall be furnished as a non-profit operation and shall be paid to the Maryland Environmental Service by the District of Columbia from monies collected from the participating jurisdictions as provided above. Such sludge disposal will be subject to review with local jurisdictions in which such disposal sites are located, and such coordination and review as required by appropriate Maryland laws and regulations.

*See the News Release dated October 13, 1971 by James B. Coulter, Maryland's Secretary of Natural Resources.

POINT OF AGREEMENT # 7

This agreement is entered into for the purpose of implementing the provisions of Article 10 of the October 1970 Memorandum of Understanding and modifies both that document and applicable extant agreements to the extent that:

- Rate structure may be revised
- Interim plant flows (that is, until 1975) are restricted as shown herein; without implying any changes in ultimate flows shown in extant agreements and in the Memorandum of Understanding.

This agreement is entered to with the advice and consent of the enforcement agencies of States of Maryland and Virginia.

Executing Parties:

DISTRICT OF COLUMBIA

By ______________________ Date ____________

WASHINGTON SUBURBAN SANITARY COMMISSION

By ______________________ Date 10/27/71

Per WSSC letter dated October 27, 1971

FAIRFAX COUNTY, VIRGINIA

By ______________________ Date ____________

Concurring Enforcement Agencies:

MARYLAND DEPT. OF HEALTH & MENTAL HYGIENE

By Howard E. Chaney Date 11/8/71

VIRGINIA WATER CONTROL BOARD

By ______________________ Date 10/21/71

MARYLAND DEPT. OF NATURAL RESOURCES

WASHINGTON SUBURBAN SANITARY COMMISSION

4017 Hamilton Street, Hyattsville, Maryland 20781 | APpleton 7-7700

OMMISSIONERS
ATORE BARRANCA
Chairman
GE W. McKORY, JR
Vice Chairman
OUIS A. GRAVELLE
TER C. HUBBEL, JR.
JOHN J. McBURNEY

STAFF
ROBERT J. McLEOD
General Manager & Chief Engineer
JOHN T. BONIFANT
Secretary
JAMES J. LYNCH
Treasurer
JOHN B. KENKEL
General Counsel

October 27, 1971

Government of the District of Columbia
Fairfax County, Virginia
Virginia Water Control Board
Maryland Department of Natural Resources
Maryland Department of Health and Mental Hygiene

In re: Blue Plains Interim Treatment
<u>Program Agreement, October 18, 1971</u>

Gentlemen:

The Washington Suburban Sanitary Commission is pleased to advise the other parties to the "Agreement: Blue Plains Interim Treatment Program" bearing date of October 18, 1971, that it has formally executed the Agreement today. The original of the Agreement was obtained from the District of Columbia and after WSSC execution is being sent to the Maryland Department of Health and Mental Hygiene for its endorsement as in the Agreement provided, together with a copy of this letter.

Assuming that Department's execution, the fully signed Agreement will then be returned to the District of Columbia, which will be the repository of the original instrument. The original of this letter will be appended to the Agreement but for convenience of the other parties a separate copy is being sent to each of you now.

In authorizing the execution today, the Commission reviewed the procedural steps, including the review and comment by the county governing bodies of the two counties of the Washington Suburban Sanitary District, namely, Montgomery County and Prince George's County. In that connection, and from a desire to provide clarification and assistance to all parties (including the Maryland regulatory agency which is called upon to review and indicate its concurrence following the Commission's execution), the following comments are made. For convenience, the Washington Suburban Sanitary Commission's comments are expressed under the Points of the Agreement to which they directly relate.

1. <u>Point of Agreement 1.</u> In expressing its approval of the interim treatment proposition, the County Council of Montgomery County stated its understanding of a premise of equitable distribution of

costs of the chemical treatment, with cost sharing among the participants to be based upon total proportional flows if the load to the river is reduced to a figure below 100,000 lbs. per day of BOD_5, and a payment by participants on the basis of incremental increases in flows, as set forth in the Agreement, for the costs of the interim treatment program for reducing the pollutional load to that figure from any higher amount. In that light, and since the Agreement itself specifies that if the pollutional load to the Potomac River is reduced to less than 100,000 lbs. of BOD per day the payment formula would be recast, the Commission has prepared a formula to reflect its understanding of cost sharing of the program. The understanding of that item is expressed in the attachment hereto in both narative form and in mathematical expression on the basis of a sample calculation.

2. Point of Agreement 2. In reviewing this Point which provides for additional connections of Washington Suburban Sanitary Commission's system to that part of the regional system operated by the District of Columbia, both the County Council of Montgomery County and the County Executive expressed, as part of their approval of the whole Agreement, an understanding that if implementation of Point 2 does not result in relieving the sewage overflows in the Cabin John Basin the presently expressed numerical figures concerning the connection to the Rock Creek sewer and of the proposed Cabin John relief sewer to the Potomac interceptor would be expected to be re-negotiated, so as to preclude raw sewage overflows into the Cabin John Creek above the District of Columbia water intake at Little Falls.

3. Point of Agreement 5. Although this Point states that the Commission agrees to proceed immediately with the designation of the site or sites necessary for the expansion of regional wastewater treatment capabilities in accordance with the October, 1970 Memorandum of Understanding, all parties were aware both in connection with the 1970 Memorandum of Understanding and the present Agreement that the actual selection of a site or sites for such installation(s) or enlargement of existing capabilities in the Washington Suburban Sanitary District must be made first by the county governing bodies of Prince George's and Montgomery Counties. When the Maryland county, or counties, concerned with the site location question have completed their decisional procedures and communicated that determination to the Commission, the Washington Suburban Sanitary Commission will then proceed with the preparation of the plans for the expansion of the regional water pollution control capabilities within the Sanitary District effectuating the county designation.

4. Point of Agreement 6. In reviewing the Agreement on October 20, 1971, and again on October 26th, when the Prince George's County Council expressed its approval of the interim treatment program as recited in the Agreement, the County Council specifically stated that insofar as the Maryland Environmental Services' implementation of that state agency's agreement to provide for the disposition of the additional sludge to be generated by the interim treatment program

might contemplate a place of disposal in Prince George's County, the County recognizes the necessity for serving as the place for disposing of its share of the sludge generated by the treatment. However, the question of the location of a site within the county for increased amounts of sludge assumes a premise of beneficial result to the county and a recognition by the other jurisdictions within the metropolitan region that each should be willing to bear a part of the burden of disposing of the sludge generated by the additional treatment attributable to its area.

With the aforegoing comments and the attachment hereto, the Commission executes and transmits the interim treatment program Agreement, and urges all parties to provide for the expeditious implementation of the program. The Commission has previously announced an intention to cooperate with and assist the District of Columbia and the State of Virginia in preventing further degradation of the Potomac River and upgrading substantially the effluent produced by the growing population and commercial endeavors of this important metropolitan region. With each jurisdiction willing to bear its fair share of the cost of the public program, the Commission is optimistic that our mutual concerns can produce demonstrable results.

Sincerely yours,

George W. McRory, Jr.
Vice-Chairman

Attachment
cc: County Executive and
County Council of Montgomery County
County Executive and
County Council of Prince George's County

ATTACHMENT TO WSSC'S LETTER OF 10-27-71

This agreement is predicated upon an anticipated reduction in the BOD_5 discharged as plant effluent from the Blue Plains Plant from chemical treatment of the plant flow through the activated sludge basins. For the purpose of sharing the cost of the chemicals, the labor required for handling the chemicals and maintaining the chemical feeding equipment and the disposal of the additional sludge which exceeds that resulting from the previous processes at the plant, the following are adopted. It is agreed that the "base load" shall be 100,000 pounds per day of BOD_5. This is the load that was discharged to the river when the flow was 240 MGD and the effluent BOD_5 was 50 mg per liter. Inasmuch as this condition was approximated by the average of the flows in fiscal year 1968 and 1969, all participants "base flow" will be the average of the flow during these same fiscal years, namely:

D.C.	P.I.	WSSC	Va.	Total
126	3	105	6	240 mgd

Each participant's share of the "base load" will be calculated on the preceding "base flow" at 50 mg per liter, namely:

D.C.	P.I.	WSSC	Va.	Total
52,500	1,200	43,800	2,500	100,000 lbs./day

If the chemically treated effluent has a BOD_5 of less than 100,000 pounds per day, the proportionate share of the chemical treatment cost ascribed to this improvement in accordance with the following formula shall be shared by all parties in proportion to each party's annual flow to the total annual flow of all parties through the plant. The actual annual average BOD_5 in pounds per day shall be subtracted from 100,000 and divided by the calculated BOD_5 that would have occurred without chemical treatment. This shall be the proportionate share of the total chemical treatment cost ascribed to improvement in the quality of the "base flow."

For the purpose of this calculation, it is agreed that the BOD_5 ascribed to the plant without the chemical treatment shall be the total plant flow x 50 mg per liter x 8.33 and each participant's share shall be calculated in a similar manner using each participant's annual flow. For the purpose of clarity a sample calculation is attached.

That portion of the total cost of chemical treatment that exceeds the cost of improving the "base flow" shall be ascribed to treatment of the increment of flow exceeding the "base flow". The share of each participant shall be in the ratio of his "excess flow" to the total "excess flow." The "excess flow" is defined as that portion of the total annual flow which exceeds the "base flow."

If the parties' contemplation of success of the chemical treatment to reduce pollutant loads is not brought to fruition on account of some unforseen or unexpected reason, as referred to on page 2 of the Agreement, and the chemically treated effluent has a BOD_5 that is greater than 100,000 lbs. a day, then pending the additional steps referred to in the Agreement the chemical treatment costs will be shared on the basis that the chemical treatment is an improvement of each participant's portion of the "excess flow" only and no portion of the chemical treatment cost will be shared in the ratio of total plant flow. The Memorandum of Understanding of October 1970 contemplates and provides for the expansion and improvement of the Blue Plains Plant on a permanent basis with construction in stages, with additional secondary treatment being placed in service prior to completion of the tertiary portion of the permanent plant improvement, and if the additional secondary treatment is placed in service prior to completion of the tertiary portion and the effluent from the plant is in the order of magnitude projected therefor by the District of Columbia in its schedule and graph entitled "BOD Loading to Potomac River from Blue Plains Treatment Facility" appended to the October 1970 memorandum of Understanding, then he cost of chemical treatment will be shared on the basis of each participant's share of the total flow through the plant and not on an "excess flow" basis.

The WSSC understands that each party will pay its share of the treatment costs monthly on the basis of the cumulative monthly flows as estimated by the District of Columbia, with the costs to be adjusted at the end of each fiscal year on the basis of the total annual flows for such year.

Sample calculation:

Flows:

	D. C.	P.I.	WSSC	Va.	Total
Year 197_	135	17	139	8	299 mdg
Jan. 1969	126	3	105	6	240
Excess	9	14	34	2	59
% base 1969	52.5	1.2	43.9	2.4	100.
% excess	15.3	23.7	57.6	3.4	100.

BOD_5 lbs./day

Base load	100,000
Chemically treated (year 197_)	70,000
Secondary 299 x 50 x 8.33=	124,000
Reduction due to interim treatment 124,000 -70,000=	54,000
Reduction below "base load" 100,000 -70,000=	30,000
Reduction of "excess load" 124,000-100,000=	24,000

Percent & cost	Cost share below "base flow"	30,000/54,000=	55.5%
	$5,000,000 X 55.5%=		$2,800,000
	Cost share of "excess flow"	24,000/54,000=	44.5%
	$5,000,000 x 44.5%=		$2,200,000

ce of costs:

	D. C.	PI	WSSC	Va.	Total
se flow"	$1,470,000	$33,000	$1,230,000	$67,000	$2,800,000
cess flow"	340,000	520,000	1,265,000	75,000	2,200,000
Total	$1,810,000	$553,000	$2,495,000	$142,000	$5,000,000

te: Above calculations are approximate slide rule results.

THE 1954 AGREEMENT WITH WSSC

AGREEMENT NO. DCF-1-

THIS AGREEMENT, made in quintuplicate this 12th day of August, Nineteen Hundred and Fifty-Four, by and between the COMMISSIONERS OF THE DISTRICT OF COLUMBIA and the WASHINGTON SUBURBAN SANITARY COMMISSION, a body corporate created under the laws of the State of Maryland,

WITNESSETH:

WHEREAS, the Congress of the United States, by an Act approved September 1, 1916 (39 Stat. 717), authorized the connection of Maryland sewers and sewerage systems with the sewerage systems of the District of Columbia, for the protection of streams flowing through United States government parks and reservations in the District of Columbia from pollution by sewage, and authorized the said Commissioners of the District of Columbia to enter into agreements, under certain terms and conditions, with the proper authorities of the State of Maryland in relation thereto; and

WHEREAS, the General Assembly of the State of Maryland by an Act known as Chapter 122 of the Acts of 1918, as amended, created the Washington Suburban Sanitary Commission, a body corporate, and by virtue of said Act and of other laws in force in the State of Maryland said Commission was and is authorized to take over existing sewerage systems within designated areas bordering upon the District of Columbia and operate the same, and to construct and operate additional systems and to enter into contracts and agreements with the Commissioners of the District of Columbia for the connection of said systems with the sewerage systems of the District of Columbia and concerning any other matter necessary, advisable or expedient for the proper construction, maintenance and operation of the water supply, sewerage, drainage or refuse disposal systems under its control or those under the control of the Commissioners of the District of Columbia, which said contracts and agreements have the full force and effect of contracts between the District of Columbia and the State of Maryland; and

WHEREAS, the said Commissioners of the District of Columbia and the said Washington Suburban Sanitary Commission did enter into certain agreements dated June 3, 1924, and July 27, 1926, under the authority of the aforesaid Acts of the Congress of the United States and of the General Assembly of the State of Maryland, pursuant to which agreements the said Washington Suburban Sanitary Commission constructed and provided connecting sewers, as necessary, to discharge sewage from the aforementioned areas into certain of the sewerage systems of the District of Columbia in such manner as to free certain of the streams entering the District of Columbia from pollution by sanitary sewage; and

WHEREAS, the great increase in population of the areas of Maryland which normally do or would discharge sewage into streams which flow through United States government parks and reservations in the District of Columbia, and the corresponding actual and potential increase in the quantity of sewage which does and will discharge into the sewerage systems of the District of Columbia and into said streams, requires that the agreements between the parties hereto be revised and superseded by this new agreement,

NOW, THEREFORE, in consideration of the premises, and of the mutual benefits to be derived therefrom, and of the respective undertakings, promises, and covenants of the parties hereto as hereinafter contained, the Commissioners of the District of Columbia, hereinafter called "District", hereby agree to permit the connection of sewers and sewerage systems in Maryland and under or subject to the jurisdiction of the Washington Suburban Sanitary Commission, hereinafter called "Commission", with the sewerage systems of the District, and to handle, pump and treat all sewage delivered to the District of Columbia sewerage systems through each connection therewith of a sewer or sewerage system from Maryland properties or Commission sewers or sewerage systems, and the Commission agrees to permit the connection of sewers and sewerage systems in the District of Columbia and under or subject to the jurisdiction of the District with sewers and sewerage systems of the Commission, under the following terms and conditions:

Section 1. (A) Every connection of a sewer of either party hereto to a sewerage system of the other party shall be made at or near the District line at such points as the natural drainage of the areas to be sewered require, each such connection to be made upon the basis of prior agreement between the Director of Sanitary Engineering, D. C., and the Chief Engineer of the Commission.

(B) Any property lying in Maryland and abutting a District of Columbia sanitary service sewer, shall be permitted to connect with the said District service sewer upon written application to, and written consent from, the Department of Sanitary Engineering, D. C., provided such connection is made in accordance with District of Columbia regulations and that payment be made by the Commission to the Collector of Taxes, D. C., of an amount equal to the charge or assessment which, if the property to be connected were located in the District of Columbia, would be made by the District of Columbia pursuant to laws or regulations in force in the District of Columbia at the time permission to make such connection is given, without regard to the amount of any assessment or charge the Commission may collect for itself from the owner of such property for said connection.

(C) Any property lying within the District of Columbia shall be permitted to connect with a Commission sanitary service sewer upon written application to, and written consent from, the Commission, provided such connection is made in accordance with Commission regulations and that payment is made to the Commission by the person applying for such permission of an amount calculated on the same basis as the amount which would be paid by the Commission to the District of Columbia on behalf of a similar Maryland property making a connection to the sewerage system of the District of Columbia at such time.

Section 2. The Commission, as to its sewers draining into the sewerage systems of the District, and the District, as to its sewers draining into the sewerage systems of the Commission, shall prevent insofar as possible the passage of any drainage other than sanitary sewage or matter not detrimental to the sewerage systems or treatment processes, and shall use every practicable precaution in construction and in regulations governing the use of sewers and sewerage systems to exclude therefrom surface water or rain water except from areaways and depressed driveways which may be drained in accordance with the plumbing regulations applicable in such jurisdiction.

Section 3. (A) Sewers of the Commission which discharge into the sewerage systems of the District shall be provided with sewage flow meters whenever the use of such meters is practicable. The practicability of metering, and the size and type of meter and the location thereof, shall, in each instance, be determined by agreement of the Engineers of the parties hereto. The entire cost of each meter installation shall be borne by the Commission.

(B) Each sewage flow meter shall be operated and maintained by the party hereto within whose jurisdiction such meter is located, but all costs of such operation and maintenance shall be paid by the Commission, and both parties may participate from time to time in joint readings of all sewage meters and in joint inspections of such meters.

(C) In case a sewage flow meter fails to function from any cause, the sewage flow for the period of such failure shall be considered as equal to the flow as determined during the most recent corresponding period the meter was in satisfactory operation, and if there is no such corresponding period the flow shall be determined or estimated in such manner as shall be agreeable to the

Engineers of the parties hereto.

Section 4. (A) The Commission shall pay annually to the District the actual costs to the District of handling, pumping and treating all sewage delivered to the District sewerage systems through each connection therewith of a sewer or sewerage system of the Commission or of a Maryland property. Such payments, denominated "sewage flow charges", shall consist of the following amounts:

(1) An amount (herein called "Number 1 Sewage Flow Charge Amount") equal to such portion of the total operation, repair and maintenance costs, including overhead, of each District facility which handles sewage from Maryland as the total annual flow of Maryland sewage in the particular facility bears to the total annual flow of all sewage in such facility. The annual costs of operation, repair and maintenance shall be determined from the records of actual costs of operation and maintenance which are kept by the District with respect to each facility. Said records shall be subject to inspection by the Commission or its duly authorized agent. To the total of these costs for each facility shall be added four per cent (4%) thereof as overhead.

(2) An amount (herein called "Number 2 Sewage Flow Charge Amount") with respect to each District facility, exclusive of lateral branches conveying sewage to interceptors, constructed or for the construction of which funds were obligated prior to ~~Jan.~~ Jul 1, 1954, which handles sewage from Maryland, such payment to be a sum equal in the case of

a. Interceptors, to one per cent (1%)

b. Buildings, to one and one-half per cent (1-1/2%)

c. Equipment, to four per cent (4%)

of the Commission's proportionate share of the value of each such facility. As used herein the Commission's proportionate share of the value of each District facility shall be such portion of the total cost to the District of each such facility as the total annual flow of Maryland sewage in the particular facility bears to the total annual flow of all sewage in such facility.

At such time as any facility as to which the Number 2 Sewage Flow Charge Amount is being paid shall be abandoned, or replaced by another facility toward the cost of whose construction the Commission shall have paid its proportional share as hereinafter provided, the further payment of the Number 2 Sewage Flow Charge Amount with respect to such original facility shall cease.

(B) The Commission shall pay to the District the Commission's share of the cost of restoring or replacing each District facility, exclusive of lateral branches conveying sewage to interceptors, which handles sewage from Maryland. Upon the restoration or replacement of any such facility, or part thereof, the District will charge the Commission's share of the actual cost of such restoration or replacement to a "Receivable" account as described in Section 6.

(C) The Commission's share of the cost of restoration or replacement, as used in subsection (B) hereof, shall be so much of the actual cost to the District of restoring or replacing such facility, or part thereof, as the maximum design capacity assigned to the Commission bears to the maximum design capacity assigned to both parties with respect to such facility, or part thereof, as restored or replaced. The maximum design capacity assigned to each party shall be such maximum capacity at peak flow as each such party notifies the other party it desires incorporated in the restored or replaced facility and which shall be actually incorporated in the design thereof. In the event the District shall notify the Commission that restoration or replacement of a facility or part thereof is intended and the Commission fails to notify the District of the maximum design capacity which the Commission desires to have incorporated in such facility, or part thereof, the Commission shall be deemed to have requested a maximum design capacity sufficient only to accommodate the greatest actual peak flow of Maryland sewage through such facility, or part thereof, prior to the date restoration or replacement work is commenced.

(D) Recognizing that through parts of its length the Oxon Run Interceptor Sewer is situated in the District and through other parts of its length this same sewer is situated in Maryland, and recognizing that sewage originating in the District is conveyed through the portions of this sewer situated in Maryland and sewage originating in Maryland is conveyed through the other portions of this sewer situated in the District, it is hereby agreed, any provision in Section 4(A) to the contrary notwithstanding, that the charges payable by the Commission for Maryland sewage flows therein shall be as follows:

(1) The Number 1 Sewage Flow Charge Amounts shall be based on

the flows measured by sewage meter, the flows so metered to be allocated between the District and the Commission in proportion to the number of sewage units as defined in Section 8 hereof as are served in the respective jurisdictions upstream from the said sewage meter.

(2) No Number 2 Sewage Flow Charge Amounts shall be paid with respect to the existing Oxon Run Interceptor Sewer.

The Commission shall pay its proportional part of the cost of replacement of those portions of the said sewer situated in the District and carrying sewage originating in Maryland. The District shall pay its proportional part of the cost of replacement of those portions of the said sewer situated in Maryland and carrying sewage originating in the District.

Section 5. (A) Whenever it may become necessary for either party to plan an extension of its sewerage system which would result in the delivery of materially increased sewage flows into existing sewers of the other party, the party contemplating such extension shall submit to the other party general information as to said contemplated work, including estimates of the increased flows resulting therefrom, for certification as to the availability of the other party's system to handle the increased flow.

It is understood that the effect of routine service sewer extensions will not be construed as resulting in the delivery of materially increased flows, in the sense of this subsection; however, not less often than once each year the Engineer of each party hereto shall furnish the Engineer of other party his best estimate as to the average and maximum quantities of sewage anticipated during the next succeeding year to be delivered through each of the major connections to the sewerage system of the other.

(E) Whenever it shall become necessary to add any facilities to the sewerage systems of either party to this Agreement in order to receive, handle, pump or treat sewage received from the other party, such facilities shall be constructed or installed as promptly as practicable. The cost of such work (exclusive of lateral branches conveying sewage to interceptors) shall be shared by the parties hereto as provided in subsection (D) hereof. In the event of shortage of funds, the parties agree to attempt to obtain funds as quickly as possible for the purpose of constructing or installing such facilities. Neither party shall be obligated to commence construction or installation of any additional facilities until (1) the other party has made its share of the cost available to the constructing party or has otherwise satisfied the constructing party that funds will be available on demand, as may be mutually agreed at the time, and (2) the constructing party has available sufficient funds (including funds which the other party has already made available or will make available on demand) to pay all estimated costs of such facility. All money paid to the District by the Commission as its share of construction costs under this Section 5 shall be credited to an appropriate "Receivable" account as described in Section 6, and all construction costs properly chargeable to the Commission shall be charged to an appropriate "Receivable" account.

(C) In the event the District proposes to construct or install a new facility (exclusive of lateral branches conveying sewage to interceptors) which will or may handle sewage from Maryland, the District will advise the Commission of all pertinent facts concerning such proposed construction or installation. The Commission shall promptly advise the District whether it desires the District to incorporate in such facility any capacity for the handling of Maryland sewage, and if so, state what maximum capacity at peak flow it desires, and furnish therewith all necessary design data. The District will construct any such proposed facility of such capacity to make available to the Commission for the handling of Maryland sewage the requested maximum capacity at peak flow in accordance with time elements as specified by the Commission in its design data furnished to the District. Prior to construction the District will notify the Commission of the maximum capacity, at peak flow in accordance with time elements specified by the District for which the facility has been designed for handling District sewage (without making provision for any capacity for the handling of Maryland sewage, whether Maryland sewage will actually flow in the same or in another facility), which shall be deemed the "maximum design capacity assigned" to the District with respect thereto.

(1) In the event Maryland sewage will actually flow through the new facility, the requested maximum capacity, at peak flow in accordance with time elements as specified by the Commission in its design data furnished to the District, shall be deemed the "maximum design capacity assigned" to the Commission with respect thereto.

(2) In the event Maryland sewage will not actually flow through the new facility and the Commission requests the District to construct it of sufficient capacity to increase the availability of another facility for the carriage of Maryland sewage, the maximum capacity, at peak flow in accordance with time elements specified by the Commission in its design data furnished to the District, by which the availability of the other facility for actual carriage of Maryland sewage is increased, shall be deemed the "maximum design capacity assigned" to the Commission with respect to the new facility.

The costs of construction shall be shared by the parties as provided in subsection (D) hereof.

In the event the Commission pays its proportionate share of the cost of a new facility through which Maryland sewage will not actually flow, but whose construction will increase the availability of another facility for the carriage of Maryland sewage, as described above, then the District will credit the amount of such payment to the appropriate "Receivable" account for the restoration or replacement of the facility whose availability for the carrying of Maryland sewage has thus been increased but such credit shall never be available for application to any other facility.

(D) The cost of each facility constructed or installed under this section shall be paid by the parties hereto in the same proportions as the maximum design capacity assigned to each party with respect to such facility bears to the total maximum design capacity assigned to both parties with respect to such facility. Except as provided in subsection (C) hereof, the "maximum design capacity" assigned to each party with respect to each facility constructed or installed under subsection (B) hereof shall be determined by mutual agreement prior to commencement of construction or installation.

(E) It is understood that wherever used in this Section the expression "cost of the work" shall mean the cost of the work paid or payable from the funds or revenues of the parties hereto exclusive of any construction costs paid or payable from the proceeds of any grant of Federal funds made to either of the parties hereto pursuant to S3232, as introduced in the Senate of the United States on March 15, 1954, or other similar special legislation, to aid in the construction of the particular work whose cost is being divided between the parties hereto under the terms of this Section.

Section 6. The District shall establish such number of accounts, referred to in Sections 4(E), 5(B) and 5(C) and hereinafter in this Agreement as "Receivable" accounts, as may be necessary and appropriate, to which shall be charged all costs of restoration and replacement as provided by Section 4(E), and all construction costs as provided by Section 5(B), and to which shall be credited all payments of such costs by the Commission and other credits authorized by Section 5(C). A separate account shall be established for all charges made within each fiscal year with respect to each separate facility or part thereof. Not later than 30 days after a charge is made to any "Receivable" account the District shall render to the Commission a statement of such charge together with an explanation thereof. Charges made against "Receivable" accounts shall be due and payable by the Commission as provided in Section 10 hereof. Upon written notice from the Commission to the District any such charge may be paid in such number of annual installments, not exceeding ten (10), as may be specified by the Commission, but in such event the Commission shall pay annually to the District interest on the unpaid balance of such charge at a rate equal to the average rate of interest which the District would be required to pay for loans (repayable in the same number of annual installments) obtained during such year whether funds are borrowed by the District during such year or not. In addition to the right hereinabove granted, the Commission may, with respect to so much of any charge for cost of replacement which represents the Commission's proportionate share of such replacement cost based upon additional capacity made available to the Commission in the replaced facility but not then required for use by the Commission, and upon written notice to the District, postpone payment of any part of such charge for a period of not exceeding 10 years or until some part of such additional capacity is required for use by the Commission, whichever be the lesser period, but in such event the Commission shall pay to the District, so long as payment of said part of said charge is postponed, interest on said part of said charge at a rate equal to the average rate of interest which the District would be required to pay for loans (payable after a like period of years not exceeding ten) obtained during such years whether funds are borrowed by the District during such year or not. In addition to the rights hereinabove granted, in the event the District prior to 1970 supplements the Upper Potomac Interceptor pursuant to Section 5 hereof, the Commission may, upon written notice to the District postpone, without interest accruing thereby, payment of any part of its proportionate share of the cost of such construction until 1970 or until such earlier year in which the annual average flows entering the Upper Potomac Interceptor from Maryland exceed ten (10) million gallons per day.

Section 7. (A) The District agrees that with respect to every District facility, or part thereof, of which the Commission has paid all, or a part, of the cost of construction or replacement, the Commission shall be entitled to the use of so much of the capacity of such new or replacement facility, or part thereof, as does not exceed the maximum design capacity thereof upon which was based the Commission's proportionate share of such cost of construction or replacement.

(B) Except to the extent set forth in subsection (A) of this Section, the Commission recognizes that the District is primarily entitled to the entire and exclusive use of all District facilities, and that if the District at any time in order to provide for District sewage requires use of a theretofore jointly used District facility, or part thereof, to an extent which will reduce its availability to carry Maryland sewage the Commission is obligated to pay for any new construction or replacement which thereby may become necessary to meet the Commission's current or future requirements for carriage of Maryland sewage.

(C) The parties recognize that, by the terms of other sections of this Agreement, the Commission is not obligated to contribute toward the cost of any new construction unless it so elects, but that the Commission may not lawfully discharge sewage from Maryland into any District facility or part thereof except to the extent of the capacity which has been made available in such District facility or part thereof to the Commission by reason of the Commission's payment of its proportionate share of the cost of such facility or part thereof or to the extent that the District permits use by the Commission of capacity temporarily excess to the requirements of the District.

Section 8. (A) Until sewage flow meters shall have been installed, the total annual flow of sewage in each facility shall be either (1) estimated or agreed upon by the Engineers of the parties hereto, or (2) determined on the basis of the number of sewerage units connected to, or discharging into, such facility, or (3) based upon a combination of estimated flows and sewage units.

(B) Until changed by mutual agreement of the parties hereto, a "sewage unit" shall be considered to represent an annual flow or discharge of one hundred seventy-five thousand (175,000) gallons.

(C) For the purposes of this Agreement it is understood and agreed that each service connection to a sewer or sewerage system shall be counted as one, or more than one, "sewage unit" dependent upon the use of the premises served through such connection, as follows:

(1) For single-family dwelling purposes, each single-family dwelling unit shall constitute one sewage unit. Such single-

family dwelling units may be detached or attached single-family dwellings, or may be contained in flats or apartment houses. If the dwelling unit is in a building or structure other than a detached single-family dwelling, each space in such building or structure which is occupied by, or intended for the occupancy of, a single-family for dwelling purposes, shall constitute a separate "sewage unit" except that each apartment unit shall constitute one-half of a "sewage unit".

(2) It is further understood that units for commercial, industrial, office, institutional or business establishments of any kind, including country clubs, motels, hotels, trailer camps, restaurants, public places, night clubs, government buildings, filling stations, public schools, churches, fire houses, and municipal buildings should be determined by doubling the annual water consumption in gallons and dividing the same by the number of gallons specified in Section 8(B).

Section 9. (A) The District will deduct from the total annual flow of Maryland sewage in District facilities such volume as equals the number of sewage units located in the District of Columbia which discharge into sewers or sewerage systems of the Commission which sewers or systems connect with such District facilities.

(B) The District will credit the Commission with the number of gallons per sewage unit, specified in Section 8(B), located in the District of Columbia which discharge into sewers or sewerage systems of the Commission without being returned to a

District sewer or sewerage system.

(C) No deductions or credits will be made or allowed for sewage originating in the District, which discharges into sewers or sewerage systems of the Commission and is thereafter delivered to a District sewer or sewerage system, if the Commission does not pay flow charges to the District with respect to such sewage.

Section 10. The amounts equal to assessments provided for in subsection 1(B), the cost of operation and maintenance of sewage flow meters provided for in subsection 3(B), sewage flow charges provided for in section 4, charges against "Receivable" accounts provided for in section 6, and all other amounts and charges payable by the Commission under this Agreement shall be billed by the District to the Commission annually for the year ending June 30th, and each such billing shall show all deductions and credits as provided for in section 9. The Commission agrees to pay each such bill within thirty (30) days after receipt thereof by check drawn payable to the order of the Collector of Taxes of the District of Columbia.

It is expressly covenanted and agreed by and between the parties hereto that either party hereto may include in any subsequent bill any charge omitted from any previous bill, and that the right of each party to be paid any sum, which by any provision of this Agreement the other party has agreed to pay, shall not be barred by any statute of limitations or any other bar.

All accounts and other records maintained by either party hereto under or in connection with this Agreement shall be open for inspection by the other party or its authorized representatives at any time during regular business hours.

Section 11. As used in this Agreement:

(A) The word "facility" shall mean intérceptor sewer, trunk sewer, lateral branch conveying sewage to an interceptor, pumping station, sewage treatment plant, any equipment used or useful in connection with any of the foregoing, or any other construction, structure or personal property of any description through which sewage flows or passes or which is necessarily related to the handling, pumping or treatment of sewage, but excluding movable personal property, such as trucks, tools, etc., actually used in connection with several other facilities.

(B) The phrase "lateral branch conveying sewage to an interceptor" shall mean a sewer which is not an interceptor and to which house connections are permitted.

(C) The phrases "facilities which handle sewage from Maryland" and "facilities which will or may handle sewage from Maryland", as applied to District facilities, shall include not only facilities through which Maryland sewage will actually flow but also facilities which increase the availability of other facilities for the carriage of sewage from Maryland even though Maryland sewage does not flow through such facilities.

(D) "Maryland sewage" and "sewage from Maryland" shall mean sewage which has originated within the present area of the Washington Suburban Sanitary District or any extensions thereof which may be hereafter authorized by law and including territory within the state from which sewage enters into any system owned or controlled by the Commission and has entered District sewers or sewage systems through connections thereto of either (1) such Maryland properties under authorization from the Commission, or (2) Commission sewers or sewerage systems.

(E) "Agreement" or "mutual agreement" of the parties hereto, shall mean an agreement in writing signed by the Board of Commissioners on behalf of the District of Columbia and by the members of the Commission on behalf of the Washington Suburban Sanitary Commission.

(F) The phrases "Engineer of each party" or "Engineers of the parties", and similar phrases referring to "Engineer", shall mean the Director of Sanitary Engineering, D. C., in the case of the District, and the Chief Engineer of the Commission in the case of the Commission.

(G) All references to actions to be taken by "the parties" or by "the District" or by "the Commission" shall mean actions to be taken by the Board of Commissioners of the District of Columbia on behalf of the District and by the members of the Washington Suburban Sanitary Commission on behalf of the Commission.

Section 12. This Agreement may be amended or terminated at an time by mutual agreement of the parties hereto.

Section 13. This Agreement shall be effective as of July 1, 1954, and all prior Agreements between the parties hereto shall terminate as of said effective date.

IN WITNESS WHEREOF, the Commissioners of the District of Columbia, appointed under an Act of Congress entitled "An Act providing a permanent form of government for the District of Columbia," approved June 11, 1878, sitting as a Board, have considered and approved the foregoing Agreement, and have hereunto set their hands and caused the seal of the District of Columbia to be hereto affixed, and the Washington Suburban Sanitary Commission has caused these presents to be signed with its name by RAYMOND W. BELLAMY, Chairman, and L. S. RAY and J. NORMAN AGER, Commissioners, attested by JAMES B. PARKHILL, its Secretary, and its corporate seal to be hereunto affixed, the day and year first hereinbefore written.

COMMISSIONERS OF THE DISTRICT OF COLUMBIA

____

(SEAL)

____

Attest:

____

____

Secy., Board of Commissioners of
the District of Columbia

WASHINGTON SUBURBAN SANITARY COMMISSION,
a corporation,

By:

____

(SEAL)

____

Attest:

____

____

Secretary, Washington Suburban
Sanitary Commission

THE 1967 AGREEMENT WITH WSSC
FOR USE OF THE POTOMAC INTERCEPTOR

THIS AGREEMENT, made in quintuplicate this 6th day of July, Nineteen Hundred and Sixty-Seven by and between the COMMISSIONERS OF THE DISTRICT OF COLUMBIA and the WASHINGTON SUBURBAN SANITARY COMMISSION, a body corporate created under the laws of the State of Maryland,

WITNESSETH:

WHEREAS, the Congress of the United States, by an Act approved September 1, 1916 (39 Stat. 717), authorized the connection of Maryland sewers and sewerage systems with the sewerage systems of the District of Columbia, for the protection of streams flowing through United States Government parks and reservations in the District of Columbia from pollution by sewage, and authorized the said Commissioners of the District of Columbia to enter into agreements, under certain terms and conditions, with the proper authorities of the State of Maryland in relation thereto; and

WHEREAS, the Congress of the United States, by Public Law 86-515, 86th Congress, approved June 12, 1960, (74 Stat. 210) authorized the Commissioners of the District of Columbia to plan and construct the Potomac Interceptor from the Dulles International Airport to the District of Columbia to provide service, among other things, 'for the expected community growth and development in the adjacent areas in

WSSC

2824 RECEIVED AUG

the States of Maryland and Virginia, 'and further authorized the Commissioners of the District of Columbia to operate and maintain the said Potomac Interceptor 'as a part of a regional sanitary sewer system in cooperation with the proper authorities of the State and local jurisdictions concerned under such regulations as may be prescribed by the Commissioners'; and

WHEREAS, the General Assembly of the State of Maryland by an Act known as Chapter 122 of the Acts of 1918, as amended, created the Washington Suburban Sanitary Commission, a body corporate, and by virtue of said Act and of other laws in force in the State of Maryland said Commission was and is authorized to take over existing sewerage systems within designated areas bordering upon the District of Columbia and operate the same, and to construct and operate additional systems and to enter into contracts and agreements with the Commissioners of the District of Columbia for the connection of said systems with the sewerage systems of the District of Columbia and concerning any other matter necessary, advisable or expedient for the proper construction, maintenance and operation of the water supply, sewerage, drainage or refuse disposal systems under its control or those under the control of the Commissioners of the District of Columbia, which said contracts and agreements have the full force and effect of contracts between the District of Columbia and the State of Maryland; and

WHEREAS, The Agreement (DCF-A-766) made on the 12th day of August, 1954, by and between the Commissioners of the District of Columbia and the Washington Suburban Sanitary Commission, shall remain in full force and effect since it does not relate to the use of the Potomac Interceptor by either of the parties, and the sewer service provided for therein and the terms of payment and other undertakings of the parties shall not be affected by the provisions of this agreement as hereinafter set forth.

NOW, THEREFORE, in consideration of the premises, and of the mutual benefits to be derived therefrom, and of the respective undertakings, promises, and covenants of the parties hereto as hereinafter contained, the Commissioners of the District of Columbia, hereinafter called "District", hereby agree to permit the connection of sewers and sewerage systems in Maryland and under or subject to the jurisdiction of the Washington Suburban Sanitary Commission, hereinafter called "Commission", with the Potomac Interceptor System, hereinafter called "Interceptor", which discharges into the sewerage systems of the District, and to handle, pump and treat all sewage delivered to the Potomac Interceptor System through each connection therewith

WSSC

RECEIVED AUG 10 1967

of Commission sewers or sewerage systems, under the following terms and conditions:

Section 1. Every connection of a sewer of the ~~County~~ Commission to the Interceptor shall be made upon the basis of prior letter agreement in each case between the representatives of the parties hereto.

Section 2. (A) The Commission shall prevent the passage from its sewers into the Interceptor of any drainage other than sanitary sewage or wastes not detrimental to the Interceptor or to the District's sewerage systems or treatment processes, and shall use every precaution in construction, and in regulations governing the use, of its sewers and sewerage systems to exclude therefrom surface water, rain water or ground water and in all other respects shall conform with and enforce within those portions of the Commission sewerage systems tributary to the Interceptor, where applicable, such regulations of the Commissioners of the District of Columbia governing the use of said Interceptor as may be prescribed pursuant to the authority vested in said Commissioners of the District of Columbia under P.L. 86-515. "It shall be the policy of the District to inform all user agencies, with which it has agreements in force for use of the Interceptor, a reasonable time in advance of any proposed modifications of said regulations governing the use of the Interceptor and to receive and consider, prior to adoption of said modifications, any timely comments submitted by said agencies."

(B) In the event there is connected to the Potomac Interceptor System a sewer of the Commission which receives sewage flows from any political jurisdiction or other sanitary agency, district or authority not also a party to an agreement with the District covering that jurisdiction's, agency's, district's or authority's use of the Interceptor, the Commission shall, as a condition precedent to the acceptance of such other sewage flows, stipulate and require of the said political jurisdictions, sanitary agency, district or authority, as the case may be, the full observance and enforcement of the provisions of Section 2(A) hereof, including the regulations of the Commissioners of the District of Columbia governing the use of said Interceptor.

(C) Should the Commission together with any political jurisdiction, or other sanitary agency, district or authority not also a party to an agreement with the District covering that jurisdiction's, agency's, district's or authority's use of the Interceptor, undertake jointly to construct and/or operate a sewerage system connecting to the Interceptor, then the Commission shall as a condition precedent to such arrangement stipulate and require of the participants in the said joint sewer facility their full observance and enforcement of the provisions of Section 2(A) hereof, including the regulations of the Commissioners of the District of Columbia governing the use of said Interceptor.

Section 3. (A) Sewers of the Commission which discharge into the Potomac Interceptor System shall be provided with sewage flow meters whenever the use of such meters is practicable. The practicability of metering, and the size and type of meter and the location thereof, shall, in each instance, be determined by the agreement of the representatives of the parties hereto. The entire cost of each meter installation shall be borne by the Commission.

(B) Each sewage flow meter shall be operated, maintained and read, and all costs of such operation, maintenance and reading shall be paid by the Commission, provided, however, that if agreed by the representatives of the parties hereto the District at the sole expense of the Commission may operate, maintain and read any meter recording flows from a sewer of the Commission at its point of connection with the Interceptor.

(C) In case a sewage flow meter fails to function from any cause, the sewage flow for the period of such failure shall be considered as equal to the flow as determined during the most recent corresponding period

RECEIVED.
AUG 10 1967
WFC

during which the meter was in satisfactory operation, and if there is no such corresponding period the flow shall be determined or estimated in such manner as shall be agreeable to the representatives of the parties hereto.

(D) The District may at any time and at no direct cost to the Commission examine or test for accuracy any sewage meter of the Commission whose purpose it is to record the flows of sewage to the Potomac Interceptor System.

(E) The District will at no direct expense to the Commission provide as part of the initial construction of the Potomac Interceptor System manholes, connection structures or stubs for the connection thereto of sewers by the Commission; however, similar accommodations not included as part of the original construction, if subsequently required by the Commission, will be provided by the District at the direct expense of the Commission or, upon prior agreement of the parties, by the Commission at its expense at the time of their installation.

(F) In the event that there is connected to the Potomac Interceptor System a sewer of the Commission which receives sewage flows from any other political jurisdiction or sanitary agency, district or authority, as well as from the Commission, the flows therefrom reaching the Interceptor, the metering thereof, the charges therefor, and all installations therefor will be sole responsibilities of the Commission.

(C) Should the Commission together with any political jurisdiction or sanitary agency, district or authority undertake jointly to construct and/or operate a sewerage system connecting to the Interceptor, then for the purposes of this agreement the District will deal with but a single participant in such joint undertaking, as may be selected and designated in writing for the purpose by the said Commission and others, and the terms of Section 3(F) hereof will apply if the Commission is the designee.

Section 4. (A) Pursuant to the provisions of P.L. 86-515 it is the intent of the parties hereto that the Commission shall pay

(1) the actual costs to the District for handling, pumping and treating all sewage discharged from Commission sewerage systems into the Potomac Interceptor System and thence into the sewerage systems of the District of Columbia other than the Potomac Interceptor;

(2) the proportionate costs of operation, maintenance and amortization of the cost of all planning and construction, (including acquisition of rights-of-way) of the Potomac Interceptor System,

RFC AUG 10 WPCA

excluding any Federal Grants made for these purposes;

(3) in proportion to its usage of the Potomac Interceptor System, the construction and amortization costs incurred by the District, excluding any Federal Grants applicable thereto, for the provision of facilities other than the Potomac Interceptor for handling, pumping and treating sewage discharged or to be discharged by the Commission through connections to the Potomac Interceptor System;

all as hereinafter more particularly set forth.

(B) All of the elements of cost recited above shall be reflected in a single charge or service rate which when multiplied by the total volume of sewage, expressed in millions of gallons, delivered to the Interceptor from Commission sewerage systems will constitute the total cost to the Commission for the sewage services provided hereunder for the period during which such sewage flows were recorded, or estimated, such charge or service rate to be uniformly applicable to all jurisdictions, agencies and authorities (except the Federal Aviation Agency) which may be simultaneously served by the Interceptor during the same period of service or billing interval, provided, however, that the amount of the charge or service rate shall be adjusted from time to time to cover fully the actual costs to the District of providing the services and amortizing, as required by law, or otherwise reflecting the capital costs of facilities devoted to such services. At any time the charge or service rate per million gallons shall consist of the aggregate of the following amounts:

(1) An amount equal to the actual cost per million gallons of the total flow in the Interceptor, as recorded or estimated from all users thereof, for the total operation, repair and maintenance costs of the Interceptor including the rights-of-way and access roads therefor, the testing of meters and the services of engineers and others engaged to direct and perform these operations, administer the regulations and provide the services called for under this and similar agreements between the District and other users of the Interceptor, including overhead where applicable.

(2) An amount which shall be the actual cost to the District per million gallons for the operation, repair, maintenance and replacement, including overhead, of each

District facility which handles, pumps or treats sewage or wastes conveyed by the Interceptor to the sewerage systems of the District. (Major replacements normally financed from capital funds shall be considered as improvements and financed and reimbursed accordingly.)

(3) An amount, expressed as a unit cost per million gallons, which reflects the proportionate annual share of the historical cost of the District's sewage treatment plant, up to the date of connection of the Interceptor to the District's sewerage systems, devoted to the treatment of sewage and wastes received/from the Interceptor. As used herein the proportionate annual share of the historical cost of the plant shall be such portion of the cost as the total annual flow of sewage received from the Interceptor bears to the total annual flow of all sewage received at the plant, computed on the historical costs of:

a. Conduits and piping at one percent (1%)

b. Buildings and tanks at one and one

half percent ($1\frac{1}{2}$%), and

c. Equipment at four percent (4%)

At such time as any facility as to which the amount under this Section 4(B)(3) is being paid shall be replaced, supplemented or augmented by another facility toward the cost of whose construction the Commission shall be making payments pursuant to Section 4(B)(6) hereof, then the amounts payable under this Section 4(B)(3) shall be reduced in proportion to the resulting reduction in the use of the initial facilities for the treatment of sewage from the Interceptor.

(4) An amount which shall be the charge per million gallons necessary to amortize over a period of forty years the loans from the United States to the Metropolitan Area Sewage Works Fund for the planning, design construction and initial operation, if necessary, of the Interceptor; such charges to be graduated over the life of the loans from zero, if warranted, to such maximum as may ultimately be necessary to fulfill the requirements of law; however, should the

resulting rates thereby become unduly burdensome to the user agencies, the District agrees to participate in efforts to secure modification of the law, or of its interpretations as may be appropriate.

(5) An amount which shall be the charge per million gallons necessary to amortize, over a period of thirty years, the loans from the United States to the District of Columbia Sewage Works Fund for the planning, design and construction of those portions of the pipe lines and pumping facilities which are provided for the transport of flows from the Interceptor to the District of Columbia Water Pollution Control Plant (P.L. 86-711); such charges to be graduated over the life of the loans from zero, if warranted, to such maximum as may ultimately be necessary to fulfill the requirements of law. The portion of the cost of the pipe lines and pumping facilities provided for the transport of flows from the Interceptor shall be so much of the total cost of each such facility to the District as the maximum design capacity

assigned therein for Interceptor flows bears to the maximum design capacity assigned therein for all flows.

The application of the charges provided for under this Section 4(B)(5) to flows from the Commission received by way of the Interceptor shall be in addition to any other sums toward whose payment the Commission may become liable to the District under the provisions of the Agreement of August 12, 1954 (DCFA-766) for the construction of pipe line, and pumping facilities for the accommodation of flows from the Commission which are or may be delivered to the District's sewerage systems through Commission sewer connections to lines other than the Interceptor.

(6) An amount expressed as a charge per million gallons which shall be sufficient to cover the cost to the District of Columbia, exclusive of Federal Grants, if any, for planning, designing and constructing additional treatment facilities at the District of Columbia Water Pollution Control Plant as may become necessary from time to time to accommodate flows received from the Interceptor, or to enhance the degree of treatment provided such flows. The cost to the

District as used in this subsection shall be taken to include long and short term loans taken by the District, if used for such purpose, all of which shall be amortized as to principal and interest over a period of not less than thirty years exclusively from the charges provided for in this Section 4(B)(6). The application of the charges provided for under this Section 4(B)(6) to flows from the Commission received by way of the Interceptor shall be in addition to any other sums toward whose payment the Commission may become liable to the District under the provisions of the Agreement of August 12, 1954 (DCFA-766) for the construction of sewage and waste treatment facilities for the accommodation of flows from the Commission which are or may be delivered to the District's sewerage systems through Commission sewer connections to lines other than the Interceptor.

(7) When applicable, the total charge, as computed in accordance with the foregoing subsections for any jurisdiction which, under other agreements, has provided financing for capacity in any District facilities used for

RECEIVED AUG 10 1967 WP

WSSC

handling or treating flows from the Interceptor, shall be adjusted annually or more often at the option of the District to reflect credit, as determined by the District, for proportionate use by any other agency of such "purchased" capacity.

(C) The annual costs of operation, repair, maintenance and replacement shall be determined from the records of actual costs which are kept by the District with respect to the Interceptor and each District facility handling or treating flows from the Interceptor. Said records shall be subject to inspection by the Commission or its duly authorized agent.

Notwithstanding the provisions of subsection (B) of this Section requiring that actual costs shall be the bases of the various 'amounts' which make up the rate charged per million gallons, the said rate shall not be changed more frequently than each three years. Payments received from the Commission will be credited first to the operating accounts in amounts equal to the actual costs of operations, repairs, maintenance and replacement as provided and the balance, when available, shall then be credited to the capital accounts toward whose ultimate liquidation the users of the Interceptor become liable through this and other similar agreements.

The District shall furnish to the Commission annually or more often at the option of the District, itemized data showing costs of operations, repairs, maintenance and replacements and amounts credited to the capital accounts for each year.

(D) The Commission will be billed on the basis of metered, or estimated flows at three month intervals ending on August 31, November 30, February 28, and May 31 each year. Payments shall be made by or before the 30th day next succeeding each bill rendition date.

Should the District perform at the request of the Commission any services not covered by the rates charged per million gallons the Commission shall pay to the District the costs of such services within thirty days after such payment is requested by the District.

Section 5. Inasmuch as the land area within the Cabin John Watershed under Commission plans is connected directly to the District of Columbia Sewerage System by a trunk sewer of the Commission and is thus provided with sewerage service under the terms of the Agreement of August 12, 1954 (DCFA-766), but by subsequent request of the Commission may also connect to the Interceptor, for the interception of part of the flows therefrom for so long as capacity is available in the Interceptor for such service, the charges for flows delivered to said Interceptor from the said Cabin John drainage area shall be payable only in part under the provisions herein The charge or service rate per million gallons for sewage and

WSSC

wastes delivered to the Interceptor from the Cabin John drainage area shall consist of the aggregate of the amounts set forth in Sections 4(B)(1), 4(B)(2), 4(B)(3) and 4(B)(4) hereof only. Such charges shall be in lieu of payment of the "Number 1 Sewage Flow Charge Amount" and the "Number 2 Sewage Flow Charge Amount" as described in Section 4(A)(1) and Section 4(A)(2) of Agreement DCFA-766. In all other respects the remaining provisions of Agreement DCFA-766 relating to the paymen by the Commission to the District for the construction by the District of facilities to handle, pump and treat sewage and wastes originating in the Cabin John drainage area shall apply.

Section 6. (A) The District agrees that with respect to the main line of the Interceptor the Commission shall be entitled to the use of so much of the maximum capacity thereof at any section as was shown in the "Report to the District of Columbia Upon Planning Studies for the Potomac Interceptor Sewer" prepared by the Burns and McDonnell Engineering Company in 1961, to be required as of the year 2000 for the provision of sewerage service to the various drainage areas, or parts thereof, situated in the Sanitary District under the control of the Commission.

It is understood that as to the portions of the Interceptor System extended into the tributary watersheds of the Sanitary District by the District the same will have been constructed in accordance with the maximum flow requirements of the Commission and other jurisdictions as anticipated in

WSSC

the said Planning Studies for the year 2000 as modified prior to construction and shall be available for the use of the Commission only to the extent assumed therein. Should any drainage area, or part thereof, for which flow allocation is herein made to the Commission, cease at any time to remain under such Commission control or in its Sanitary District, the capacity of the Interceptor and its parts to which the Commission is entitled hereunder shall be reduced in proportion to be determined by agreement between the Commission and the party assuming control of said drainage area or part thereof.

(B) The District agrees that with respect to every District facility, or part thereof, as to the cost of whose construction the Commission is paying the amounts herein described in Sections 4(B)(5) and 4(B)(6), the Commission shall be entitled to the use of so much of the capacity of such facility, or part thereof, as does not exceed the maximum design capacity provided therein for the handling and treatment of sewage and wastes of the Commission delivered to the Interceptor, excluding however, such sewage and wastes originating in the Cabin John Watershed as to which payments under Section 5 are provided herein.

(C) Except to the extent set forth in subsection (B) of this Section, the Commission recognizes that the District is primarily entitled to the entire and exclusive use of all District facilities, and that by virtue of an agreement between the District and the Washington Suburban Sanitary Commission, No. DCFA-766, dated August 12, 1954, the said Commission has certain rights to use District facilities jointly with the District which rights are superior to any rights granted in this Agreement by the District to the Commission, and that by virtue of an agreement between the District and the County of Fairfax, No. DCFA-1357, dated April 28, 1959, the said County has certain rights to use District facilities jointly with the District which rights are superior to any rights granted herein by the District to the Commission, and that if the District at any time, in order to provide for District sewage or in order to accord the said Commission its rights under the said Agreement DCFA-766, or the said County its rights under the said Agreement DCFA-1357, requires use of a theretofore jointly used District facility, or part thereof, to an extent which will reduce its availability to carry Commission sewage flowing from the Interceptor the Commission is obligated to pay in rates which the District periodically will establish for any new construction which thereby may become necessary to meet the current or future requirements for the handling and treatment of sewage from the Interceptor. The payment by the Commission

WSSC

of the amounts herein described in Sections 4(B)(5) and 4(B)(6) shall be considered to satisfy the requirements of this Section 6(C) as to payments by the Commission.

(D) The Commission expressly covenants and agrees that if it fails to pay to the District the amount of any bill within the time specified in Section 4, and such failure continues for a period of time determined by the Commissioners of the District of Columbia, in their discretion, to be unreasonable, it, the said Commission, will become liable for payment of interest at the going District rate on such delinquent bill until the same is paid and will be subject to appropriate action by the District and/or other interested parties to secure payment or other suitable performance in any court of competent jurisdiction.

Section 7. (A) Until sewage flow meters shall have been installed, the total annual flow of sewage in each Commission sewer or sewer system shall be either (1) estimated or agreed upon by the representatives of the parties hereto, (2) determined on the basis of the number of sewage units connected to, or discharging into, such sewer or system or (3) based upon a combination of estimated or agreed flows and sewage units.

(B) Until changed by mutual agreement of the parties hereto, a "sewage unit" shall be considered to represent an annual flow or discharge of one hundred thousand (100,000) gallons.

(C) For the purposes of this Agreement it is understood and agreed that each service connection to a sewer or sewerage system shall be counted as one, or more than one, "sewage unit" dependent upon the use of the premises served through such connection, as follows:

(1) For single-family dwelling purposes, each single-family dwelling unit shall constitute one sewage unit. Such single-family dwelling units may be detached or attached single-family dwellings, or may be contained in flats or apartment houses. If the dwelling unit is in a building or structure other than a detached single-family dwelling, each space in such building or structure which is occupied by, or intended for the occupancy of, a single-family for dwelling purposes, shall constitute a separate "sewage unit".except that each apartment unit shall constitute one-half of a "sewage unit".

(2) It is further understood that units for commercial, industrial, office, institutional or business establishments of any kind, including country clubs, motels,

hotels, trailer camps, restaurants, public places, night clubs, government buildings, filling stations, public schools, churches, fire houses, municipal buildings and parks shall be determined by dividing the annual water consumption therefor by the number of gallons specified in Section 7(B) to constitute one "sewage unit".

Section 8. All amounts and charges payable by the Commission under this Agreement shall be billed by the District to the Commission as elsewhere herein provided. The Commission agrees to pay each such bill by or before the 30th day next succeeding the bill rendition date by check drawn payable to the order of the D. C. Treasurer.

It is expressly covenanted and agreed by and between the parties hereto that erroneous billings may be corrected at any time and that any rights secured to each party to be paid any sum of money pursuant to the terms of this Agreement shall not be barred by any statute of limitations or by any other bar.

All accounts and other records maintained by either party hereto under or in connection with this Agreement shall be open for inspection by the other party or its authorized representatives at any time during regular business hours.

Section 9. As used in this Agreement:

(A) The word "facility" shall mean the Potomac Interceptor or any other interceptor sewer, trunk sewer, pumping station, sewage treatment plant, any equipment used or useful in connection with any of the foregoing, or any other construction, structure or personal property of any description through which sewage flows or passes or which is necessarily related to the handling, pumping or treatment of sewage, but excluding movable personal property, such as trucks, tools, etc., actually used in connection with several other facilities.

(B) "Commission sewage" and "sewage from the Commission" shall mean sewage which has originated within the Washington Suburban Sanitary District, or within any county, town, city, district or territory within the State of Maryland from which sewage enters into any system owned or controlled by the Commission, and has entered the Interceptor through connections thereto of Commission sewers or sewerage systems.

(C) "Agreement" or "mutual agreement" of the parties hereto, shall mean an agreement in writing signed by the Board of Commissioners on behalf of the District of Columbia and by the members of the Commission on behalf of the Washington Suburban Sanitary Commission.

(D) The phrase "representatives of the parties" shall mean the Director of Sanitary Engineering,

D. C., in the case of the District, and the Chief Engineer of the Commission, in the case of the Commission.

(E) All references to actions to be taken by "the parties" or by "the District" or by "the Commission" shall mean actions to be taken by the Board of Commissioners of the District of Columbia on behalf of the District and by the members of the Washington Suburban Sanitary Commission on behalf of the Commission.

Section 10. This Agreement may be amended or terminated at any time by mutual agreement of the parties hereto.

Section 11. This Agreement shall be effective as of the date first hereinabove written.

IN WITNESS WHEREOF, the Commissioners of the District of Columbia, appointed under an Act of Congress entitled "An Act providing a permanent form of government for the District of Columbia," approved June 11, 1878, sitting as a Board, have considered and approved the foregoing Agreement, and have hereunto set their hands and caused the seal of the District of Columbia to be hereto affixed, and the Washington Suburban Sanitary Commission has caused these presents to be signed with its name by Louis A. Gravelle , Chairman, and and and , Commissioners, attested by John T. Bonifant, its Secretary, and its corporate seal to be hereunto affixed, the day and year first hereinbefore written.

COMMISSIONERS OF THE DISTRICT OF COLUMBIA

(SEAL)

Attest:

Secretary, Board of Commissioners
of the District of Columbia

WASHINGTON SUBURBAN SANITARY COMMISSION,
a corporation

By: Louis A. Gravelle
Louis A. Gravelle, Chairman

(SEAL)

Attest:

Secretary, Washington Suburban
Sanitary Commission

Approved as to form:

Assistant Corporation Counsel, D.C.

______________________, 1967

RECEIVED

WSSC

APPENDIX H

RECOMMENDATIONS TO SPEED ACTION
ON POTOMAC CLEANUP

PREPARED BY

VINCENT W. BACON
PROFESSOR OF CIVIL ENGINEERING
THE UNIVERSITY OF WISCONSIN - MILWAUKEE

The University of Wisconsin — Milwaukee
MILWAUKEE, WISCONSIN 53201

COLLEGE OF APPLIED SCIENCE AND ENGINEERING

May 19, 1970

RECOMMENDATIONS TO SPEED ACTION ON POTOMAC CLEANUP

Dear Mr. Klein:

1) The Blue Plains Sewage Treatment Plant is overloaded. Further, it cannot be expanded to treat the waste load which will be generated in the metropolitan area by the year 2000 (420 MGD* estimated) simply because the Potomac Estuary does not have the receiving capacity even if the degree of treatment exceeds 99% removal. The logical solution is to remove much of the load from suburban Maryland, requiring that area to provide waste treatment plant capacity over and above its capacity rights at Blue Plains. Thus, both land and treatment capacity at Blue Plains will be reserved for the core area, the Potomac (Dulles) Interceptor area, and the capacity to which Maryland and Virginia are entitled. Of greatest importance, the Potomac will be cleaned up in less time and, in my opinion, at less cost.

*Million Gallons per Day

The capacity at Blue Plains should be leveled off at present at 240 MGD with new primary additions to be placed under construction immediately with completion by December 31, 1971, with new secondary additions to achieve 90% removals by December 31, 1972, and with advanced waste treatment by December 31, 1975, to achieve nutrient and organic removals. Such a program is practical. It should meet the standards of 96% removal of BOD*, 96% removal of phosphorus, and 85% removal of nitrogen. At 240 MGD, Blue Plains should have adequate capacity into the mid '80's.

* Biochemical Oxygen Demand

2) The degree of treatment proposed for the 30 MGD Piscataway Sewage Treatment Plant by past enforcement conferences is not adequate to protect Piscataway Embayment from eutrophication. Newly completed FWQA scientific studies, including mathematical models and dye dispersion studies, show that the present enforcement conference removal requirements of 96% BOD, 96% phosphorus, and 85% nitrogen are adequate only to 15 MGD. Respectively, these removal requirements should be increased to 98%, 98%, and 95% for a 30 MGD plant. The timetable for accomplishment should not be changed.

3) Beyond the 67 MGD capacity rights which Maryland has established at Blue Plains, no further connections to the WSSC system discharging to Blue Plains should be allowed. This need not inhibit development in the WSSC area. So-called package waste treatment plants can be installed as temporary treatment while regional facilities are being designed and constructed. They should be operated by WSSC, and stream standards must be met. The same applies to Virginia installations.

4) Solids disposal does not impinge directly upon the Potomac River and Estuary. But it can be a source of air pollution, and it can be costly, thus diverting monies from the basic treatment process. Disposal of digested sludge onto crop lands on a crop rotation basis should be given consideration <u>now</u>. Land should be purchased <u>now</u> for this purpose, and held <u>until</u> needed. A loading factor <u>of</u> 20 dry tons per acre per year is a conservation design criterion. Land disposal and utilization should prove less costly, should free some of the acreage at Blue Plains and other plants, and will close the organic cycle making beneficial use of the solids.

5) All agencies should attempt to envision their ultimate treatment plant site requirements, and sufficient land for this purpose should be purchased <u>now</u>.

In arriving at the above conclusions, I worked very closely with your staff, with the experts from FWQA's Technical Support Laboratory at Annapolis and the Charlottesville Regional Office, and with Eugene Jensen, FWQA Assistant Commissioner for Operations. Field trips were made to Blue Plains and to potential sites for regional treatment plants.

Attached are more detailed findings and recommendations for action to abate water pollution in the Washington Metropolitan area reach of the Potomac and tributaries. They are under the headings: The Blue Plains Problem, The Piscataway Problem, and Advanced Waste Treatment Package Plants.

It has been a pleasure working with you and your cooperative and competent staff.

Sincerely yours,

Vinton W. Bacon

Vinton W. Bacon
Professor of Civil Engineering

Honorable Carl L. Klein
Assistant Secretary for
Water Quality and Research
Department of the Interior
Washington, D. C. 20240

Enclosures

FINDINGS AND RECOMMENDATIONS FOR ACTION TO ABATE WATER POLLUTION

IN THE WASHINGTON METROPOLITAN AREA REACH OF THE POTOMAC AND TRIBUTARIES

I. FINDINGS:

I. THE BLUE PLAINS PROBLEM

1. The Blue Plains Plant of the District of Columbia, which handles nearly 80% of the metropolitan area sewage load, is overloaded. Its design capacity is 240 mgd; its present load is about 250 mgd, with one-half of the sewage originating outside D.C., (Md-114 mgd; Va.-11 mgd; D.C.-124 mgd)

2. No reading of existing agreements under which D.C. accepts sewage from other jurisdictions can yield an interpretation to the end that D.C. is obligated to overload its plant. Likewise, such agreements cannot be interpreted to hold that jurisdictions outside D.C. are relieved from the obligation to manage the sewage problems created within their own boundaries. In either case, the Potomac is the victim.

3. The Maryland counties represented by the Washington Suburban Sanitary Commission (WSSC) have established certain "capacity rights" to treatment of a portion of their sewage at Blue Plains through WSSC's contributions to that plant's construction. Such "rights" are calculated at about 45 mgd, and should remain so reserved.*

4. Other "rights" to Blue Plains capacity arise from legislation authorizing the Potomac Interceptor, amounting to 22 mgd for WSSC and 42 mgd for Virginia areas when the loads reach full design capacity. These should also remain intact.

5. Beyond these outside "capacity rights", no obligation arises for D.C. to accept sewage flows from outside its boundaries -- to the detriment of the River. Beyond this point, too, the credibility of continuing adherence to the single-large-plant-approach as the best regional solution is in serious doubt.

6. On the basis of scientific studies and approved water quality standards for the metro segment of the Potomac Estuary, it is apparent that the sewage load from populations connected to Blue Plains will have to be reduced, or virtually 100% treatment will have to be achieved. As of 1 year ago, an excess load equivalent to the sewage from 230,000 people was imposed on Blue Plains and the 4 other smaller plants in the metropolitan area.

II. RECOMMENDATIONS:

1. The present site at Blue Plains should be reserved first and foremost for D.C. sewage, including adequate treatment for excess flows.

2. The design flows allotted to WSSC in the Potomac Interceptor (22 mgd) should continue to remain reserved, and the flows from all other WSSC sources to Blue Plains should be limited to 45 mgd, for a total of 67 mgd thus to be treated at Blue Plains

3. The Blue Plains plant capacity should be retained at 240 mgd for the present; with all plant components brought up to that capacity, and with installation of tertiary facilities, Blue Plains should thus have sufficient capacity to beyond the Year 1980 and meet water quality standards. (See Table A)

4. WSSC should immediately commence design and construction of facilities for tertiary treatment in excess of 67 mgd, as required to meet water quality standards. No further connections to WSSC system discharging to Blue Plains should be allowed.

5. Any Advanced Waste Treatment Package Plants utilized shall be considered temporary solutions and shall be operated so as to meet water quality standards.

6. The Design and Construction effort leading to tertiary treatment at the 240 mgd Blue Plains facilities should proceed on the following schedule:

(1) Primary Facilities -- put to contract immediately for the 240 mgd capacity, including excess flows.
(2) Secondary Facilities -- Begin Design immediately and complete within 1 year; Complete Construction by 12/31/1972
(3) Tertiary Facilities -- Within 1 year, begin Design; complete Design within 1 year; complete Construction by 12/31/1975.

Note: If these recommendations are followed, the capacity at Blue Plains can be leveled out at 240 mgd for secondary treatment; with the addition of tertiary facilities, this capacity will be adequate to some date beyond 1980, will meet water quality standards, and will allow for orderly planning to accommodate future needs anticipated beyond 1980.

Table A

Design Flows at Blue Plains with WSSC Inflows Restricted

Flows from:	Actual Present Inflows (1970) (mgd)	1980 (mgd)	2000 (mgd)
District of Columbia	124	135	180
Potomac Interceptor:			
Maryland	1	10	22
Virginia	4	14	42
Other than Potomac Interceptor:			
Virginia	7	6	8
Maryland (WSSC)	113	45	45
Total to be treated at Blue Plains Plant......	249	210	297

*Formula by which 45 MGD capacity rights of WSSC at Blue Plains was determined.

$$\frac{\$5.5\text{M invested by WSSC at Blue Plains}}{\$29\text{M total investment in Blue Plains from all sources}} \times 240 \text{ MGD} = 45\tfrac{1}{2} \text{ MGD}.$$

II. THE PISCATAWAY PROBLEM

Findings and Recommendations:

1. Newly completed FWQA scientific studies, including mathematical model prediction and dye dispersion results, have produced findings to show that the present Enforcement Conference removal requirements of 96% of Phosphorus and 85% of Nitrogen are not adequate to prevent accelerated eutrophication conditions with the 30 mgd Piscataway Treatment Plant bein planned by WSSC.

2. These removal requirements would have been adequate for a 15 mgd plant, and would have afforded sufficient protection for Piscataway Embay ent.

3. Thus, the Enforcement Conference will need to impose more stringe t removal requirements. For the 30 mgd plant size, these will have to be n t less than 98% BOD_5, 98% Phosphorus, and 95% Nitrogen.

4. There is no reason to change the time frame for accomplishment of these levels of treatment, and the timing requirements specified by the Enforcement Conference should be adhered to and met.

5. Because of the very high degree of sensitivity of Piscataway Emba ment waters to the adverse impacts of waste and nutrient inputs, adequate fail-safe mechanisms, including but not limited to standby power faciliti multiple treatment trains, absence of bypasses, sampling, analysis, warni systems, etc., should be provided for.

III. ADVANCED WASTE TREATMENT PACKAGE PLANTS

FINDINGS AND RECOMMENDATIONS

1. Many Washington Metropolitan Area sewage treatment plants are presently overloaded and thus aggravate an already difficult pollution problem in the Potomac and tributaries. In this setting of explosive population growth, local governments must utilize the full range of technological tools -- including interim solutions -- to minimize damage to the River until permanent, adequately-sized facilities can be put in place and eliminate such overloads.

2. Package Treatment Plants can be an effective interim solution to relieve overloading situations without calling a total halt to all further growth. Most such plants are designed to produce effluents equivalent to secondary treatment, i.e. up to 95% removal of BOD_5 and Suspended Solids. They can be augmented, however, to yiel a tertiary-equivalent type of effluent by adding sand/vaccuum filter processors, lagoons, chemical precipitators for nutrient removal, etc. For the effluents discharged in the Washington Metropolitan Area to the Potomac and tributaries, such tertiary-equivalent (advanced waste) treatment is a must.

3. Size and Performance: Package Treatment Plants can range in size up to million gallons per day (mgd), and can be used in parallel to serve more people. ...A 50,000 gpd unit can treat wastes equivalent to the sewage from 500 people, or 143 families (3.5 people per family)..... A 1 mgd unit can treat sewage for 10,000 people, or 2,857 families.

4. Other characteristics: Package plants are portable and can be moved to next location when permanent facilities are completed....The space thus vacated (usually concrete slab) reverts back to the builder and original intended use (house, etc.)

5. Costs and Cost Burden: Bid prices submitted in February 1970 for a Package Plant to be installed at Chicago, yielding 95% BOD and Suspended Solids removal, indicate a total cost of $100,000 for a 50,000 gpd unit, or $700 per family; this is equivalent to a 2.3 percent increase in the cost of a $30,000 house if the entire cost were ascribed to that single subdivision. For a 1 mgd unit serving 2,857 families, the indicated cost would be $1 million, or $350 per house, again disregarding the repeated use of the unit at other locations. It is deemed equitable that the cost burden for such interim plants should be borne by the developer who creates the housing market which attracts the people who create the sewage load. (The costs giv above will increase somewhat through addition of nutrient removal facilities, as required)

6. Operation and Supervision: Proper operation and strict, continuous supervision are essential to the success of this interim technological solution, and must remain the responsibility of the local sewage authority. Under no circumstances ca a developer, or other private entity, be allowed to operate a package plant.

APPENDIX I

ENVIRONMENTAL STATEMENT AND SUPPLEMENTS

PREPARED BY THE DISTRICT OF COLUMBIA
DEPARTMENT OF ENVIRONMENTAL SERVICES

ENVIRONMENTAL STATEMENT
D. C. WATER POLLUTION CONTROL PLANT EXPANSION
1971 - 1974

I. Purpose

This statement is intended to provide the information required by the National Environmental Policy Act of 1969, Public Law 91-190, January 1, 1970; the Environmental Quality Improvement Act of 1970, Public Law 91-224, April 3, 1970; Executive Order 11507, Prevention, Control, and Abatement of Air and Water Pollution at Federal Facilities, February 4, 1970; Executive Order 11514, Protection and Enhancement of Environmental Quality, March 5, 1970; and Interim Guidelines of the Council on Environmental Quality, April 30, 1970 as revised and amended on January 28, 1971.

The purpose of the D. C. Water Pollution Control Plant expansion and modernization program is to improve the aquatic environment by providing ultratreatment of wastewater. Other environmental benefits will accrue as detailed herein.

II. Background

From the northwestern corner of the District at Chain Bridge, to its mouth at Chesapeake Bay (about 115 miles), the Potomac River is an estuary - it ebbs and floods in response to the mechanical action of the ocean tides. Although the ocean tides reach to Chain Bridge, salt water does not, and the water in the estuary at Washington is always fresh. The estuarine character of the Potomac and Anacostia Rivers intensifies water quality problems and complicates water quality management.

THE PROBLEM

The main cause of water pollution in the Washington area is municipal wastewater. This includes raw sewage released from overloaded sewer systems, sewage treatment plant effluents, combined sewer overflows, and storm water. Combined sewers are a remnant of the past and are found in the older sections of some cities, including the District and Alexandria. During dry weather, they convey sanitary sewage to the treatment plant but when it rains, they also function as storm drains. During a heavy rainstorm, it is not possible to accommodate the entire combined sewer flow at the treatment plant and the excess flow, a dilute mixture of rainfall runoff and sanitary sewage, must be discharged into the nearest stream. About one third of the area of the District is on a combined sewer system.

Once considered innocuous, rainfall runoff from urbanized areas has been found to be contaminated by the washing of accumulated filth from streets, and in areas undergoing development, runoff may carry tremendous quantities of eroded soil.

POLLUTION CONTROL

In 1938, the District placed into operation a primary sewage treatment plant at a location known as Blue Plains, in the southwest corner of the city. Twenty years later, secondary type treatment was added. Other improvements have been made since the secondary facilities were completed. The facilities are officially designated the "District of Columbia Water Pollution

Control Plant." This plant is a regional one, serving large areas in Maryland and Virginia as a result of an Act of Congress in 1916. As a matter of fact, the potential tributary area outside the District is ten times the size of the District itself.

The present treatment facilities are inadequate. Accordingly, the Department of Sanitary Engineering plans to increase the hydraulic capacity of the plant and greatly improve the quality of the effluent. To do this will require the expenditure of large sums of money and the full cooperation of the Federal Government and participating local governments.

In June 1967, pursuant to the provisions of the Water Quality Act of 1965 (P.L. 89-234), the District adopted quality standards for its interstate waters. The water quality standards consist of (1) a set of planned water uses, (2) quality criteria designed to protect those uses, and (3) a plan for implementation and enforcement of the criteria. Again pursuant to law, the District's standards were submitted to the Secretary of the Interior on June 29, 1967. After certain adjustments to the standards were made by the District, partial approval was granted in April 1968. Further adjustments were made before the Secretary gave his full approval in January 1969. (All the states and territories went through similar procedures during this period.) Upon approval by the Secretary, the District of Columbia water quality standards became federal standards also.

The District's standards are primarily intended to provide improved recreational opportunities as a result of water quality improvement. With the exception of the criteria related to water contact recreation (swimming, wading, waterskiing), the water quality objectives were to be realized by 1972. Water quality to permit contact recreation was planned for 1975 in limited zones of the Potomac River and Rock Creek.

In April 1969, dissatisfied with pollution control progress, the Secretary of the Interior reconvened the Potomac River - Washington Metropolitan Area Enforcement Conference. The conferees represented the water pollution control agencies of Maryland, Virginia, and the District of Columbia; the Interstate Commission on the Potomac River Basin; and the Department of the Interior. (The first two sessions of the conference were held in 1957 and 1958.) After three days of hearing testimony, the conferees recessed to study the extensive data presented to them. They reassembled about one month later to issue a set of recommendations for actions to improve water quality. The most important recommendation was the one calling for the construction of advanced waste treatment facilities. The effluent parameters established by the conferees will require almost complete renovation of wastewater and assure realization of the District's water quality goals for the Potomac.

In accordance with the conference recommendations, the District proceeded to implement its phased development plan for the Blue Plains site. One of the elements of the plan was the reclamation of 51 acreas of Potomac River mud flats for plant expansion to 419 million gallons per day (MGD), the flow expected to occur near the year 2000. However, subsequent Department of the Interior opposition to the reclamation proposal made approval by the Federal Government unlikely. As a result, it was necessary to abandon plans for full expansion of the plant to 419 MGD.

In recognition of this impasse, the conferees reached the compromise set forth in a "Memorandum of Understanding," the execution of which was completed on October 7, 1970. The Memorandum calls for the development of the Blue Plains site to provide advanced waste treatment for 309 MGD by the end of 1977.

In accordance with the subsequent request of the Secretary of the Interior, the parties to the Memorandum of Understanding agreed to advance the completion date of the treatment plant improvements to December 1974, provided adequate federal assistance in the form of construction grants is made available.

Expansion of the plant will proceed in three phases, each phase increasing the level of treatment until the required ultratreatment is reached. The three phases are:

Phase I - additional primary tanks and sludge processing facilities

Phase II - additional secondary facilities

Phase III - advanced waste treatment

Interim measures, such as the use of special chemicals and mechanical devices, will be investigated and, if proven to be beneficial, instituted to improve the quality of all plant effluents in the area at the earliest possible date. A list of promising interim controls is contained in the Memorandum of Understanding. A most important feature of the Memorandum is the provision requiring the suburban governments to immediately proceed to acquire a plant site to accommodate flows beyond the 309 MGD level.

DESCRIPTION OF EXISTING AND PROPOSED FACILITIES

A. Existing Facilities

The D. C. Water Pollution Control Plant is located at the southern tip of the city in an area known as Blue Plains. The plant site (159 acres) is bounded on the north by the Naval Research Laboratory, on the east by the Anacostia Freeway (Route I-295), on the south by Oxon Bay and the Potomac River, and on the west by the Potomac River.

Present facilities provide primary and secondary sewage treatment (for a flow of approximately 253 MGD in FY 1970) through the following sequence of treatment processes: prechlorination, aerated grit chambers, primary settling, activated sludge (modified or short-term aeration), secondary settling, and post chlorination. Excess sludges are anaerobically digested, vacuum filtered, and air-dried prior to final disposal.

The number and sizes of the various treatment units are as follows:

1. Primary sedimentation tanks: These consist of 16 circular tanks, each 106 feet in diameter.

2. Aeration tanks: This portion of the plant consists of four tanks, each 460 feet long and 120 feet wide.

3. Secondary sedimentation tanks: There are 12 of these, each 80 feet wide and 250 feet long.

These major unit processes plus a variety of smaller facilities such as pumping stations, grit chambers, administration building, elutriation tanks, thickening tanks, and a sludge dewatering building occupy a total of approximately 75 acres. The sludge yards occupy an additional 40 acres.

B. Proposed Facilities

1. Primary sedimentation: To accommodate 309 MGD, plus "excess flow," 20 additional tanks, each 120 feet in diameter, will be added.

2. Aeration tanks: Although the design of these units is not complete, it is expected the additional rectangular aeration tanks will have a total water surface area of approximately 70,000 square feet.

3. Secondary sedimentation tanks: The design of these units is not complete. However, it is expected the additional rectangular tanks will have a total water surface area of approximately 350,000 square feet.

4. Sludge processing building: This facility will be 600 feet long and 280 feet wide. A 300 foot section of the building will be 91 feet in height, with a stack height of 114 feet above grade. Sludge will be thickened, dewatered and incinerated. The incinerator will be equipped with a high energy venturi scrubber and after burners to provide for particulate removal, destruction of condensible gases, and plume attenuation. The gaseous effluent will be invisible and odorless and will comply with applicable air quality control

standards and regulations. This large building will be so sited that its major axis will be generally parallel to the Potomac River and thus have a minimum impact on the visual approach to the city, both from the river and I-295.

5. Advanced waste treatment: The advanced waste treatment facilities will consist of units for phosphorous removal, nitrogen removal, and additional removal of biochemical oxygen demand. While these units have not been designed, they will resemble the primary and secondary treatment units. There will be no ammonia stripping towers, as present plans contemplate the use of nitrification-denitrification for nitrogen removal.

Along with a chlorine contact chamber, aerated grit chambers, and other ancillary facilities, the new plant will occupy a total of 165 acres.

As a direct result of plant expansion and improvement, two important sources of odor will be eliminated. These are:

1. Aerated grit chambers: The new grit chambers will be fully enclosed and incorporate ozone generating equipment for destruction of odors.

2. Sludge storage yard: Sludge storage yards will be eliminated and all sludge will be incinerated in an ultramodern sludge incinerator designed to meet the latest air pollution control standards.

III. Environmental Considerations

1. Probable impact on the environment

a. Primary consequences

The proposed improvements are an absolute necessity if the District is to achieve the water quality goals set forth in the water quality standards approved by the Secretary of the Interior in January 1969. The goals are defined by the various water quality criteria intended to protect future uses of the Potomac River and its tributaries in and below the District of Columbia. Among these uses are "fish and wildlife propagation."

The present state of the Potomac River makes it a suitable habitat only for scavenger fishes and a few of the hardier game fishes. Although the upper estuary provides spawning grounds for several anadromous species, several large fish kills have occurred in the fall of the year, presumably as a result of low dissolved oxygen content during the seaward migration of the young fry. An important influence on dissolved oxygen content of the upper estuary is the effluent from the District's plant. The proposed improvements will effectively deal with this problem. This can be demonstrated by the fact that the quantity of oxygen demanding substances (biochemical oxygen demand) discharged from the plant will be reduced from approximately 100,000 lbs per day in 1970 to less than 13.000 lbs per day in 1975. During this period, the plant flow will increase from 253 to 309 MGD, requiring an increase in plant efficiency from about 70% to 97%. To state it another way, the oxygen demanding substances in the plant effluent will be reduced from 30% to 3% of the incoming.

b. Secondary consequences

The proposed work is not expected to significantly affect population distribution or concentration even though land use plans in the tributary area were based on expansion and upgrading of the facility. Because the D. C. plant will not be expanded to the previously assumed 419 MGD capacity, an additional plant or plants will be constructed in suburban Maryland by the Washington Suburban Sanitary Commission or other appropriate agency.

2. Adverse environmental effects which cannot be avoided

No adverse environmental conditions are envisioned. Compared to the present facility, the improved plant will be vastly superior in its overall impact on the environment. In addition to the primary goal of wastewater quality improvement, the present offensive sights and odors will be eliminated. Other favorable factors to be considered are:

a. Reduction in the planned plant capacity from 419 to 309 million gallons per day.

b. Reduction in the planned size of the plant as a result of (a) above from approximately 210 acres to 165 acres.

c. The Department of Sanitary Engineering will cooperate with the National Park Service in the latter's efforts to achieve a river front park along the Potomac River side of the site. Except for the sludge handling building, low profile type tank structures will be used. As a result of research conducted by the District and the Water Quality Office of the Environmental Protection Agency, a determination has been made that ammonia stripping towers will not be used in the nitrogen removal process. Additional aesthetic considerations, as outlined in the report of the District Public Improvements Committee of the National Capital Planning Commission dated February 4, 1971, will be evaluated.

3. Alternatives to the proposed action with evaluations thereof

There are no viable alternatives to the proposed improvement program. Under the terms of the Potomac River Enforcement Conference, the District is required to proceed with the plant expansion as outlined above. The need for bigger and better water pollution control plants has been a subject of the Enforcement Conference since 1957. More recent discussions of the justifications for the proposed construction is amply described in various documents, among which are: "Water Quality Criteria, Implementation and Enforcement Plan, District of Columbia, Potomac River and Tributaries," "Potomac River Water Quality, Washington, D. C. Metropolitan Area," and the Proceedings of the Potomac River Enforcement Conference sessions held in May and November of 1969 and May and December of 1970. Consequently, nothing can be added, in this statement, to the conclusions reached within the framework of the Enforcement Conference, namely, that the District must expand and improve the D. C. Water Pollution Control Plant.

4. Relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity

The site in question, already occupied by a sewage treatment plant, can only benefit from the proposed construction. While the long-term effects of the facility on the site itself are not amenable to measurement, the long-term beneficial effects on water quality and the usefulness of the river are obvious and measurable. Improving the water pollution control plant now can only provide benefits for the future.

5. Irreversible and irretrievable commitments of resources

The only resource committed is the land upon which the facility is located. Construction will be limited to the existing site, which is almost completely occupied by treatment facilities and sludge storage areas. A small amount of construction work, such as the erection of docking facilities, will be conducted along the shore of the Potomac River. No irretrievable commitments of resources will be involved. In fact, the huge quantities of excavated material may be used to restore another natural resource -- Dyke Marsh. Although not envisioned, it is conceivable that, at some time in the distant future, if completely new sewage disposal technology makes the proposed plant obsolete, the site could be restored to its natural state by the removal of structures.

6. Objections to the project

There now are no objections to the project other than the request for further consideration of aesthetic values, as detailed in the above mentioned report of the District Public Improvements Committee of the National Capital Planning Commission. The previous objection of the Department of the

Interior to the request for filling in 51 acres of Potomac River mud flats has been resolved by reducing the proposed installed capacity of the plant from a projected 419 MGD to 309 MGD. If anything, there has been, both within the various federal, state, and local governmental entities and the general public, a strong expression of desire for the proposed construction.

Conclusion

In considering (1) the environmental impact of the proposed action, (2) any adverse environmental effects which cannot be avoided, (3) alternatives to the proposed action, (4) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and (5) irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented, the Department of Sanitary Engineering, Government of the District of Columbia concludes that the proposed expansion and improvement of the D. C. Water Pollution Control Plant is in conformance with the purposes of the National Environmental Policy Act of 1969, which are: "To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the nation..."

AS/vdm
2/16/71

SUPPLEMENT TO ENVIRONMENTAL STATEMENT D. C. WATER POLLUTION CONTROL PLANT EXPANSION 1971-1974

I. Purpose

This statement is intended to supplement Section III. Environmental Considerations, paragraph 3. Alternatives to the proposed action with evaluations thereof.

In selecting incineration as the disposal method for the sludge process considerable investigation was made of other alternatives. In 1968 an extensive study on barging sludge to sea was completed and considered as a viable method, however the trend of ecology has now precluded this as a possibility. Such methods as pumping sludge to drying beds for which the vast open area is needed and is not available, pumping sludge to farm land for irrigation and fertilizing where the only farm land is far removed from the site and in another State and permission to cross the State lines would never be granted, were studied and abandoned as not practical. Further the Federal requirement to remove phosphorous from the plant effluent has necessitated drastic sewage treatment process changes which will eventually eliminate the present sludge digestion stage. This means that raw sludge must be handled and disposed of and thus there is no viable method of disposal other than incineration.

EFFECTS OF SHORELINE ADJUSTMENTS AND DREDGING ON THE ECOLOGY OF THE POTOMAC ESTUARY

I Purpose

This statement is intended to supplement the environmental statement titled, "D. C. Water Pollution Control Plant Expansion, 1971 to 1974" and dated February 16, 1971.

II Description of the Area

From its traditional source on the North Branch in West Virginia, where Thomas Lord Fairfax's surveyors set an inscribed stone in 1776 to mark the northwestern corner of his holdings, to its mouth at Chesapeake Bay, the Potomac River drains an area of some 15,000 square miles. Approximately 12,000 square miles lie above the fall line, where the river flows in a predominately natural state. Below the fall line, which approximates the northern boundary of the District of Columbia, the river is an estuary; it ebbs and floods in response to the mechanical action of the ocean tides. As will be seen in the following discussion, the transition from a free flowing stream to a tidal estuary is an important factor in Washington's special water quality management problems. As a matter

MAY 24 1971
FWQA

of fact, a cursory review of the history of the Washington area would reveal that the navigable quality of the Potomac estuary is precisely what attracted the early settlers. Over the years, the combination of rapid population growth and the estuary's limited capacity for transporting wastes has resulted in the present unsatisfactory condition of the river.

Contrary to popular notion, not all estuaries are saline throughout their length. The Potomac estuary is among those which are not. In fact, the upper third of its 115 mile length, from about Quantico to Little Falls, is considered to be fresh water. (While the head of tide is officially recorded at Chain Bridge, Little Falls is by its very nature a convenient line of demarcation of tidal influence.) Because it is fresh water this stretch of the estuary has an ecology unlike the middle and lower estuary and Chesapeake Bay. It should also be noted that the lower or downstream boundary of the fresh water zone coincides roughly with the lower boundary of the Washington metropolitan area. It is into this zone that virtually all of the metropolitan area's wastewaters are discharged. Also, the roughly 2.5 million tons per year of sediment which flushes out of the upper 12,000 square miles of the basin is deposited in the fresh water zone. Along with the sediment, other undesirable components of land runoff such as nitrogen, phosphorus, other agricultural chemicals, and bacteria flow into the Potomac River to be transported into the upper estuary. The interaction of these and other factors has culminated in the estuary's present condition.

As noted above, the virtual absence of salt in the upper estuary sets it apart, from an ecological point of view, from the saline zones. For example, the upper estuary provides spawning grounds for certain anadromous species of fishes. However, poor water quality (severe depression of dissolved oxygen) has resulted in several spectacular fish kills during the seaward migration of the young fry. Another factor which may be involved in the destruction of fishes is the heavy suspended silt load in the estuary. This material is capable of causing fish to suffocate by clogging their gills.

III Effects of Shoreline Adjustment and Dredging

The proposed future water use for which the highest level of water quality is required is water contact by humans (swimming, wading, water skiing, etc.). If water quality can be improved to permit this use, all other planned uses will be protected. Thus, one of the main justifications for construction of an improved D. C. Water Pollution

Control Plant is to improve water quality to the point where human contact will be safe. If this level of quality can be achieved, fish and wildlife productivity will be enhanced.

It has been competently determined that construction of a water pollution control plant capable of meeting established water quality requirements will necessitate certain alterations of the existing shoreline and river "bottom". In making this determination, it has been established that the logistics of this vast and complex construction project will be such that the proposed construction will be feasible only if their irregular shoreline is adjusted and barge docking facilities are provided. The shoreline adjustment and the docking facilities are needed to keep the cost of the project within reasonable limits. As far as logistics are concerned, the quantities of construction materials and excavation spoil envisioned are so vast, that, without the ability to use water transportation, the feasibility of the entire project is open to question.

Recognizing that any alteration of the natural environment may have undesirable consequences, such undesirable consequences must be viewed against the overall background of the environmental benefits which may result from the proposed alterations. In this case, it has been clearly established that the proposed construction is essential for improvement of environmental quality. Furthermore, it is recognized that the proposed Water Pollution Control Plant improvements will have a profound benefical effect on the aquatic environment. It is the position of the Department of Sanitary Engineering, Government of the District of Columbia that the proposed dredging and shoreline adjustments are an integral part of the development plan. Consequently, the proposed alterations must be viewed as a trade-off in the process of overall improvement of the environment, with the repugnant alternatives of not constructing the plant or doing so at greatly increased cost. With regard to the latter alternative, it must be emphasized that the current estimated cost of the proposed construction ($360 million), may not be within the financial grasp of the participating units of government.

A brief description of the proposed dredging and shoreline adjustment is in order. To permit barges to reach the plant site an entrance channel, turning basin, and dock are proposed. Because of existing shallow water, the entrance channel and turning basin must be dredged. In the area covered by the proposed turning basin, the existing water depth at mean low water varies from 0 to approximately 1.5 feet. The overall dimensions of the turning basin are approximately 1900 feet long by 650 feet wide. The turning basin will be connected to the navigation channel by an entrance channel measuring approximately 200 feet wide by 2200 feet long. The entrance channel and turning basin will be connected by a transition section approximately 600 feet long by 400 feet wide. Except for a small area immediately adjacent to the existing navigation channel, the existing water depth at mean low water is generally less than 2 feet. Under this proposal, the previously described area will be dredged to a uniform depth of 16 feet below mean low water. The material to be removed may be described as fine organic mud having no apparent value either to aquatic organisms or man. The previously mentioned dock will be approximately 1200 feet long by 75 feet wide and will be adjacent to the turning basin.

The adjusted shoreline will be generally coextensive with the dock. The dock will be constructed over the water and will not involve the placement of fill material.

In an area of sound ecology, the proposed dredging work could result in some temporary detrimental effects on aquatic organisms. However, the area under consideration is a normal habitat only for a few of the hardier game fishes and certain rough or trash fish. Also, it is felt the already silt laden condition of the Potomac estuary will not, except on a very short term basis, be adversely affected by the small amount of dredging proposed. It should also be noted that dredging for purposes of maintaining a navigation channel is periodically conducted in the vicinity of the area in question. Consequently, any possible adverse effects which might result from the proposed dredging will be transitory in nature and mild in degree. The beneficial ecological effects of the improved wastewater treatment facility will greatly outweigh the questionable ecological detriment of filling in this small area. An added benefit will be the restoration of Dyke Marsh using material excavated during plant construction.

IV Public Opinion

At the several public sessions of the Potomac River Enforcement Conference, there was not a single objection to the proposed construction. These sessions were attended by numerous conservation minded individuals. In fact, at one such session, the Executive Director of the Interstate Commission on the Potomac River Basin stated: "In this particular instance, I have come to the conclusion that this would be probably the highest use for this particular area, that this is, in fact, a mud flat, . . .".

AS:AM

February 26, 1971

ENVIRONMENTAL STATEMENT
FOR THE
PROPOSED SLUDGE PROCESSING FACILITIES

I. Purpose:

This statement is intended to supplement the environmental statement titled, "D. C. Water Pollution Control Plant Expansion, 1971 to 1974," dated February 16, 1971.

II. Architectural Concept:

The architectural expression of the building defines the basic functions of the operation in simplicity of mass and form. The basic concrete facing panels surround the functions to encompass the whole in clean, horizontal lines, but broken by the introduction of vertical ribs in the main entranceway, thereby eliminating that which might be monotonous. The entranceway and the vertical ribs will project shadows which will be ever-changing as the sun spans the horizon.

The incinerator function rises out of the basic structure in a rectangular shape and its color shall be blending with the base form. The building is located far enough from the water line to be properly landscaped with grass, shubbery and trees to blend it in naturally with the proposed park strip along the Potomac River. The building will be appropriately night-lighted.

It is believed that this building, architecturally speaking, will be in harmony with the new architectural designs for this type of building in the

Washington area and will enhance this part of the coastline of the Potomac River.

III. Air Pollution Prevention:

The sludge incinerator complements the entire solids processing building air pollution control by providing a totally integrated system of ventilation, exhaust, combustion air and exhaust gas treatment in a manner designed to contain all odors and uncleaned products of the combustion process within the structural enclosure.

Ventilation exhaust air from the entire building is collected in an equalizing plenum from which the furnace combustion air is drawn in order that odors, if any, entrained in the ventilation air will be destroyed in the combustion process. Additional combustion air which may be required will be drawn into the system through a "one way" connection to a stack on the equalizing plenum above the incinerator roof level. In the event that the ventilation exhaust gas quantity exceeds the required furnace combustion air quantity, the excess will be diverted to one of the heat exchanger-fume furnaces where odors, if any, will be destroyed by direct flame contact burning with natural gas.

The exhaust gas from the sludge incineration process will be cooled to approximately 200° F. by evaporative cooling using filtered and polished treatment plant effluent water. Upon leaving the evaporative cooling section, the cooled exhaust gas will be cleaned in a high energy venturi scrubber of approximately 20 inches water gage pressure drop to remove dry dust particles and further condense gaseous compounds in the exhaust. The cleaned exhaust gas will then pass into a sub-cooler where further condensing of gaseous compounds and water vapor will occur in order that there will be a minimum quantity of water vapor and exhaust gas for further treatment. All condensed water vapor and scrubber effluent from the wet cleaning portion of the process is collected and routed to the head of the waste water treatment plant for cleaning in the normal waste water process.

The sub-cooled and scrubbed exhaust gases are normally discharged to the atmosphere at comparable installations in this country. However, under some conditions of temperature and humidity a white plume of water vapor will be evidenced if no further treatment is applied. In addition, the District of Columbia Department of Sanitary Engineering has sponsored independently performed tests on exhaust gases from similar furnaces at another installation in the Midwest and has determined that further treatment is required to remove a small quantity of hydrocarbons entrained in the scrubbing and sub-cooling portion of the process. Further, the location of the plant near the geographic boundary with the State of Maryland created a desire to meet that state's new and restrictive air pollution standards, if technically possible.

For these reasons the scrubbed and cooled gases are passed through a direct flame contact fume furnace designed to burn any carry-over gaseous

:ompounds from the exhaust and reheat it to a point where no visible water 'apor will be evidenced at the point where the purified gases are emitted to he atmosphere where they will quickly mix with the ambient air.

There has been no by-pass capability provided in the air pollution :ontrol system so that it is impossible to operate the furnaces without having he exhaust gases pass through the entire air pollution control equipment ırrangement. An emergency relief has been provided for the protection of he plant personnel and equipment under extreme emergency conditions to prevent an in-plant catastrophy until normal shut-down procedures can be ıccomplished. It is not expected that this emergency relief will be required ıny more frequently than the emergency relief valve on a normal domestic ıot water heater, but good judgment and proper design require that it be provided.

The system described is costly to install and will be costly to operate because of the power and fuel requirements. It represents the maximum limit of presently proven air pollution control technology and is expected to meet both the State of Maryland and the proposed District of Columbia emission standards for the process when tested with the procedures recommended by the Air Pollution Office of the Environmental Protection Agency.

IV. Water Pollution Prevention:

The entire quantity of evaporative cooling and scrubber water required in the incineration of the sludge and the exhaust gas cleaning process described above will be directed to the head of the plant where it will receive the same treatment as the standard plant influent. The water discharged from the sub-cooler will be introduced into the plant effluent sewer at a point where it will be mixed thoroughly before the sub-cooling process, no additional pollution load is anticipated from the mixing of the sub-cooler effluent with the normal plant effluent.

V. Thermal Pollution:

The volume of process water from the cleaning and sub-cooling process associated with the sludge incineration will have a minor effect on the overall plant effluent temperature. If the total heat input is considered added to the normal plant effluent, it is anticipated that the total effluent temperature will be raised approximately 3°F. However, the dirty portion of the process water is returned through the plant cleaning process and it can be expected to receive some cooling. It is reasonable to expect that only the sub-cooler discharge heat will affect the normal plant effluent temperature. This effect is estimated to raise the effluent temperature approximately 2°F. before it enters the river.

VI. Noise Abatement:

There is no equipment required by the sludge incineration process which offers any unusual noise potential and the normal equipment and operating noise will be contained in the building. The air-conditioned and enclosed operating room will offer protection for the plant operators from even the normal process equipment noise within the building.

APPENDIX J

TEMPORARY ENVIRONMENTAL CONTROLS REQUIRED OF DISTRICT OF COLUMBIA CONTRACTORS

SECTION 1B

TEMPORARY ENVIRONMENTAL CONTROLS

I. SCOPE

A. The Contractor shall provide and maintain temporary measures to control erosion, dust and water pollution. These temporary measures shall be coordinated with permanent project features to assure economical, effective and continuous environmental control.

B. any other temporary environmental control measures required due to Contractor negligence, carelessness or failure to install permanent controls as scheduled shall be at Contractor expense

C. should the Contractor fail to promptly provide needed control measures to the Engineer's satisfaction, this work will be done by others and the cost thereof plus 10 percent deducted from payment to the Contractor

D. prior to start of applicable work, the Contractor shall submit an approved schedule showing control as applicable for clearing, excavation and grading, plus control on haul roads and borrow pits and a plan for disposal of waste materials

E. the Contractor shall provide prompt temporary measures to prevent erosion. Such work may involve the construction of temporary berms, dikes, dams, sediment basins, slope drains, and use of temporary mulches, mats, seeding or other control devices or methods as approved. Cut slopes shall be seeded and mulched to the extent practicable as the excavation proceeds. The Engineer may limit the surface area of exposed erodible material

F. the Contractor shall remove temporary environmental control features as needed and incorporate permanent control features into the project at the earliest practicable time

II. SITE PREPARATION

A. grade and scarify as needed and feasible to permit use of equipment

B. scarify parallel to contours

C. install diversion and desilting devices

1. interceptor ditches

2. berms, terraces

3. erosion stops or basins

III. SEEDED PREPARATION

A. apply

1. pulverized dolomitic limestone, 2,000 lb. per acre

2. 0-20-0 superphosphate or equivalent 700 lb. per acre

3. 10-10-10 fertilizer or equivalent 1,000 lb. per acre

B. harrow or disk lime and fertilizer into soil parallel to contour to depth of 2 - 3 in. and till to uniform fine seedbed

IV. SEEDING

A. Kentucky 31 tall fescue 60 lb. per acre

B. apply uniformly

1. with cyclone seeder, drill, cultipacker seeder, or hydroseeder (slurry includes seed and fertilizer)

2. on firm moist seedbed

3. along contour

C. compact surface following seeding

1. with cultipacker, roller, or light drag

2. normal soil cover 1/4 to 1/2 in.

V. <u>MULCHING</u>

A. immediately after seeding

B. uniformly with unweathered small grain straw

1. 1-1/2 to 2 tons per acre

2. wheat straw preferred

3. oat straw excluded

C. asphalt mulch tie down

1. liquid asphalt

a. RC-250 or MC-250

b. apply at 0.1 gallons per square yard

2. emulsified asphalt

a. RS-2 or MS-2

b. apply at 0.04 gallons per square yard

3. apply so area has uniform appearance

VI. <u>MAINTENANCE</u>

A. irrigate if required

1. until firmly established

2. particularly if seeding is late in planting season, abnormally dry or hot

B. repairs

1. inspect for failures
2. reseed as required

C. mowing
1. not required in some areas
2. not closer than 4 in. in other areas

APPENDIX K

CONDITIONS FOR TEMPORARY USE OF LAND AS CONTRACTOR'S STORAGE AREA

PREPARED BY THE NATIONAL PARK SERVICE

The Contractors will be permitted to use a portion of the storage area as designated by the Engineer. The storage area is located between South Capitol Street, Oxon Run, and the District of Columbia line and belongs to the National Park Service of the U. S. Department of the Interior. The District has obtained a permit from the National Park Service for the use of the storage area. The Contractors shall comply with all conditions of the permit which are as follows:

> "The District of Columbia hereby agrees to be fully responsible for the management, protection, use and safety within the park areas involved in this authorization until the work is completed, inspected, and the park areas are accepted, in writing. The District of Columbia hereby agrees, subject to the availability of appropriations, to accept responsibility and assume liability for any and all claims arising through tort actions which result from incidents directly or indirectly connection with the work performed. To the extent that work is performed by non-governmental persons or organizations, the District of Columbia shall require such persons or organizations to provide evidence of adequate public liability and property damage insurance in a form to protect the interests of the United States.
>
> In the work described, the District Government will require employees and contractors to exercise all normal and reasonable safety precautions.
>
> All reasonable precautions shall be exercised to protect park property. The work and storage area shall be enclosed with solid board fencing, 8 feet high, painted a neutral shade of green, and placed 8 feet inside the property line. The entrance gate to the area shall be at the dead end of Southern Avenue, west of South Capitol Street. Vehicles shall not be parked on the grass outside of the fenced enclosure.
>
> All disturbed areas and park facilities damaged by this work shall be restored to the satisfaction of the Superientendent, National Capital Parks-East, National Park Service. Disturbed grass area shall be fine graded, topsoiled, and seeded, with a mixture of 70 percent K-31 and 30 percent Kentucky blue-grass seed.

Permittee shall comply with all instructions issued by the U. S. Park Police and other official representatives of this office.

Barricades, fences, signs, flares, lanterns, and other suitable devices necessary for employee and public safety shall be provided and adequately maintained.

All trash, debris, and litter left at the site by workmen shall be removed by permittee. Trash baskets shall be maintained within the enclosure.

Vehicles shall enter and leave the work and storage area at Southern Avenue and South Capitorl Street. Traffic regulations shall be complied with and there shall be no interference with traffic during the rush hour periods of 7 to 9:30 a.m. and 4 to 6:30 p.m. daily.

A copy of this letter shall be available at the site during occupancy of the area. An approved informational sign shall be displayed during use indicating the identity of the permittee responsible for the work on parkland. The permittee shall notify the Division of Permits and Inspections prior to commencing and when the use is completed and the area ready for inspection."

APPENDIX L

PROPOSED POLLUTION PREVENTION REGULATIONS FOR VESSEL AND OIL TRANSFER FACILITIES, U. S. COAST GUARD, DEPARTMENT OF TRANSPORTATION

DEPARTMENT OF TRANSPORTATION

Coast Guard

[33 CFR Parts 154, 155, 156]

[CGFR 71-160]

POLLUTION PREVENTION

Vessel and Oil Transfer Facilities

The Coast Guard is considering amending the pollution regulations by adding three new Parts, 154, 155, and 156, to Subchapter O of Title 33, Code of Federal Regulations, to govern the operation of facilities and vessels and the transfer of oil to or from certain vessels to prevent the discharge of oil.

Interested persons are invited to participate in the making of the proposed rule by submitting written data, views, or comments regarding the proposal to the U.S. Coast Guard (CMC), Washington, D.C. 20590. Communications should identify the notice number, CGFR 71-160, any specific wording recommended, reasons for any recommended change, and the name, address, and organization, if any, of the commentator.

The Coast Guard will hold a public hearing on February 15, 1972 at 9:30 a.m. in Conference Room 2230, Department of Transportation, Nassif Building, 400 Seventh Street SW., Washington, DC. Interested persons are invited to attend the hearing and present oral or written statements on this proposal.

All communications received before February 21, 1972, or at the hearing, will be fully considered and evaluated before final action is taken on this proposal. Copies of all written communications received will be available for examination in Room 8234, Department of Transportation, Nassif Building, 400 Seventh Street SW., Washington, DC, both before and after the closing date for the receipt of comments. The proposal contained in this document may be changed in the light of the comments received.

On April 3, 1970, the President signed the Water Quality Improvement Act of 1970 which amended the Federal Water Pollution Control Act (FWPCA). Section 11 of this Act, concerning control of pollution by oil, states in part, "The Congress hereby declares that it is the policy of the United States that there should be no discharge of oil into or upon the navigable waters of the United States, adjoining shorelines, or into or upon the waters of the contiguous zone."

At the NATO Committee on the Challenges to Modern Society (CCMS) meeting in Brussels in November of 1970, Secretary of Transportation John Volpe proposed "by mid-decade (1975) a complete halt to all intentional discharges of oil and oily wastes into the oceans by tankers and other vessels". This goal, modified to include "other noxious substances", has been established as the major objective of the Oil Pollution Conference to be held in 1973 under the auspices of the Intergovernmental Maritime Consultative Organization (IMCO).

A review of pollution incident statistics and the progress of vountary industry programs since amending the FWPCA indicates that regulatory action is necessary to meet our stated goals. Therefore, acting under the authority of section 11(j)(1) of the FWPCA, which provides in part: "* * * the President shall issue regulations * * * (C) establishing procedures, methods, and requirements for equipment to prevent discharges of oil from vessels and from onshore facilities and offshore facilities, and (D) governing the inspection of vessels carrying cargoes of oil and the inspection of such cargoes in order to reduce the likelihood of discharges of oil from such vessels in violation of this section," the Coast Guard is considering regulations in four general problem areas. These are: tank cleaning and ballast; bilges, leaks, and fueling spills; vessel casualties; and facility (terminal) or oil transfer operations.

The tank cleaning and ballast discharge problem principally occurs in international waters and, due to the relative fleet sizes, results primarily from vessels other than U.S. flag vessels. This problem is under active consideration by the Intergovernmental Maritime Consultative Organization (IMCO) and can only be resolved by international agreement. Therefore, in developing these regulations, consideration of the deliberate discharge problem has been limited to implementing the 1969 amendments to the Convention for Prevention of Pollution of the Seas by Oil, 1954, as amended. However, it should be noted that shore reception of dirty ballast appears to be the only feasible solution for vessels not able to use load-on-top procedures. Comments on making a mandatory requirement for the reception of slops and dirty ballast by terminals are solicited.

Although the United States has ratified the 1969 amendments, they will not come into force internationally for some time. Implementation of these amendments on a worldwide basis would reduce the deliberate discharge of oil to the seas by nearly 90 percent. Although drafted in regulatory form, the 1969 amendments cannot be promulgated until legislation is enacted by the Congress modifying the 1961 Oil Pollution Act which implemented the Oil Pollution Convention.

The problem of vessel casualties can be divided into collisions (vessel to vessel), collisions (vessel to object), groundings, and other items such as fire and explosions, which are primarily safety problems with pollution as a secondary consideration. The problem of fire and explosions is under continuous review and analysis and, therefore, special efforts in this area for pollution prevention are considered unnecessary.

The external (to the vessel) navigational and operational control of vessels to prevent collisions and groundings is being considered by Congress in the Port Safety Bill H.R. 8140 S. 2074 et al. No action in this regard is presently proposed in the matter of general maritime safety. It is emphasized here, and will become further apparent in this discussion, that maritime safety and pollution prevention are intimately related and cannot be separated. The proposed regulations do consider the structural adequacy of the vessel to withstand specified limited energy operational groundings, rammings, and collisions. If operational control proves inadequate, then vessel design will be reconsidered.

The maneuvering characteristics of vessels are under study internationally. It is not deemed possible at this time to relate and resolve the contribution to pollution of the powering and maneuvering characteristics of tugs and barges in our inland and coastal waterways. This potential problem will be further studied and, should a problem be determined to exist, appropriate action will be taken.

This notice, then, stresses efforts to reduce oil pollution from bilge discharges, leaks, spills, and terminal operations which result in the discharge of oil into the ecologically sensitive inland and coastal waters of this country. In developing this proposal, the existing body of laws, regulations, policy, and internal procedures were examined.

An accompanying notice of proposed rule making revises Chapter I of Title 46 to specify additional examination and licensing requirements for U.S. seamen and to modify the inspection and drydocking requirements for U.S. vessels. In addition, changes will be proposed in the near future to revise Chapter I of Title 46 to more clearly define the requirements concerning the discharge of liquid ballast required for stability.

The definition of oil used in this proposal is that contained in the act and includes the lighter fractions of the petroleum distillation process such as kerosenes, gasolines, and napthas.

Part 154 would contain regulations governing large onshore and offshore facilities engaged in the transfer of oil to and from vessels. A large facility is one which transfers oil to or from a vessel which has a tank capacity for that oil of 10,000 U.S. gallons or more. These large facilities will remain subject to the safety requirements of 33 CFR Part 126. These regulations would not apply to small vessel fueling operations such as marinas using insert automatic fill nozzles, typical of gas station operations. Also, they would not apply to such operations as a large vessel taking on lube oil at a dry cargo terminal even though the vessel may have a fuel oil capacity greater than 10,000 gallons.

Subpart A of Part 154 contains the general applicability clauses, definitions, and the basic requirement that no person may engage in oil transfer operations to or from a vessel after April 3, 1973, without or in violation of an oil transfer permit issued by the U.S. Coast Guard. Although 33 CFR Part 126 presently requires all facilities handling hazardous products to be a "designated waterfront facility," there is no formal designation. A formal permit system will result in a current inventory of all oil handling facilities and thereby enable inspection and control of such facilities to determine the adequacy of the physical plant, its personnel, and procedures.

Subpart B would contain the details of eligibility, procedures, and requirements to obtain an operating permit. The basis of permit issuance will be an inspection of the facility and an evaluation of the procedures used for oil transfer operations. Each facility must provide an operations manual and operate in accordance therewith.

A major eligibility requirement is that the owner or operator must in accordance with section 21(b) of the Act provide certification from the State that the facility meets or will not violate the State water quality standards.

The April 3, 1973, date is selected to coincide with the effective date of section 21(b) of the Act and thereby avoid any need to reissue permits issued prior to that date.

Facilities in operation on the effective date of these regulations must submit their applications to the Coast Guard prior to November 1, 1972, to allow processing and issuance of the permit prior to April 3, 1973.

Since each oil transfer facility is unique, the required operations manual provides a means for the permitholder to inform his personnel and the Coast Guard how he plans to transfer oil. The manual specifies the number of terminal personnel required for various operations; the setup of piping systems, communications, alarms, controls, and lighting; the location of personnel during operations and other information or procedures pertinent to the safe transfer of oil in bulk. The manual also must contain emergency procedures for spill response.

Subpart C of Part 154 would contain facility equipment requirements. Design features of the hose, piping, loading arms, and couplings would be specified. Each facility would be required to have a small discharge containment system in work areas subject to routine operational discharges such as connections, hose drainage, and coupling points. Equipment for containing discharges on the water would also be required.

Subpart C of Part 154 would require that for vessel loading operations, the facility provide a means independent of the normal operating procedure to stop the flow of oil. Primarily, this requirement is intended as an emergency procedure in the event of an overfill, but is equally applicable to a loading arm or hose failure. The point of flow cut-off must be located to minimize the amount of oil which will drain from the transfer systems. In certain cases where the facility manning and available dedicated communications are adequate, this emergency shutdown system may be a communications system if acceptable to the Captain of the Port.

The facility would be required to provide a ship-terminal communications system. The regulation is very general because of the wide variation in facilities and thus permits each communications system to be custom designed to the facility. The actual system to be used will be authorized under the permit/operating procedures of this part.

Section 154.570 would require the facility to be adequately illuminated for oil transfer operations at night. The illumination standard given is from the American Petroleum Institute Recommended Practice for Oil Terminals, API RP 540 dated 1959. It is equivalent to industrial standards for similar activities. This section would also require the facility to provide a similar degree of lighting at work areas of barges engaged in transfer operations at the facility.

The regulations would not require a personnel shelter for each facility. However, a shelter would be a consideration to be covered in the operating manual to assure the presence of personnel during the oil transfer.

Subpart D, Facility Operations, would contain general requirements for the operation of an oil transfer facility.

Requirements would be given for the designation and the qualification of facility personnel as person in charge of oil transfer operations. This designation is made by the facility permit holder based upon the designee's knowledge, training, and experience. The designation is valid only at specified facilities and is not generally transferable.

Part 155 would contain regulations governing vessel design and operation to minimize any loss of oil from accident or from normal operations and would also contain regulations for vessels engaged in oil transfer operations analogous to Part 154 for facilities.

This part would apply to all vessels carrying oil as cargo and to all vessels engaged in fueling, oily waste disposal or ballast discharge, and operating in the navigable waters of the United States. These regulations would be applicable to foreign vessels and uninspected vessels. Any limitation on applicability is noted in the particular regulation.

Subpart B would contain the requirements for vessel design and construction.

Section 155.305 would require that all inland barges built after December 31, 1972, be of double wall (sides and fore and aft ends) construction. The purpose of this proposal is to eliminate the myriad of leaks from barges in the inland waterways from routine operational side and end damage. Additionally, this requirement is expected to substantially reduce the oil spills resulting from minor vessel collisions. This type of construction has been required for some years for vessels carrying flammable chemical products and has not created any safety problems such as explosions or fires from flammable vapors in the void spaces.

The regulation would apply to new or "rebuilt" vessels. The term "rebuilt" is recognized to be quite subjective and must be considered in each individual case. The intent is to permit plate renewal or hull repairs to damaged single-skin barges in otherwise good condition, but to prevent circumvention of the regulation applicable to new construction by rebuilding an old vessel and significantly extending the vessel's life. This would then phase out existing single-skin barges. The alternative to this use of "rebuilt" is to specify a termination date for the use of single-skin barges. Comments on the proposed approach and its alternatives are specifically invited.

Section 155.310 requires a deck spill containment system on all vessels capable of handling more than 10,000 gallons of cargo oil. The containment may be either fixed catchments or enclosed deck areas. The required containment volume is related to hose size as an estimate of possible spill size. This system is not intended to prevent a massive discharge but is aimed at the frequent accidental hose drainage, air bubble in the vent, or minor overfill type discharge.

Section 155.330 would require that all vessels operating on the navigable waters or contiguous zone must prior to January 1, 1975, have a means to retain all oily bilge wastes onboard. Such containment may in fact be the bilge itself provided an undue fire or stability problem does not result therefrom. For vessels which have large volumes of oily wastes generated onboard, a holding tank would be necessary. There would be no requirement to hold water such as stern tube leakage onboard provided it would not become contaminated with oil.

All vessels of 100 gross tons or more would have positive acting valves installed in their bilge overboard discharge lines which can be sealed when in the U.S. navigable waters. Vessels less than 100 gross tons would be exempt from the valve requirement but would have onboard a placard concerning the prohibition of oily waste discharge. Additionally, all vessels of 100 gross tons or more would have to install topside fittings for the discharge of oily wastes to shore reception facilities. All vessels which ballast fuel oil tanks would have to install ballast discharge valves and deck fittings as required for bilge systems. Vessels which have a means to process or transfer bilge wastes to a cargo oil slop tank would be exempt from the requirements to have a system to discharge oily wastes to reception facilities.

All vessels of 100 gross tons or more would be required to seal their bilge and ballast overboard valves in the closed position while in the navigable waters. Each operator will provide the seals and seal his own valves and maintain a record of valve usage. This recordkeeping is not considered an administrative burden since the valve seals should not be broken while in U.S. waters.

Section 155.470 would specify that oil not be carried in barge rakes nor forward of the collision bulkhead in vessels required to have such bulkheads. This requirement would apply to all vessels in U.S. waters. The rakes of barges and bows of ships are exposed and subject to damage, and any oil in these forward compartments constitutes an unnecessary hazard to the environment. These requirements are intended to prohibit not only the bulk carriage of oil in these forward compartments but also to prohibit stripping cargo tanks into these compartments.

Subpart C, Part 155 is similar to parts C and D of Part 154 in specifying personnel, equipment, and procedures to prevent oil pollution.

Sections 155.720 through 155.760 would require each vessel capable of transferring 10,000 U.S. gallons or more of oil to have, use, and post oil transfer procedures. These procedures would be reviewed by the Coast Guard during routine inspections of vessel operations and would be conspicuously posted on board the vessel in a language commonly used by the crew. This will provide a ready reference to the crew and local law enforcement personnel to determine if the proper equipment and personnel are being used to safely transfer oil products. The procedure would be applicable to the handling of cargo and fuel oil. The Coast Guard may require the procedure to be revised. Section 155.810 would require that any vessel containing oil in cargo tanks must be attended. This requirement is a result of incidents of vandalism and malicious mischief resulting in barges being cast adrift or valves being opened. This is an extension of the watchman requirement presently specified in 46 CFR 35.05–15.

Part 156 would contain the procedures to be followed on the vessel and the facility while transferring oil to or from vessels with a capacity of 10,000 U.S. gallons or more.

Section 156.110 would specify the conditions under which the person in charge can supervise one or more vessels or act as the person in charge for both the vessel and the facility.

Section 156.120 would specify the conditions which must exist during oil transfer operations. In general, these requirements could be classed as good operating practice. However, items of special interest are:

(a) A person must be present who can fluently speak the common languages used on the supplying and receiving units.

(b) The persons in charge of the two units must hold a conference and agree on procedures and equipment to be used and be aware of applicable laws and emergency procedures.

Section 156.150 would require the persons in charge to follow and complete an extensive declaration of inspection form prior to any oil transfer. The declaration of inspection required is for items directly related to pollution; however, it should be combined with the present declaration of inspection required for safety purposes.

Under Section 11(j)(2) of the Act, any owner or operator of a vessel or an onshore facility or an offshore facility and any other person subject to these regulations who fails to comply or refuses to comply with the provisions of these regulations, shall be liable to a civil penalty of not more than $5,000 for each violation.

In consideration of the foregoing, the Coast Guard proposes to amend Chapter I of Title 33 of the Code of Federal Regulations as follows:

a. By amending Subchapter O by adding new Parts 154, 155, and 156 to read as follows:

PART 154—LARGE OIL TRANSFER FACILITIES

Subpart A—General

Subpart B—Oil Transfer Permit

Subpart C—Equipment Requirements

Subpart D—Facility Operations

AUTHORITY: The provisions of this Part 154 issued under sec. 11(J)(1)(C) of the Water Pollution Control Act of 1956, added by the Water Quality Improvement Act of 1970 (84 Stat. 91). 33 U.S.C. 1161(J)(1)(C); E.O 11548, 3 CFR, 1971 Supp., p. 545; 49 CFR 1.46(m).

Subpart A—General

§ 154.100 Applicability.

This part applies to the operation of each onshore or offshore facility when it transfers oil to or from any vessel that has a capacity of 10,000 U.S. gallons or more for that oil except when it transfers—

(a) Lubricating oil for use onboard the vessel; or

(b) Nonpetroleum based oil to or from a vessel other than a tank vessel.

§ 154.105 Definitions.

As used in this part:

(a) "Commandant" means the Commandant of the Coast Guard or his authorized representative.

(b) "Captain of the Port" means a U.S. Coast Guard officer commanding a captain of the port area described in Part 3 of this chapter or his authorized representative or, where there is no captain of the port area, a district commander of a Coast Guard district described in Part 3 of this chapter or his authorized representative.

(c) "Discharge" includes but is not limited to, any spilling, leaking, pumping, pouring, emitting, emptying, or dumping.

(d) "Officer in Charge Marine Inspection" means a U.S. Coast Guard officer commanding a marine inspection zone described in Part 3 of this chapter or his authorized representative.

(e) "Offshore facility" means any facility of any kind located, in, on, or under, any of the navigable waters of the United States other than a vessel or a public vessel.

(f) "Oil" means oil of any kind or in any form, including, but not limited to, petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil.

(g) "Onshore facility" means any facility (including, but not limited to motor vehicles and rolling stock) of any kind located, in, on, or under, any land within the United States other than submerged land.

(h) "Vessel" means every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water other than a public vessel.

(i) "Person in charge" means a person designated as a person in charge under § 154.710 or § 155.700.

§ 154.110 Permit required.

After April 3, 1973, no person may operate a facility in operations to which this part applies without, or in violation of an oil transfer permit issued under this part or in violation of this part.

Subpart B—Oil Transfer Permit

§ 154.300 Eligibility for permit and amendment.

(a) An applicant is entitled to the issue or amendment of an oil transfer permit if—

(1) The captain of the Port finds, after an inspection of the facility and a review of the oil transfer procedures, that the applicant is properly and adequately equipped and able to transfer oil in accordance with this part and without discharge into the navigable waters.

(2) The applicant has the certification prescribed in section 21(b)(1) of the Federal Water Pollution Control Act, as amended.

(b) At any time within 30 days after receiving from the Captain of the Port a notice of refusal to issue or amend a permit, the applicant or permitholder may petition the Commandant via the Captain of the Port to reconsider the refusal to issue or amend.

§ 154.310 Application for issue or amendment of permit.

(a) Each applicant for the issue of an oil transfer permit under this part must submit his application in writing, accompanied by a copy of the facility's operations manual and a copy of the certification required by section 21(b)(1) of the Federal Water Pollution Control Act, to the Captain of the Port in the area in which the facility is or will be located.

(b) Each application submitted under paragraph (a) of this section may be in any form but must contain the name and address of—

(1) The facility;

(2) The owner of the facility; and

(3) The operator of the facility.

(c) Each operations manual submitted under paragraph (a) of this section must be prepared in accordance with § 154.355 and contain the information in § 154.360.

(d) An applicant for a permit must submit his application at least 60 days before the date of intended operation under this part except that a facility operating before (the effective date of these regulations) must submit its application before November 1, 1972.

(e) An applicant for an amendment to a permit must submit his application at least 30 days before the proposed effective date of that amendment unless a shorter period is allowed by the Captain of the Port.

§ 154.320 Contents of permit.

Each oil transfer permit issued under this subpart contains—

(a) The names of the facility and the owner and operator of the facility;

(b) The facility location;

(c) The oil transfer operations covered by the permit;

(d) Limitations;

(e) The expiration date of the permit; and

(f) Any other item that the Captain of the Port determines is necessary to cover a particular situation.

§ 154.325 Duration of permit.

An oil transfer permit issued under this part is effective for 5 years unless it is surrendered, suspended, revoked, or otherwise terminated.

§ 154.330 Renewal of permit.

Each permitholder desiring to renew its permit must apply to the Captain of the Port for renewal in accordance with the procedures in § 154.310.

§ 154.335 Suspension and revocation of permit.

(a) The Captain of the Port may suspend or revoke an oil transfer permit issued under this part at any time the facility does not meet the requirements of this part.

(b) If an oil transfer permit is suspended or revoked, the holder of that permit shall return it to the Captain of the Port.

§ 154.340 Amendment of permit and operations manual.

The Captain of the Port may, on his own initiative, amend an oil transfer permit or require the permitholder to amend the operations manual if, after inspection he finds that the permit or operations manual is not adequate to meet the requirements of this part.

§ 154.345 Amendment, suspension and revocation procedures.

(a) When the Captain of the Port determines to require an amendment of an operations manual, or to amend, suspend, or revoke an oil transfer permit, he notifies the permitholder, in writing of a date not less than 14 days from the date of the notice, on or before which the permitholder may submit written information, views, and arguments on the amendment, suspension, or revocation. After considering all relevant material presented, the Captain of the Port notifies the permitholder of any amendment required or adopted or of his decision to suspend or revoke the permit or he rescinds the notice. The amendment, suspension, or revocation becomes effective not less than 30 days after the permitholder receives the notice, unless the permitholder petitions the Commandant to reconsider the notice, in which case its effective date is stayed pending a decision by the Commandant.

(b) If the Captain of the Port finds that there is a condition requiring immediate action to prevent the discharge of oil that makes the procedure in paragraph (a) of this section impracticable or contrary to the public interest, he may issue an amendment, suspension, or revocation effective, without stay, on the date the permitholder receives notice of it. In such a case, the Captain of the Port includes a brief statement of the reasons for his finding in the notice, and the permitholder may petition the Commandant to reconsider the amendment, suspension, or revocation.

(c) Petitions to the Commandant must be submitted in writing to the Captain of the Port.

§ 154.350 Waivers.

The Captain of the Port may, by an appropriate provision in or amendment to the permit, waive, in whole or in part, compliance with any requirement in this part if—

(a) Application for the waiver is submitted to the Captain of the Port at least 30 days before operations under the waiver are proposed unless a lesser time is authorized by the Captain of the Port; and

(b) The Captain of the Port finds that an equivalent level of protection of the navigable waters from pollution by oil will be provided by the alternative procedures, methods, or equipment standards to be used by the applicant or permitholder.

§ 154.355 Operations manual: general.

(a) Each applicant for an oil transfer permit must prepare and submit with its application an operations manual that describes—

(1) The means and procedures that the applicant uses to meet the operating rules and equipment requirements prescribed by this part;

(2) The duties and responsibilities of operations personnel in conducting oil transfer operations under this part.

(b) In determining whether the manual meets the requirements of this part, the Captain of the Port considers the size, complexity, and capacity of the facility.

§ 154.360 Operations manual: contents.

Each operations manual required by § 154.355 must contain—

(a) The geographic location of the facility;

(b) A physical description of the facility including a plan of the facility showing mooring areas, transfer locations, control stations, and locations of safety equipment;

(c) The hours of operation of the facility;

(d) The sizes, types, and number of vessels that the facility can transfer oil to or from simultaneously;

(e) The grade and trade name of each product transferred at the facility that is not compatible with oil;

(f) The minimum number of personnel on duty during transfer operations;

(g) The names and telephone numbers of facility, Coast Guard, and other personnel who may be called by the employees of the facility in an emergency;

(h) The duties and responsibilities of watchmen required by § 155.810 of this chapter and 46 CFR 35.05–15 for unmanned vessels moored at the facility;

(i) A description of each communication system required by this part;

(j) The location and facilities of each personnel shelter, if any;

(k) A description and instructions for use of drip and discharge collection and vessel slop reception facilities;

(l) A description and the location of each emergency shutdown system;

(m) Location and instructions for use of the containment equipment required by § 154.545;

(n) The maximum relief valve setting or maximum system pressure when relief valves are not provided for each oil transfer system;

(o) Procedures for—

(1) Operating each loading arm including the limitations of each loading arm;

(2) Transferring oil;

(3) Completion of pumping;

(4) Emergencies;

(5) Reporting oil discharges; and

(6) Containing discharges.

§ 154.365 Operations manual: copies.

Each permitholder shall maintain at least one complete copy of the operations manual at the facility and shall make it readily available to the operating personnel and, upon request, to the Captain of the Port.

§ 154.370 Inspection authority.

Each applicant for an oil transfer permit and each permitholder shall allow the Commandant, at any time, to make any inspection or test to determine compliance with the Federal Water Pollution Control Act, as amended, and this part.

Subpart C—Equipment Requirements

§ 154.500 Hose assemblies.

(a) Each assembly consisting of a hose and couplings that is manufactured after September 1, 1972, and used for transferring oil must meet the requirements of this section.

(b) The pressure which the manufacturer represents to be the minimum bursting pressure for each hose assembly must be—

(1) More than 600 pounds per square inch; and

(2) At least four times the pressure of the relief valve setting (or the maximum pump pressure when no relief valve is installed) plus the static head pressure of the oil transfer system in which the hose is installed;

(c) The pressure which the manufacturer represents to be the recommended working pressure for each hose assembly must be—

(1) More than 150 pounds per square inch; and

(2) More than the pressure of the relief valve setting (or the maximum pump pressure when no valve is installed) plus the static head pressure of the oil transfer system in which the hose is installed;

(d) Each nonmetallic hose must be specified for oil service by its manufacturer.

(e) Unless otherwise authorized by the Commandant, each hose assembly must have flanges that met Standard B16.5, Steel Pipe Flanges and Flanged Fittings, of the American National Standards Institute.

(f) Each hose must be marked for identification or with—

(1) The products for which the hose is used;

(2) Date of manufacture;

(3) Burst pressure;

(4) Manufacturers recommended working pressure;

(5) Date of the last test required by § 156 170 of this chapter; and

(6) The pressure used for that test.

§ 154.510 Loading arms.

(a) Each mechanical loading arm used for transferring oil and placed into service after April 3, 1973, must meet the design, fabrication, material, inspection, and testing requirements in Standard B31 3, Petroleum Refinery Piping, of the American National Standards Institute.

(b) Each mechanical loading arm used for transferring oil after April 3, 1973, must have a means of being drained prior to disconnection.

§ 154.520 Closure devices.

The facility must have enough butterfly valves, wafer-type resilient seated valves, blank flanges or other means acceptable to the Captain of the Port to blank off the end of each hose or loading arm that is disconnected after transfer of oil.

§ 154.530 Small discharge containment.

(a) Except as provided in paragraph (c) of this section, the facility must have fixed catchments, curbing, or other fixed means to contain oil discharged in at least—

(1) Each hose handling and loading arm area; and

(2) Each hose connection manifold area.

(b) The discharge containment means required by paragraph (a) of this section must hold at least—

(1) 100 U.S. gallons if it serves one or more 6-inch nominal diameter or smaller hose or loading arm connections.

(2) 150 U.S. gallons if it serves one or more hose connections larger than 6 inches but less than 12 inches nominal diameter; and

(3) 200 U.S. gallons if it serves one or more 12-inch or larger nominal diameter hose or loading arm connections.

(c) The facility may have portable means to meet the requirements of paragraph (a) of this section if the Captain of the Port finds that fixed means to contain discharges are not feasible for part or all of a facility.

§ 154.540 Discharge removal.

The facility must have a means to safely and quickly remove discharged oil from the containment means required by § 154.530 without mixing incompatible products.

§ 154.545 Discharge containment equipment.

(a) Each oil transfer facility must have ready access to oil containment equipment to contain oil discharged on the water, considering—

(1) Oil handling rates;

(2) Oil capacity susceptible to being spilled;

(3) Frequency of facility operations;

(4) Tidal and current conditions;

(5) Facility age, capability, arrangement, and past experience; and

(6) If the equipment is shared, the expected frequency of use and probability of immediate availability.

(b) For the purpose of this section. "Access" may be by direct ownership, joint ownership, cooperative venture, or contractual agreement.

§ 154.550 Emergency shutdown.

(a) The facility must have in addition to the means of communication required by § 154.560, a means to enable the person in charge of the transfer of oil on board a vessel at his usual operating station to stop the flow of oil to the vessel if normal operating procedures fail.

(b) The point in the oil transfer system at which the flow of oil is stopped must be on the facility and as close to the vessel as practicable.

§ 154.560 Communications.

(a) Each facility must have a means that enables two-way voice communication between the person in charge of the transfer operation on board the vessel and the person in charge of the facility transfer operation.

(b) Each facility must have a means that enables a person on board a vessel or on shore to effectively signal his intention to use the means of communication required by paragraph (a) of this section.

§ 154.570 Lighting.

(a) For operations between sunset and sunrise, the facility must have fixed lighting that illuminates—

(1) Each transfer connection point on the facility with a minimum lighting intensity of 10 foot-candles;

(2) Each work area on the facility with a minimum lighting intensity of 2 foot-candles;

(3) Each transfer connection point on any barge moored at the facility, to or from which oil is transferred, with a minimum lighting intensity of 10 foot-candles; and

(4) Each work area on any barge moored at the facility, to or from which oil is transferred, with a minimum lighting intensity of 2 foot-candles.

(b) The lighting intensity must be measured on a horizontal plane 3 feet above the barge deck or walking surface.

Subpart D—Facility Operations

§ 154.700 General.

The holder of an oil transfer permit shall provide, maintain, and use facilities, equipment, personnel, and procedures at least equal in condition, quality, and quantity to the facilities, equipment, personnel, and procedures required for the issue of the oil transfer permit for that facility.

§ 154.710 Persons in charge: designation.

The permit holder shall—

(a) Designate the person or persons in charge of the transfer of oil to or from the facility; and

(b) Advise the Captain of the Port in writing of each designation.

§ 154.720 Persons in charge: qualification.

(a) No person may serve, and the permit holder may not use the services of a person, as a person in charge of oil transfer operations unless—

(1) He has had at least 48 hours of experience in oil transfer operations under the supervision of the permit holder or a person in charge of transferring oil at the facility for which qualification is desired, except that for new facilities, the Captain of the Port may authorize alternative experience requirements;

(2) The permit holder has determined that he can operate the oil transfer equipment of the facility; and

(3) The permit holder has determined that he knows—

(i) The hazards of each product to be transferred;

(ii) The rules in this part and in Part 156 of this chapter;

(iii) The operator's discharge containment procedures;

(iv) The facility operating procedures;

(v) Vessel oil transfer systems, in general;

(vi) Vessel oil transfer control systems, in general;

(vii) Each facility oil transfer control system to be used;

(viii) Applicable Federal, State, and local oil pollution laws and regulations; and

(ix) Local discharge reporting procedures;

(x) Discharge containment and cleanup procedures.

§ 154.730 Person in charge: evidence of designation.

(a) Each person in charge shall carry evidence of his designation as a person in charge when he is engaged in transfer operations unless such evidence is immediately available at the facility.

(b) A person holding a valid qualification as a person in charge of oil transfers under § 126.15(o) of this chapter on April 3, 1973, is qualified to serve as a person in charge for the purpose of this section.

§ 154.740 Records.

(a) Each permit holder shall keep at the facility and make available for inspection by the Captain of the Port—

(1) A copy of the operating permit for the facility;

(2) The name of each person currently designated as a person in charge of oil transfer operations;

(3) The date and result of the most recent test or inspection of each item tested or inspected under § 156.170 of this chapter; and

(4) The hose information required by § 154.500(f) unless that information is marked on the hose.

§ 154.750 Compliance with operations manual.

The permit holder shall use and require its personnel to use the procedures in the operations manual prescribed by § 154.355 for operations under this part.

PART 155—VESSEL DESIGN AND OPERATIONS

AUTHORITY: The provisions of this Part 155 issued under secs 11(J)(1) (C) and (D) of the Water Pollution Control Act of 1956, added by the Water Quality Improvement Act of 1970 (84 Stat. 91), 33 U.S.C. 1161 (J)(1) (C) and (D); E.O. 11548, 3 CFR, 1971 Supp., p 545; 49 CFR 1.46(m).

Subpart A—General

§ 155.100 Applicability.

This part prescribes rules that apply to the operation of all vessels on the navigable waters of the United States for the purpose of preventing the discharge of oil into or upon the navigable waters of the United States. United States vessels must meet the vessel design and equipment requirements in this part to be eligible for the issuance of a Certificate of Inspection under 46 CFR Chapter I.

§ 155.105 Definitions.

As used in this part:

(a) "Commandant" means the Commandant of the Coast Guard or his authorized representative.

(b) "Captain of the Port" means a U.S. Coast Guard officer commanding a captain of the port area described in Part 3 of this chapter, or his authorized representative or, where there is no captain of the port area, a district commander of a Coast Guard district described in Part 3 of this chapter, or his authorized representative.

(c) "Discharge" includes, but is not limited to, any spilling, leaking, pumping, pouring emitting, emptying, or dumping.

(d) "Officer in Charge Marine Inspection" means a U.S. Coast Guard officer commanding a marine inspection zone described in Part 3 of this chapter or his authorized representative.

(e) "Offshore facility" means any facility of any kind located in on, or under, any of the navigable waters of the United States other than a vessel or a public vessel.

(f) "Oil" means oil of any kind or in any form, including, but not limited to, petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil.

(g) "Onshore facility" means any facility (including, but not limited to motor vehicles and rolling stock) of any kind located in, on, or under, any land within the United States other than submerged land.

(h) "Vessel" means every description of watercraft or other artificial contrivance used, or capable of being used as a means of transportation on water other than a public vessel.

(i) "Person in charge" means a person designated as a person in charge under § 154.710 or § 155.700 of this chapter.

§ 155.110 Waivers.

The Commandant may waive, in whole or in part, compliance with any requirement in this part if—

(a) Application for the waiver is submitted to the Captain of the Port or Officer in Charge of Marine Inspection 30 days before operations under the waiver are proposed unless a lesser time is authorized by the Captain of the Port or Officer in Charge of Marine Inspection; and

(b) The Commandant finds that an equivalent level of protection of the navigable waters from pollution by oil will be provided by the alternative procedures, methods, or equipment standards to be used by the vessel operator.

Subpart B—Vessel Design and Equipment

§ 155.305 Double walls: tank barges.

(a) Except as provided in paragraph (b) of this section, no person may operate a tank barge of 100 gross tons or more built, rebuilt, or converted to oil service after December 31, 1972, that is carrying oil unless it has—

(1) Double walls on each side and each end;

(2) No less than 24 inches between the outer surface of the inner wall and the outer surface of the outer wall at any point;

(3) Sounding tubes, manholes, or instruments for detecting leaks into the space between the walls;

(4) A fixed or portable means of removing water and oil from the space between the walls; and

(5) A means of personnel access into all spaces between the walls for purposes of inspection.

(b) This section does not apply to tank barges that have a certificate of inspection for ocean or coastwise service under 46 CFR Chapter I when operated as the only barge in a tow.

§ 155.310 Cargo oil discharge containment.

(a) After December 31, 1974, no person may operate a tank vessel that is carrying oil that has a tank capacity for 10,000 U.S. gallons or more of oil unless it has—

(1) Fixed containers or enclosed deck areas that meet the requirements of this section under or around each oil loading

manifold and each oil transfer co[illegible] tion area; and

(2) A means of draining or removing discharged oil from each container or enclosed deck area.

(b) Each drain and scupper in an enclosed deck area required by this section must have an attached means of closing.

(c) Each fixed container or enclosed deck area must hold, in all conditions of vessel list or trim, to be encountered during the loading operation at least—

(1) 100 U.S. gallons if it serves one or more 6-inch nominal diameter or smaller hose or loading arm connections;

(2) 150 U.S. gallons if it serves one or more hose or loading arm connections larger than 6 inches, but less than 12 inches, nominal diameter; or

(3) 200 U.S. gallons if it serves one or more 12-inch or larger nominal diameter hose or loading arm connections.

§ 155.320 **Fuel oil discharge containment.**

After December 31, 1974, no person may transfer oil for fuel to a vessel of 100 gross tons or more unless—

(a) It has a fixed container or enclosed deck area of at least 14 U.S. gallons capacity under or around each fuel tank vent, overflow, and fill pipe; or

(b) Each fuel tank vent, overflow, and fill pipe is located where a portable container that is at least 18 inches deep and has at least 14 U.S. gallons capacity can be placed under it.

§ 155.330 **Oily waste and slop retention.**

(a) After December 31, 1974, no person may operate a vessel of 100 or more gross tons unless it has capacity to retain on board all oily waste and oily bilge slops that may accumulate while operating in the navigable waters.

(b) No person may use a tank for oily bilge slops or oily waste on U.S. vessels unless the tank meets the requirements of 46 CFR 56 50–50(h) for isolation betwen oil tanks and bilge systems.

§ 155.340 **Bilge slops on vessels more than 100 gross tons: international voyages.**

After December 31, 1974, no person may operate a vessel of 100 or more gross tons that is certificated under 46 CFR Chapter I for international voyages or a foreign vessel of 100 or more gross tons unless—

(a) The vessel has at least one pump installed to discharge oily bilge slops through a fixed piping system;

(b) The piping system required by this section has at least one outlet—

(1) For vessels of 1,600 or more gross tons, on each side of the weather deck; or

(2) For vessels of less than 1,600 gross tons, accessible from the weather deck;

(c) Each outlet required by this section has a shore connection that meets the specifications in appendix A of this part or the vessel has at least one portable adapter that meets the specifications in appendix A and fits the required outlets;

(d) The vessel has a means on the weather deck near the discharge piping to stop each pump that is used to discharge oily waste and;

(e) The vessel has a stop valve installed at each outlet required by this section.

§ 155.350 **Bilge slops on vessels more than 100 gross tons: operations other than international voyages.**

After December 31, 1974, no person may operate a vessel of 100 or more gross tons that is not subject to § 155.340 of this part unless—

(a) The vessel has at least one pump installed to discharge oily bilge slops through a fixed piping system;

(b) The piping system required by this section has at least one outlet that is accessible from the weather deck;

(c) Each outlet required by this section has a shore connection that meets the specifications in appendix A of this part or the vessel has at least one portable adapter that meets the specifications in appendix A and fits the required outlets; and

(d) The vessel has a stop valve installed at each outlet required by this section.

§ 155.360 **Bilge slops on vessels less than 100 gross tons.**

After December 31, 1974, no person may operate a vessel of less than 100 gross tons unless it has a fixed or portable means to discharge oily bilge slops to a reception facility.

§ 155.370 **Ballast discharge: vessels of 100 gross tons or more: international voyages.**

After December 31, 1974, no person may operate a vessel of 100 or more gross tons that (1) is certificated under 46 CFR Chapter I for international voyages or a foreign vessel and (2) that ballasts fuel oil tanks or has combined fuel and ballast tanks unless—

(a) The vessel has at least one pump installed to discharge ballast through a fixed piping system;

(b) The piping system required by this section has at least one outlet—

(1) For vessels of 1,600 or more gross tons, on each side of the weather deck; or

(2) For vessels of less than 1,600 gross tons, accessible from the weather deck;

(c) Each outlet required by this section has a shore connection that meets the specifications in Appendix A of this part or the vessel has at least one portable adapter that meets the specifications in Appendix A and fits the required outlets;

(d) The vessel has a means near the discharge piping on the weather deck to stop each pump that is used to discharge oily ballast; and

(e) The vessel has a stop valve installed at each outlet required by this section.

§ 155.380 **Ballast discharge: vessels more than 100 gross tons: operations other than international voyages.**

After December 31, 1974, no person may operate a vessel of 100 or more gross tons that (1) is not subject to § 155.370 and (2) ballasts fuel oil tanks or has combined fuel and ballast tanks unless—

(a) The vessel has at least one pump installed to discharge all oily ballast through a fixed piping system;

(b) The piping system required by this section has at least one outlet that is accessible from the weather deck;

(c) Each outlet required by this section has a shore connection that meets the specifications in Appendix A of this part or the vessel has at least one portable adapter that meets the specifications in Appendix A and fits the required outlets; and

(d) The vessel has a stop valve installed at each outlet required by this section.

§ 155.390 **Ballast discharge: vessels less than 100 gross tons.**

After December 31, 1974, no person may operate a vessel of less than 100 gross tons that ballasts fuel oil tanks unless it has a fixed or portable means to discharge oily ballast to a reception facility.

§ 155.400 **Valves.**

After December 31, 1974, no person may operate a vessel of 100 or more gross tons unless—

(a) It has a valve in each fixed overboard bilge and ballast discharge line except a line used only for discharges from spaces free from sources of oil;

(b) It has a positive means of closing each valve required by paragraph (a) of this section at the valve if it is accessible and—

(1) On or above the freeboard deck of a vessel that is required to have a freeboard deck under 46 CFR 43.05–1(g); or

(2) On or above the main deck of a vessel that does not have a freeboard deck;

(c) Each valve required by §§ 155.340, 155.350, 155 370, 155.380, and paragraph (a) of this section has a positive means of being sealed in the closed position; and

(d) Each valve required by §§ 155.340, 155.350, 155.370, 155.380, and paragraph (a) of this section is conspicuously identified by a label on or next to the valve and each remote means of closing the valve.

§ 155.410 **Bilge and ballast valve seals.**

Except when discharging bilge slops or ballast, no person may operate a vessel of 100 or more gross tons unless each valve required by §§ 155.400, 155.340, 155.350, 155.370, 155.380, and each emergency bilge suction valve is sealed in the fully closed position in a way that the valve cannot be opened without breaking the seal.

§ 155.420 **[illegible]alve seals: identification and reuse.**

Each person who seals a valve required to be sealed under § 155.410 shall use a seal that—

(a) Is numbered or otherwise marked to distinguish it from all other seals on board;

(b) Cannot be resealed after it broken; and

(c) Breaks without restricting valve operation when the valve is opened.

§ 155.430 Valve seal record.

(a) Each operator of a vessel required to have the bilge or ballast valves sealed under § 155.410 shall maintain a record for each valve containing—

(1) The name or number of the vessel;

(2) The identification number of each seal used on the valve;

(3) The date and time each seal is applied;

(4) The date and time each seal is broken; and

(5) The reason each seal was broken.

(b) Each person who makes a record required by paragraph (a) of this section shall keep that record for at least 30 days after the seal is broken.

§ 155.440 Placard: vessels less than 100 gross tons.

After December 31, 1974, no person may operate a vessel of less than 100 gross tons, except a foreign vessel or a vessel less than 26 feet in length, unless it has at least a 5 by 8 inch placard made of durable material fixed in a conspicuous place stating the following:

DISCHARGE OF OIL PROHIBITED

The discharge of oil or oily waste into or upon the navigable waters of the United States which causes a film or sheen upon or discoloration of the water or causes a sludge or emulsion beneath the surface of the water is prohibited by the Federal Water Pollution Control Act, as amended. Violators are subject to a penalty of $10,000.

§ 155.450 Exception for all vessels: oily waste processing equipment.

Sections 155.340 through 155.390 do not apply to a vessel that has a means approved by the Commandant to process oily bilge slops or oily ballast.

§ 155.460 Exception for tank vessels: oily waste transfer equipment.

Sections 155.340 through 155.390 do not apply to tank vessels that have a means of transferring oily bilge slops to a cargo tank used for slops if that means meets the bilge and oil system isolation requirements in 46 CFR 56.50-50(h).

§ 155.470 Prohibited oil spaces.

(a) Except as provided in paragraph (b) of this section, after December 31, 1974, no person may operate a vessel carrying bulk oil or oily waste in—

(1) Any space forward of a collision bulkhead;

(2) The forwardmost space of any vessel that does not have a collision bulkhead; or

(3) Any space between double walls, including spaces on the aft end, on a barge that is required to have double walls under § 155.305; or

(4) The aftermost space on any barge.

(b) Fuel oil for use on the vessel may be carried in independent tanks in the spaces specified in paragraph (a) of this section if such a tank is at least 24 inches inboard of the hull structure or is aft of the forward quarter length of the vessel.

§ 155.480 Inspection of valves.

No person may operate any vessel that has a certificate of inspection issued under 46 CFR Chapter I unless each of the following valves has been opened, inspected, and found to function properly by the owner or operator of the vessel or his representative at or since the last drydocking or hauling out of the vessel required by 46 CFR Chapter I:

(a) Bilge emergency suction valves

(b) Ballast sea suction valves except in lines to oil free tanks.

(c) Bilge overboard discharge valves required by § 155.400.

(d) Ballast overboard discharge valves required by § 155 400.

(e) Valves used to separate clean ballast from oil or oily ballast.

(f) Valves used to isolate oil or oily ballast from the sea.

Subpart C—Oil Transfer Personnel, Procedures, Equipment, and Records

§ 155.700 Designation of person in charge.

The operator of each vessel shall designate the person or persons in charge of each transfer of oil to or from the vessel and of each tank cleaning operation.

§ 155.710 Qualifications of person in charge.

(a) No person may serve, and the operator of a vessel may not use the services of a person, as a person in charge of the transfer of oil to or from a vessel or of tank cleaning operations unless—

(1) For oil transfer operations on tank ships, he holds a valid license as a master, mate, pilot, or engineer for tank vessel service, except that the person in charge of tank cleaning operations conducted at an onshore tank cleaning facility may be a certificated tankerman;

(2) For tank barges, he holds a valid license as a master, mate, pilot, or engineer for tank vessel service or is a certificated tankerman;

(3) For vessels other than tank vessels that are required by Chapter I of Title 46 to have a licensed officer on board, he holds a valid license as master, mate, pilot, engineer, or operator; or

(4) For all other vessels, he has been instructed by the operator in his duties and the Federal water pollution laws and regulations that apply to the vessel.

§ 155.720 Oil transfer procedures.

No person may operate a vessel that has a tank capacity for oil of 10,000 U.S. gallons or more unless that vessel has oil transfer procedures that meet the requirements of this part.

§ 155.730 Compliance with oil transfer procedures.

The operator of each vessel shall use and require its personnel to use the oil transfer procedures required by § 155.720 for each oil transfer operation.

§ 155.740 Posting of oil transfer procedures.

The oil transfer procedures required by § 155.720 must—

(a) Be legibly printed in a language understood by the crew; and

(b) Be permanently posted at the fueling station or cargo control station or a place where the procedures can be easily seen and used by the crew.

§ 155.750 Contents of oil transfer procedures.

The oil transfer procedures required by § 155.720 must contain—

(a) If the vessel carries incompatible cargoes, a list of the products to which the oil transfer procedures apply:

(b) A description of each oil transfer system installed on the vessel including—

(1) A line diagram of the vessel's oil transfer piping including the location of each valve, pump, control device, vent, and overflow; and

(2) The location of the shutoff valve or other isolation device that separates any bilge or ballast system from the oil transfer system.

(c) The number of persons required to operate each oil transfer system;

(d) The duties by title of each officer, person in charge, tankerman, deckhand, and any other person required for each oil transfer operation;

(e) Procedures and duty assignments for tending the vessel's moorings during the transfer of oil;

(f) Procedures for operating the emergency shutdown means required by § 155.780;

(g) Any special procedures for topping off tanks;

(h) Procedures for closing all valves used during the oil transfer operation;

(i) A description of the deck discharge containment system;

(j) The procedures for emptying the deck discharge containment system;

(k) Procedures for containment of oil discharges on the water; and

(l) Procedures for reporting oil discharges on the water.

§ 155.760 Amendment of oil transfer procedures.

(a) The Captain of the Port or Officer in Charge of Marine Inspection may require the operator of any vessel that is required to have oil transfer procedures to amend those procedures if, after inspection, he finds that the oil transfer procedures are not adequate to meet the requirements of Part 155 of this chapter.

(b) When the Captain of the Port or Officer in Charge of Marine Inspection determines to require an amendment of an oil transfer procedure, he notifies the operator, in writing, of a date not less than 14 days from the date of the notice on or before which the operator may submit written information, views, and arguments on the amendment. After considering all relevant material presented, the Captain of the Port or Officer in Charge of Marine Inspection notifies the operator of any amendment required or of his decision to rescind the notice. The amendment becomes effective not less than 30 days after the operator receives the notice, unless the operator petitions the Commandant to reconsider the notice, in which case it effective date is stayed pending a decision by the Commandant.

(c) If the Captain of the Port or Officer in Charge of Marine Inspection finds that there is a condition requiring immediate action to prevent the discharge of oil that makes the procedure in paragraph (b) of this section impracticable or contrary to the public interest, he may require an amendment effective, without stay, on the date the operator receives notice of it. In such a case, the Captain of the Port or Officer in Charge of Marine Inspection includes a brief statement of the reasons for his finding in the notice, and the operator may petition the Commandant to reconsider the amendment.

(d) Petitions to the Commandant must be submitted in writing to the Captain of the Port or Officer in Charge of Marine Inspection who issued the requirement to amend.

§ 155.770 Machinery oil drains: U.S. vessels.

(a) Except as provided in paragraph (b), no person may drain the sumps of oil lubricated machinery or the contents of oil filters, strainers, or purifiers into the bilge of any United States vessel.

(b) Before December 31, 1974, oil may be drained from the sump of oil lubricated machinery into the bilge of a vessel that is not otherwise required to have a means to prevent oil draining into the bilge if—

(1) The oil can only be removed from the sump by first draining it into the bilge; and

(2) The oil is removed from the bilge other than by discharging into the water.

§ 155.780 Emergency shutdown.

(a) No person may operate a tank vessel carrying oil in a cargo tank with a capacity of more than 10,000 U.S. gallons unless it has on board an emergency means to enable the person in charge of the transfer of oil to stop the flow of oil to a facility or another vessel if normal operating procedures fail.

(b) The emergency means must be a pump control or a quick acting, power activated valve. If an emergency pump control is used, it must stop the flow of oil if oil could syphon through the stopped pump.

(c) The emergency means must be operable from the cargo deck, cargo control room, or the usual operating station of the person in charge of the transfer of oil.

§ 155.790 Deck lighting.

(a) After December 31, 1974, no person may operate a tank ship that is transferring oil to or from the ship between sunset and sunrise unless that tank ship has cargo deck lighting that illuminates—

(1) Each cargo transfer connection point and each ullage point with a minimum lighting intensity of 10 foot candles; and

(2) Each work area, tank trunk, dome with a lighting intensity of 2 candles.

(b) The lighting intensity must be measured on a horizontal plane 3 feet above the cargo deck or walking surface.

§ 155.800 Oil transfer hose.

No person operating any vessel may use, and no person may operate a U.S. vessel that carries, an oil transfer hose that is larger than 3 inches in diameter unless it meets the requirements of § 154.500 of this chapter.

§ 155.810 Tank vessel security.

No owner or operator of any vessel or facility may leave unattended a tank vessel that contains more than a residual amount of oil in any cargo tank.

§ 155.820 Records.

The operator of each vessel shall keep and make available for inspection by the Commandant—

(a) The name of each person currently designated as a person in charge of oil transfer operations;

(b) The date and result of the most recent test or inspection of each item tested or inspected under § 156.170 of this chapter; and

(c) The hose information required by § 154.500(f) of this chapter unless that information is marked on the hose.

APPENDIX A—SPECIFICATIONS FOR SHORE CONNECTION

Item	Description	Dimension
1	Outside diameter	215 mm. (8½").
2	Inside diameter	According to pipe outside diameter.
3	Bolt circle diameter.	183 mm. (7 3/16")
4	Slots in flange	6 holes 22 mm. (7/8") in diameter shall be equidistantly placed on a bolt circle of the above diameter, slotted to the flange periphery. The slot width is to be 22 mm. (7/8").
5	Flange thickness	20 mm. (¾").
6	Bolts and nuts	6, each of 20 mm (¾") in diameter and of suitable length.

The flange shall be of steel having a flat face, with a gasket of oilproof material, and both shall be suitable for a service pressure of 6 kg/cm² (85 p.s.i.).

PART 156—OIL TRANSFER OPERATIONS

AUTHORITY: The provisions of this Part 156 issued under secs. 11(J)(1) (C) and (D) of the Water Pollution Control Act of 1956, added by the Water Quality Improvement Act of 1970 (84 Stat. 91); 33 U.S.C. 1161(J)(1) (C) and (D); E.O. 11548, 3 CFR, 1971 Supp., p. 545; 49 CFR 1.46(m).

§ 156.100 General.

This part prescribes rules that apply to the transfer of oil to or from any vessel on the navigable waters of the United States that has a capacity of 10,000 U.S. gallons or more for that oil, except the transfer of—

(1) Lubricating oil for use on board the vessel; and

(2) Nonpetroleum based oil that is transferred to or from a vessel other than a tank vessel.

§ 156.105 Definitions.

As used in this part:

(a) "Oil" means oil of any kind or in any form, including, but not limited to, petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil.

(b) "Vessel" means every description of watercraft or other artificial contrivance used, or capable of being used as a means of transportation on water other than a public vessel.

(c) "Person in charge" means a person designated as a person in charge under § 154.710 or § 155.700 of this chapter.

§ 156.110 Person in charge: limitations.

(a) No person may serve as the person in charge of oil transfer operations on more than one vessel at a time unless—

(1) The vessels are immediately adjacent;

(2) There is a ready means of access between vessels; and

(3) The person in charge is not also the person in charge of the facility.

(b) No person may serve as the person in charge of both the vessel and the facility during oil transfer operations except when the facility permit authorizes such procedure.

§ 156.120 Requirements for oil transfer.

No person may transfer oil to or from a vessel unless—

(a) The vessel's moorings are strong enough to hold in all expected conditions of surge, current, and weather and long enough to allow adjustment for changes in draft, drift, and tide during the transfer operation;

(b) Oil transfer hoses or loading arms are long enough to allow the vessel to move to the limits of its moorings without placing strain on hose or loading arm;

(c) Each hose is supported in a manner that prevents strain on its coupling;

(d) Each part of the transfer system necessary to allow the flow of oil is lined up for the transfer;

(e) Each part of the facility and vessel transfer system that is not necessary for the transfer operation is securely blanked or shut off;

(f) The transfer system is connected to a fixed piping distribution system on the receiving vessel or facility;

(g) Except when used to receive or discharge ballast, each overboard discharge or sea suction valve that is connected to the vessel's oil transfer, ballast, or cargo tank systems is sealed in the closed position;

(h) Each oil transfer hose is free from loose covers, bulges, gouges, cuts, slashes, and soft spots;

(i) Each bolted flange coupling meets the requirements in § 156.130;

(j) The discharge containment required by §§ 154.530, 155.310, and 155.320 of this chapter as appropriate is in place;

(k) Each scupper or drain in a discharge containment system is closed;

(l) The communications required by § 154.560 of this chapter are operable for the transfer operation;

(m) The emergency means of shutdown required by §§ 154.550 and 155.780 of this chapter, as appropriate, is in position and operable;

(n) Enough personnel are on duty to conduct the transfer operations in accordance with the facility operations manual and vessel oil transfer procedures that apply to the transfer operation;

(o) At least one person is present who fluently speaks the language spoken by each person in charge;

(p) The person in charge of the transferring vessel or facility and the person in charge of the receiving vessel or facility have held a conference to assure that each person in charge understands all aspects of the transfer operations, including at least—

(1) The identity of the product to be transferred;

(2) The sequence of transfer operations;

(3) The transfer rate;

(4) The name or title and location of each person participating in the transfer operation;

(5) Particulars of the transferring and receiving systems;

(6) Critical stages of the transfer operation;

(7) Federal, State and local rules that apply to the transfer of oil;

(8) Emergency procedures;

(9) Discharge containment procedures;

(10) Discharge reporting procedures;

(11) Watch or shift arrangements; and

(12) Transfer shutdown procedures.

(q) The person in charge of the transferring vessel or facility and the person in charge of the receiving vessel or facility agree to begin the transfer operation;

(r) Each person in charge required by this part is present;

(s) Between sunset and sunrise the lighting required by § 154.570 and § 155.790 of this chapter is provided; and

(t) For transfer operations on a barge between sunset and sunrise, lighting of the intensity specified in § 155.790 of this chapter is provided.

§ 156.130 **Connections.**

(a) Each person who makes a connection for oil transfer operations shall—

(1) Use suitable material in joints and couplings to make a tight seal;

(2) Use at least four bolts and a bolt in at least every other hole of each temporary connection utilizing an ANSI standard flange coupling;

(3) Use a bolt in each hole of couplings other than a ANSI standard flange;

(4) Use a bolt in each hole of each fixed coupling; and

(5) Use bolts of the same size in each bolted coupling; and

(6) Tighten each bolt and nut uniformly to distribute the load.

(b) No person who makes a connection for oil transfer operations may use any bolt that shows signs of strain or is elongated or deteriorated.

(c) Unless otherwise authorized by the Commandant, no person who makes a connection for oil transfer operations may use a quick-connect coupling or any coupling that is not bolted or full threaded.

§ 156.150 **Declaration of inspection.**

(a) No person may transfer oil to or from a vessel unless the persons designated under §§ 154.710 and 155.700 of this chapter as person in charge of the transferring facility or vessel and the receiving facility or vessel have signed the declaration of inspection form prescribed in paragraph (c) of this section.

(b) No person in charge may sign a declaration of inspection of a vessel or facility unless he has determined by inspection that the facility or vessel meets the requirments in § 156.120.

(c) The declaration of inspection required to be signed in paragraph (a) of this section may be in any form but must contain at least—

(1) The name or other identification of the transferring vessel or facility and the receiving vessel or facility;

(2) The address of the facility or location of the transfer operation if not at a facility;

(3) The date the transfer operation is started;

(4) A list of the requirements in § 156.120 with spaces on the form following each requirement for the persons in charge to indicate whether the requirement is met for the transfer operation; and

(5) A space for the date, time of signing, signature, and title of each person in charge during oil transfer operations on the transferring vessel or facility and a space for the date, time of signing, signature, and title of each person in charge during the oil transfer operations on the receiving facility or vessel.

(d) The form for the declaration of inspection required in paragraph (a) of this section may incorporate the declaration requirements in 46 CFR 35.35–30.

(e) The operator of each vessel and each facility shall retain at least one signed copy of each declaration of inspection required for that vessel or facility for at least 2 months from the date it is signed.

§ 156.160 **Supervision by person in charge.**

(a) No person may connect, top off, disconnect, or engage in any other critical oil transfer operation unless the person in charge designated under §§ 154.710 and 155.700 of this chapter personally supervises the operation.

(b) No person may start the flow of oil to or from a vessel unless instructed to do so by the person in charge.

(c) No person may transfer oil to or from a vessel unless the person in charge is i[illegible]e immediate vicinity of the transfer operation and immediately available to the crew.

(d) No person may transfer oil to or from a vessel—

(1) While any transfer component is releasing oil at a rate that will exceed the capacity of the containment system; or

(2) While there is oil in the water near any transfer component from an unknown source;

§ 156.170 **Equipment tests and inspections.**

(a) No person may use any item of equipment listed in paragraph (c) of this section in oil transfer operations unless, since the beginning of the 11th calendar month before the month in which it is used, the operator of the vessel or facility has tested and inspected it in accordance with paragraphs (b) and (c) of this section and found that it is in the condition specified in paragraph (c) of this section.

(b) During any test or inspection required by this section, a hose must be in a straight and horizontal position and the entire external surface must be accessible.

(c) For the purposes of paragraph (a) of this section—

(1) Each nonmetallic oil transfer hose, other than submarine hose, that is larger than 3 inches in diameter must—

(i) Have no loose covers, kinks, bulges, gouges, cuts, slashes, or soft spots;

(ii) Have no external and, to the extent internal inspection is possible with both ends of the hose open, no internal deterioration; and

(iii) Not burst, bulge, leak, or abnormally distort under static liquid pressure at least as great as the pressure of the relief valve setting (or maximum pump pressure when no relief valve is installed) plus any static head pressure of the system in which the hose is used;

(2) Each transfer system relief valve must open at the pressure at which it is set to open;

(3) Each pressure gauge must show pressure within 10 percent of the actual pressure;

(4) Each loading arm and each oil transfer piping system including each metallic hose must not leak under static liquid pressure at least as great as the pressure of the relief valve setting (or maximum pump pressure when no relief valve is installed) plus any static head pressure in the system; and

(5) Each item of remote operating or indicating equipment such as a remotely operated valve, tank level alarm, or emergency shutdown device must perform its intended function.

(d) No person may use any hose in underwater service for oil transfer operations unless, since the beginning of the 23d month before the month in which it is used, the operator of the vessel or facility has tested and inspected it in accordance with paragraph (c)(1) or (4) of this section, as applicable.

(b) By revising § 151.35(h) of Part 151 to read as follows:

§ 151.35 **Oil record book.**

* * * * *

(h) The Oil Record Book m[illegible]ned on a vessel when not engaged on a foreign voyage shall be submitted during the months of January, April, July, and October with entries for the preceding 3 months to the Commander, 3d Coast Guard District(m), New York, if the home port is located on the east or gulf coast; or to the Commander, Twelfth Coast Guard District(m), San Francisco, if the home port of the vessel is located on the West Coast.

(Sec. 11(J)(1)(C) of the Water Pollution Control Act of 1956, added by the Water Quality Improvement Act of 1970 (84 Stat. 91); 33 U.S.C. 1161(J)(1)(C); E.O. 11548, 3 CFR, 1971 Supp., p. 545; 49 CFR 1.46(m))

Dated: December 15, 1971.

C. R. BENDER,
Admiral, U.S. Coast Guard, Commandant.

[FR Doc.71-18641 Filed 12-23-71;8:45 am]

[46 CFR Parts 10, 12, 31, 71, 91, 176, 187, 189]

[CGFR 71-161]

POLLUTION PREVENTION

Inspection of Vessels and Deck and Engineer Officers Licenses

The Coast Guard has under consideration the amendment of Chapter I of Title 46, Code of Federal Regulations to require additional knowledge by merchant marine officers and seamen of the effects of oil pollution and of laws, regulations and procedures to prevent oil pollution; to require pollution prevention equipment for vessel certification; and also to require increased inspection of tank barges. This proposal is issued in conjunction with a proposal for new Parts 154, 155, and 156 of Title 33, Code of Federal Regulations governing vessel and facility oil transfer operations that is published on page — of this issue of the FEDERAL REGISTER.

Interested persons are invited to participate in this proposed rule making by submitting written data, views, or comments to the Coast Guard (CMC), Washington, D.C. 20590. Communications should identify the notice number (CGFR 71-161), any specific wording recommended, reasons for any recommended change, and the name, address, and organization, if any, of the commentator.

The Coast Guard will hold a public hearing on February 15, 1972, at 9:30 a.m. in Conference Room 2230, Department of Transportation Nassif Building, 400 Seventh Street SW., Washington, DC 20590. Interested persons are invited to attend the hearing and present oral or written statements on this proposal.

All communications received before February 21, 1972, or at the hearing, will be fully considered and evaluated before final action is taken on this proposal. Copies of all written communications received will be available for examination in Room 8234, Department of Transportation, Nassif Building 400 Seventh Street SW., Washington, DC both before and after the closing date for the receipt of comments. The proposal contained in this document may be changed in the light of the comments received.

During the drafting of the proposed 33 CFR Parts 154, 155, and 156, it became apparent that to have an effective antipollution program three subjects covered in Chapter I of Title 46, Code of Federal Regulations would require revision:

(1) Merchant marine officers and seamen must be required to possess a greater knowledge than presently required concerning the law and regulations governing oil pollution and the methods and equipment to prevent or clean up oil pollution;

(2) The equipment required in the proposed Part 155 must be a prerequisite for vessels before they are issued a certificate of inspection; and

(3) The existing vessel drydocking interval for inland vessels must be shortened to eliminate the continued operation of leaky vessels.

The professional knowledge of all licensed and certificated seamen would be required to include oil pollution abatement procedures. All such seamen who by their rating may be engaged in oil transfer operations would be required to have knowledge of oil transfer operations equivalent to that of a certificated tankerman. All officers licensed for ocean service would have to have additional knowledge that includes international law and tank cleaning procedures that do not pollute the oceans.

Requiring the vessel's equipment to comply with standards for oil pollution prevention in order to obtain a certificate of inspection would assure that inspectors and technical personnel examine the vessel and its plans for compliance with the regulations.

The proposed 33 CFR 155.305 requires all inland barges built after January 1, 1973, to be of double-wall construction to phase out single-skin construction which results in pollution. To minimize the existing single-skin fleet's pollution contribution from hull leaks, the period between drydocking of single-skin vessels would be reduced to not more than 3 years. This change eliminates the 4-year and 5-year drydocking interval for certain inland vessels and eliminates the 5-year extension privilege on initial drydockings. The purpose of this shortening of drydocking intervals is to subject single-skin vessels to examination for operational damage which may permit cargo or fuel oil leakage. Double-skinned vessels in fresh water service may go 6 years between drydocking if their condition as determined by an internal inspection during the third year since docking, permits.

In consideration of the foregoing, it is proposed to amend Title 46 of the Code of Federal Regulations as follows:

(a) By amending Part 31 as follows:

(1) By amending § 31.01-1(a) by striking the period and adding the words "and 33 CFR Part 155, Subpart B."

(2) By revising the citation of authority following § 31.01-1 to read as follows:

(R.S. 4418, as amended, 4433, as amended, 4472, as amended, 4438, as amended, sec. 11 (J)(1)(C) and (D) of the Water Pollution Control Act of 1956, added by the Water Quality Improvement Act of 1970 (84 Stat. 91), National Environmental Policy Act of 1969 (83 Stat. 852); 46 U.S.C. 392, 411, 170, 481, 33 U.S.C. 1161(J)(1)(C) and (D), 42 U.S.C. 4321, et seq.; E.O. 11548; 3 CFR, 1971 Supp., p. 545; 49 CFR 1.46(m))

(3) By revising § 31.05-1(a) to read as follows:

§ 31.05-1 Issuance of certificate of inspection—TB/ALL.

(a) When a tank vessel is found to comply with law and the regulations in this subchapter, and applicable provisions of subchapters, E, F, J, O, and Q of this chapter and 33 CFR Part 155, Subpart B, a certificate of inspection shall be issued to it, or to its owners by the Officer in Charge, Marine Inspection.

* * * * *

(4) By adding a citation of authority following § 31.05-1 to read as follows:

(Sec. 11(J)(1)(C) and (D) of the Water Pollution Control Act of 1956, added by the Water Quality Improvement Act of 1970 (84 Stat. 91), National Environmental Policy Act of 1969 (83 Stat. 852); 33 U.S.C. 1161 (J)(1)(C) and (D), 42 U.S.C. 4321, et seq.; E.O. 11548; 3 CFR, 1971 Supp., p. 545; 49 CFR 1.46(m))

(5) By revoking subparagraphs (4) and (5) and revising subparagraphs (2) and (3), of § 31.10-20(a) to read as follows:

§ 31.10-20 Drydocking or hauling out—TB/ALL.

(a) * * *

(2) Each tank vessel that operates in salt water an aggregate of less than 6 months in any 12-month period since it was last drydocked or hauled out shall be drydocked or hauled out at intervals not to exceed 36 months, except that any tank barge that operates in salt water an aggregate of less than 3 months in each 12-month period since it was last drydocked need not comply with this subparagraph until after April 3, 1973. Each tank vessel that operates in salt water an aggregate of more than 6 months in any 12-month period since it was last drydocked shall be drydocked or hauled out within 6 months after the end of that period.

(3) For double-walled tank barges that operate in salt water an aggregate of less than 1 month in any 12-month period, the Officer in Charge of Marine Inspection may authorize the substitution of an internal inspection of the space between the double walls for the initially required drydocking or hauling out and for each alternate drydocking or hauling out thereafter.

(6) By adding an authority citation following § 31.10-20 to read as follows:

(National Environmental Policy Act of 1969 (83 Stat. 852); 42 U.S.C. 4321, et seq.)

(b) By amending Part 71 as follows:

(1) By amending § 71.20-15(a) by inserting the words "pollution prevention equipment," immediately after the words "pilot ladders," in the second sentence.

(2) By revising the citation of authority following § 71.20–15 to read as follows:

(R.S. 4472, as amended, sec. 2, 23 Stat. 118, as amended, sec. 2, 63 Stat. 496, as amended, sec. 633, 63 Stat. 545, sec. 11(J)(1)(C) of the Water Pollution Control Act of 1956, added by the Water Quality Improvement Act of 1970 (84 Stat. 91), National Environmental Policy Act of 1969 (83 Stat. 852); 46 U.S.C. 170, 2, 14 U.S.C. 2, 633, 33 U.S.C. 1161(J)(1)(C), 42 U.S.C. 4321, et seq.; E.O. 11548, 3 CFR, 1971 Supp., p. 545, 49 CFR 1.46(m))

(3) By adding a new § 71.25–37 with an authority citation immediately following § 71.25–35 to read as follows:

§ 71.25–37 Pollution prevention.

At each inspection for certification, the inspector shall examine the vessel to determine that it meets the vessel design and equipment requirements for pollution prevention in 33 CFR Part 155, Subpart B.

(Sec. 11(J)(1) (C) and (D) of the Water Pollution Control Act of 1956, added by the Water Quality Improvement Act of 1970 (84 Stat. 91), National Environmental Policy Act of 1969 (83 Stat. 852); 33 U.S.C. 1161(J)(1) (C) and (D), 42 U.S.C. 4321, et seq.; E.O. 11548; 3 CFR, 1971 Supp., p. 545; 49 CFR 1.46(m))

(c) By amending Part 91 as follows:

(1) By amending § 91.20–15(a) by inserting the words "pollution prevention equipment," immediately after the words "pilot ladders," in the second sentence.

(2) By amending the citation of authority following § 91.20–15 to read as follows:

(R.S. 4472, as amended, sec. 2, 23 Stat. 118, as amended, sec. 2, 63 Stat. 496, as amended, sec. 633, 63 Stat. 545, sec. 11(J)(1)(C) of the Water Pollution Control Act of 1956, added by the Water Quality Improvement Act of 1970 (84 Stat. 91), National Environmental Policy Act of 1969 (83 Stat. 852); 46 U.S.C. 170, 2, 14 U.S.C. 2, 633, 33 U.S.C. 1161(J)(1)(C), 42 U.S.C. 4321, et seq.; E.O. 11548; 3 CFR, 1971 Supp., p. 545; 49 CFR 1.46 (m))

(3) By amending § 91.25–10(a) by inserting the words "pollution prevention equipment" immediately after the words "pilot ladders," in the second sentence.

(4) By adding a citation of authority following § 91.25–10 to read as follows:

(Sec. 11(J)(1)(C) of the Water Pollution Control Act of 1956 added by the Water Quality Improvement Act of 1970 (84 Stat. 91), National Environmental Policy Act of 1969 (83 Stat. 852); 33 U.S.C. 1161(J)(1)(C), 42 U.S.C. 4321, et seq.; E.O. 11548; 3 CFR, 1971 Supp., p. 545; 49 CFR 1.46(m))

(5) By adding a new § 91.25–38 with an authority citation immediately following § 91.25–37 to read as follows:

§ 91.25–38 Pollution prevention.

At each inspection for certification, the inspector shall examine the vessel to determine that it meets the vessel design and equipment requirements for pollution prevention in 33 CFR Part 155, Subpart B.

(Sec. 11(J)1) (C) and (D) of the Water Pollution Control Act of 1956, added by the Water Quality Improvement Act of 1970 (84 Stat. 91), National Environmental Policy Act of 1969 (83 Stat. 852); 33 U.S.C. 1161(J)(1) [redacted] and (D), 42 U.S.C. 4321, et seq.; E.O. 11548, 3 CFR, 1971 Supp., p. 545; 49 CFR 1.46 (m))

(d) By amending the citation authority for Subchapter T by striking the words ", unless otherwise noted" and adding the words "Additional authority cited with regulations affected."

(e) By amending Part 176 as follows:

(1) By amending § 176.05–5(c) by inserting the words "pollution prevention equipment," immediately after the words "fire extinguishing equipment," in the first sentence.

(2) By adding a citation of authority following § 176.05–5 to read as follows:

(Sec. 11(J)(1)(C) of the Water Pollution Control Act of 1956, added by the Water Quality Improvement Act of 1970 (84 Stat. 91), National Environmental Policy Act of 1969 (83 Stat. 852); 33 U.S.C. 1161(J)(1)(C), 42 U.S.C. 4321, et seq.; E.O. 11548, 3 CFR, 1971 Supp., p. 545; 49 CFR 1.46(m))

(3) By amending § 176.05–10 by inserting the words "pollution prevention equipment," immediately after the words "fire extinguishing equipment," and by adding a new paragraph (b) to read as follows:

§ 176.05–10 Subsequent inspections for certification.

* * * * *

(b) *Pollution prevention.* At each inspection for certification, the inspector shall examine the vessel to determine that it meets the vessel design and equipment requirements for pollution prevention in 33 CFR Part 155, Subpart B.

(4) By adding a citation of authority following § 176.05–10 to read as follows:

(Sec. 11(J)(1) (C) and (D) of the Water Pollution Control Act of 1956, added by the Water Quality Improvement Act of 1970 (84 Stat. 91), National Environmental Policy Act of 1969 (83 Stat. 852); 33 U.S.C. 1161(J)(1) (C) and (D), 42 U.S.C. 4321, et seq.; E.O. 11548, 3 CFR, 1971 Supp., p. 545; 49 CFR 1.46 (m))

(f) By amending the citation of authority for Subchapter U by adding the following words: "Additional authority cited with regulations affected."

(g) By amending Part 189 as follows:

(1) By amending § 189.20–15(a) by inserting the words "pollution prevention equipment," immediately after the words "pilot ladders," in the second sentence.

(2) By adding an authority citation following § 189.20–25 to read as follows:

(Sec. 11(J)(1)(C) of the Water Pollution Control Act of 1956, added by the Water Quality Improvement Act of 1970 (84 Stat. 91), National Environmental Policy Act of 1969 (83 Stat. 852); 33 U.S.C. 1161(J)(1)(C), 42 U.S.C. 4321 et seq., E.O. 11548, 3 CFR, 1971 Supp., p. 545; 49 CFR 1.46(m))

(3) By amending § 189.25–10 by inserting the words "pollution prevention equipment," immediately following the words "pilot ladders," in the second sentence.

(4) By adding an authority citation following § 189.25–10 to read as follows:

(Sec. 11(J)(1)(C) of the Water Pollution Control Act of 1956, added by the Water Quality Improvement Act of 1970 (84 Stat. 91), National Environmental Policy Act of 1969 [redacted] Stat. 852); 33 U.S.C. 1161(J)(1)(C), 42 U.S.C. 4321 et seq.; E.O. 11548; 3 CFR, 1971 Supp. p. 545; 49 CFR 1.46 (m))

(5) By adding a new § 189.25–38 with an authority citation immediately following § 189.25–35 to read as follows:

§ 189.25–38 Pollution prevention.

At each inspection for certification, the inspector shall examine the vessel to determine that it meets the vessel design and equipment requirements for pollution prevention in 33 CFR Part 155, Subpart B.

(Sec. 11(J)(1) (C) and (D) of the Water Pollution Control Act of 1956, added by the Water Quality Improvement Act of 1970 (84 Stat. 91), National Environmental Policy Act of 1969 (83 Stat. 852); 33 U.S.C. 1161(J)(1) (C) and (D), 42 U.S.C. 4321, et seq.; E.O. 11548; 3 CFR, 1971 Supp., p. 545, 49 CFR 1.46(m))

(h) By amending Parts 10, 12, 105, and 187 Title 46 as follows:

(1) By adding the following sentence as subparagraph (3) of § 10.02–9(a); subparagraph (2) of § 10.20–9(a); and paragraph (e) of § 187.15–1: "Upon the first renewal of a license after June 30, 1972, each applicant must meet the knowledge requirements for an original license on pollution abatement."

(2) By amending the authority citations following §§ 10.02–9 and 10.20–9 by adding an additional citation and by adding a new authority citation to follow § 187.15–1 to read as follows:

(National Environmental Policy Act of 1969 (83 Stat. 852); 42 U.S.C. 4321, et seq.)

(3) By adding the new subject "Pollution abatement" as subject number (7–a) in § 10.05–43(a); (28–a) in the table in § 10.05–45(b); (20–a) in § 10.05–47(a); (13–a) in § 10.05–49(a); (9–a) in § 10.05–51(a); (10–a) in § 10.05–52(a); (9–a) in § 10.05–58; and by inserting an X in each column for the new subject "(28–a) pollution abatement" in the table in § 10.05–45(b).

(4) By adding the following authority citation following §§ 10.05–43, 10.05–45, 10.05–47, 10.05–49, 10.05–51, 10.05–52, and 10.05–58 to read as follows:

(National Environmental Policy Act of 1969 (83 Stat. 852); 42 U.S.C. 4321, et seq.)

(5) By adding the following sentence to §§ 10.05–53; 10.05–55; 10.05–57; 10.05–59; as (c–1) of § 12.05–9; as (e) of § 12.10–5; to § 12.20–5; as (a)(10) of § 105.60–10; (a)(8) of § 187.20–10; (a)(8) of § 187.20–15; (a)(8) of § 187.20–17; (12–a) of § 187.25–20(a); (12–a) of § 187.25–2(a); and (4 a) of § 187.25–25 (a); "The applicant must demonstrate to the satisfaction of the Officer in Charge, Marine Inspection, his knowledge of pollution laws and regulations, procedures for discharge containment and cleanup and methods for disposal of sludge and waste material from cargo and fueling operations."

(6) By inserting an X in each column for the following new subject (29–a) in table 12.15–9(b): 29–a Pollution laws and regulations, procedures for discharge containment and cleanup, and methods

for disposal of sludge and was om cargo and fueling operations.

(7) By adding an authority citation to follow §§ 10.05–53, 10.05–55, 10.05–57, 10.05–59, 12.05–9, 12.10–5, 12.15–9, 12.20–5, 105.60–10, 187.20–10, 187.20–15, 187.20–17, 187.25–20, 187.25–21, and 187.25–25 to read as follows:

(National Environmental Policy Act of 1969 (83 Stat. 853); 42 U.S.C. 4321, et seq.)

(8) By adding the following new subjects to the table in § 10.10–4(b) and by inserting an X in each column for each new subject:

POLLUTION

78. Pollution laws and regulations.
79. Discharge containment and cleanup.
80. Disposal of sludge and waste.
81. Loading and transfer of bunkers.
82. Bilge and ballast disposal.

(9) By adding an authority citation following § 10.10–4 to read as follows:

(National Environmental Policy Act of 1 (83 Stat. 852); 42 U.S.C. 4321, et seq.)

(10) By adding the subject "pollution abatement" as new paragraphs (b)(2) (viii); (c)(8); and (e)(7) of § 10.15–31.

(11) By adding an authority citation following § 10.15–31 to read as follows:

(National Environmental Policy Act of 1969 (83 Stat. 852); 42 U.S.C. 4321, et seq.)

(12) By adding the following new subdivision (vii) to § 10.20–5(b)(1):

§ 10.20–5 **Professional examinations.**

* * * * *

(b) * * *

(1) * * *

(vii) Pollution laws and regulations, procedures for discharge containment and cleanup, and methods for disposal of sludge and waste material from cargo and fueling operations.

(13) By adding an authority citation following § 10.20–5 to read as follows:

(National Environmental Policy Act of 1969 (83 Stat. 852); 42 U.S.C. 4321, et seq.)

These amendments are proposed under the authority of (R.S. 4405, as amended, R.S. 4462, as amended, section 11(J)(1)(C) and (D) of the Water Pollution Control Act of 1956, added by the Water Quality Improvement Act of 1970 (84 Stat. 91), National Environmental Policy Act of 1969 (83 Stat. 852), sec. 6(b)(1), 80 Stat. 937; 46 U.S.C. 375, 416, 33 U.S.C. 1161(J)(1) (C) and (D), 42 U.S.C. 4321, et seq., 49 U.S.C. 1655(b)(1); E.O. 11548; 3 CFR, 1971 Supp., p. 545; 49 CFR (b) and (m)).

Dated: December 15, 1971.

C. R. BENDER,
Admiral, U.S. Coast Guard, Commandant.

[FR Doc.71-18642 Filed 12-23-71;8:45 am]

APPENDIX M

PERTINENT CORRESPONDENCE

metropolitan washington
COUNCIL OF GOVERNMENTS
1225 Connecticut Avenue, N.W., Washington, D. C. 20036 223-6800

June 12, 1970

ɬr. Norman E. Jackson, Principal Engineer
)irector of Sanitary Engineering
?residential Building
ɪ18 12th. Street, N.W.
Vashington, D. C. 20004

)ear Mr. Jackson:

It is a pleasure to inform you of the favorable action by :he Metropolitan Washington Council of Governments on your ɪpplication for Federal funds referenced below.

The Council determined that this project is consistent ɾith the metropolitan planning process and the Council of ;overnments' adopted policies. Six copies of the review :omments on this project are enclosed.

The endorsement of these comments constitutes the formal ɪetropolitan clearinghouse review required under Section 204 of :he Demonstration Cities and Metropolitan Development Act of 1966 ɪnd Section 201 and Title IV of the Intergovernmental Cooperation ɪct of 1968.

It has been a pleasure to be of assistance to you in the levelopment of this project. The completion of the project will :ontribute to the sound and orderly development of the metro- ›olitan Washington region.

Sincerely yours,

Walter A. Scheiber
Executive Director

ɪE: COG No. 70-DC-W/S-1 (Project No. WPC-DC-22)
Construction of additional primary treatment facilities.
COG NO. 70-DC-W/S-2 (Project No. WPC-DC-23)
Construction of new Sludge processing facilities.
COG No. 70-DC-W/S-3 (Project No. WPC-DC-24)
Construction of additional secondary treatment facilities

RECEIVED
JUN 23 1970
IWQA

:c: Hon. Walter E. Washington, Mayor
District of Columbia
Mr. Comer S. Coppie, Budget Officer
District of Columbia Government

RECEIVED
JUN 19 1970
WATER QUALITY CONTROL
DIVISION

M1

COMMENTS AND RECOMMENDATIONS

OF

STATE, REGIONAL OR METROPOLITAN CLEARINGHOUSES

Date: June 16, 1970

Clearinghouse or planning agency:

Name: Metropolitan Washington Council of Governments

Address: 1225 Connecticut Avenue, N.W.
Washington, D.C.

Source of Authority for Establishment of Agency

Bureau of the Budget Circular No. A-95

An application is to be made under 33 USC 466 et seq. to the Federal Water Pollution Control Administration, Department of the Interior. The estimated date the application will be filed: June 29, 1970 .

Applicant's Name: Government of the District of Columbia

Address: District Building, 14th & E Streets, N.W., Washington, D.C. 20004

Geographic Location of Project: 5000 Overlook Avenue, S.W.
Washington, D.C.

Project Description: Construction of additional primary treatment facilities at the District's Water Pollution Control Plant. Included are grit removal facilities, preliminary sedimentation tanks, chlorine contact tank, and miscellaneous connecting conduits.

Clearinghouse Certification:

The project described above does (X) does not ( ) conform with the comprehensive plan developed or in process of development for the metropolitan area in which it is located.

Comments and Recommendations:

Please see attached letter dated June 12, 1970 and Metropolitan Clearinghouse Review Comments.

(Signature)
Authorized Representative of Clearinghouse

COMMENTS AND RECOMMENDATICNS

OF

STATE, REGIONAL OR METROPOLITAN CLEARINGHOUSES

Date: June 16, 1970

Clearinghouse or planning agency:

Name: Metropolitan Washington Council of Governments

Address: 1225 Connecticut Avenue, N.W.
Washington, D.C.

Source of Authority for Establishment of Agency

Bureau of the Budget Circular No. A-95

An application is to be made under 33 USC 466 et seq. to the Federal Water Pollution Control Administration, Department of the Interior. The estimated date the application will be filed: June 29, 1970.

Applicant's Name: Government of the District of Columbia

Address: District Building, 14th & E Streets, N.W. Washington, D.C. 20004

Geographic Location of Project: 5000 Overlook Avenue, S.W.
Washington, D.C.

Project Description: Construction of additional secondary treatment facilities of the District's Water Pollution Control Plant. Included are six aeration tanks, fifteen secondary sedimentation tanks, expansion of existing blower facility, additional blower facility, modifications to existing sedimentation tanks, and miscellaneous connecting conduits.

Clearinghouse Certification:

The project described above does (x) does not ( ) conform with the comprehensive plan developed or in process of development for the metropolitan area in which it is located.

Comments and Recommendations:

Please see attached letter dated June 12, 1970 and Metropolitan Clearinghouse Review Comments.

RECEIVED

JUN 19 1970

WATER QUALITY CONTROL
DIVISION

RECEIVED

(Signature)
Authorized Representative of Clearinghouse

JUN 23 1970

FWQA

COMMENTS AND RECOMMENDATIONS

OF

STATE, REGIONAL OR METROPOLITAN CLEARINGHOUSES

Date: June 16, 1970

Clearinghouse or planning agency:

Name: Metropolitan Washington Council of Governments

Address: 1225 Connecticut Avenue, N.W.
Washington, D.C.

Source of Authority for Establishment of Agency
Bureau of the Budget Circular No. A-95

An application is to be made under 33 USC 466 et seq. to the Federal Water Pollution Control Administration, Department of the Interior. The estimated date the application will be filed: June 29, 1970.

Applicant's Name: Government of the District of Columbia

Address: District Building, 14th & E Streets, N.W., Washington, D.C. 20004

Geographic Location of Project: 5000 Overlook Avenue, S.W.
Washington, D. C.

Project Description: Construction of new Sludge Processing Facilities to replace existing facilities at the District s Water Pollution Control Plant. Included are eight fltation thickening tanks, four sludge blending tanks, twenty vacuum filters, six multiple hearth furnaces, and necessary and required structure to house same.

Clearinghouse Certification:

The project described above does (X) does not ( ) conform with the comprehensive plan developed or in process of development for the metropolitan area in which it is located.

Comments and Recommendations:

Please see attached letter dated June 12, 1970 and Metropolitan Clearinghouse Review Comments.

(Signature)
Authorized Representative of Clearinghouse

RECEIVED
JUN 19 1970
WATER QUALITY CONTROL
DIVISION

RECEIVED
JUN 23 1970
FWQA

M4

Metropolitan Clearinghouse Review Comments

COG PROJECT NUMBERS AND NAMES:

70-DC-W/S-1	Construction--Additional Primary Treatment Facilities (WPC-DC-22)
70-DC-W/S-2	Construction--New Sludge Processing Facilities (WPC-DC-23)
70-DC-W/S-3	Construction--Aditional Secondary Treatment Facilities (WPC-DC-24)

APPLICANT: Government of the District of Columbia

FEDERAL AGENCY: U. S. Department of the Interior, Federal Water Quality Administration.

FEDERAL PROGRAM AND AUTHORIZATION: Water Pollution Control-- Waste Treatment Works Construction Federal Water Pollution Control Act, as amended.

PROJECT DESCRIPTION:

The District of Columbia is seeking assistance from the Federal Water Quality Administration for expansion of its Water Pollution Control Plant (Blue Plains.) The total cost of the proposed projects under review for the initial phase of the expansion is estimated at$90,673,084, of which $49,870,196 is sought in grant funds from FWQA and the remainder, $40,802,888 would be supplied by the applicant.

The initial phase of the proposed expansion involves three Projects. The first of these projects (WPC-DC-22) is for the construction of additional primary treatment facilities, including grit removal facilities, preliminary sedimentation tanks, and a chlorine contact tank. The total cost of these facilities is estimated at $17,265,000 of which $9,495,750 is sought as a grant and $7,769,250 would be provided in local funds.

The second of these projects (WPC-DC-23) is for the construction of additional sludge processing facilities, including eight flotation thickening tanks, four sludge blending tanks, twenty vacuum filters, and six multiple hearth furnaces. The total cost of this project is estimated at $27,327,000, of which $15,029,850 is sought as a grant and the remainder, $12,297,150 would be supplied in local funds for which the District of Columbia has requested loan authority from the Congress.

The third project (WPC-DC-24) is for the construction of additional secondary treatment facilities including six aeration tanks, fifteen secondary sedimentation tanks, expansion of the existing blower facility, an additional blower facility, and modifications to the existing sedimentation tanks. The total estimated cost of these facilities is $46, 081, 084 of which $25,344,596 is requested as a grant and $20,736,488 would be contributed in local funds for which loan authority has been requested from the Congress.

The three projects are designed to provide grit removal, primary sedimentation capacity, sludge processing capacity, incineration of dewatered sludge, aeration, and secondary sedimentation capacity for the 1980 design rate of 309 million gallons per day for a service population of 2,227,000. All of the proposed facilities are designed to be accommodated on the present site of the Plant.

The present (average daily) design capacity at Blue Plains is 240 million gallons per day (mgd). A recent Federal Water Quality Administration report indicates that the total current average flow at the plant is about 249 mgd. At present, the hydraulic load on the plant from the District of Columbia is about 124 mgd, from Maryland is about 114 mgd, and from Virginia is about 11 mgd. The report indicates that as a consequence of earlier agreements, the Washington Suburban Sanitary Commission has "purchased" about 45 mgd of treatment plant capacity, and by virtue of agreements associated with the Potomac Interceptor, has acquired rights to 22 mgd. However, the June 2, 1970, memorandum of the Sewer Task Force of Montgomery County points out that no authority has been granted to either the enforcement conference of the Secretary of the Interior to make any determination as to the degree of the respective parties' rights in the facility. The Sewer Task Force Report further states that the vested capacity rights under agreements between the District of Columbia and the WSSC appear to be far in excess of 67 mgd. The WSSC believes that it has reserved under the agreements, peak flows of 267 mgd which would require a treatment capacity of approximately 135 mgd. On the assumption that the District of Columbia can, in the foreseeable future, need up to 170 mgd daily average (by the year 2000), based upon the Metcalf and Eddy report prepared for the District of Columbia Department of Sanitary Engineering as modified by more recent population projections for the District of Columbia by Hammer, Greene, Siler, Associates, a design demand (average daily) for 295 mgd (170 + 114 + 11) is already seen to exist, if present contributions from Maryland and Virginia are neither expanded to nor diverted from Blue Plains. Reliable estimates suggest that, even by taking special measures, discussed below, the site cannot accommodate more than 419 mgd of total hydraulic capacity. The facilities currently under review would expand biological (secondary) treatment capacity to 309 mgd; a second phase of design would expand the total biological capacity to the full 419 mgd. The Metcalf and Eddy report indicates that an advanced waste treatment capacity of 419 mgd cannot be accommodated on the present site unless an additional 50-55 acres of land is made available through filling portions of the Potomac Estuary or by "double-decking" the plant. Either alternative would incur substantially greater dollar cost than construction on existing land; the first alternative has also been criticized as being possibly undesirable from an ecological viewpoint.

At the Blue Plains site, however, biological treatment capacity to remove BOD (biochemical oxygen demand) by itself is insufficient to protect the Potomac Estuary from degradation resulting from BOD loadings beyond those agreed to at the April-May 1969 sessions of the Enforcement Conference. The present plant was designed to remove 80% of the applied BOD as a result of the recommendations of the 1957 Potomac Enforcement Conference sessions, but is providing, at present, about 70% removal. In accordance with the recommendations of the 1969 session of the Enforcement Conference, the District of Columbia will be required to limit its discharge of BOD, phosphorus, and nitrogen to the Estuary to 12,700 pounds per day, 560 pounds per day (as P), and 6,130 pounds per day (as N), respectively, effectively requiring removal rates of 96%, 96%, and 85% respectively based on present flows. Recommendations of the continuing Potomac Enforcement Conference also call for continuous and effective disinfection (to reduce bacterial pollution) and for the removal of nitrogen and phosphorus to attempt to eliminate algae blooms and mitigate secondary oxygen depression due to the death and decay of those organisms. The Recommendations also established a detailed schedule for providing facilities to achieve the specified removal requirements.

Since the May, 1969 session of the Enforcement Conference, disinfection has been begun at all plants on the estuary, and the Federal Water Quality Administration (FWQA) has reported significant reductions of bacterial contamination. Meeting the removal requirements for biochemical oxygen demand (measured for convenience after five days (BOD_5)), nitrogen, and phosphorus, is not easily accompolished, and requires the coordinated use of conventional secondary biological treatment facilities, such as the ones currently under review, along with advanced waste treatment facilities (AWT) which are designed specifically for nitrogen and phosphorus removal but which also have the capability of removing additional BOD_5.

At the Potomac Enforcement Conference, it was agreed to limit the discharge of BOD_5 to the Potomac Estuary from Blue Plains to 12,700 pounds per day. At present flows and loading rates, Blue Plains is discharging about 94,000 pounds per day of BOD_5 to the estuary. At design flow (309 mgd) and a 90% removal rate, the facilities under design will permit the BOD_5 discharged to be reduced to 49,000 pounds per day. Complete conformance to the load limitation of 12,700 pounds per day can be achieved upon completion of the full complement of facilities. At that time, the entire facility, operating at a removal rate of 97.4% on a total flow of 309 mgd or 98.2% on 419 mgd, will cause a discharge of 12,700 pounds per day to the estuary. The former is well below, and the latter is well within, the range of treatment levels required at a plant which the FWQA proposes be constructed on the Anacostia River to relieve the loads at Blue Plains. The point should be stressed that at levels of treatment in this range, wastewater ceases to be a liability to the receiving water, and in fact, enhances its quality.

RELATIONSHIP TO METROPOLITAN PLANNING PROCESS AND THE ACHIEVEMENT OF AREAWIDE GOALS AND OBJECTIVES:

The projects described above have been submitted to COG in accordance with established Regional Review Procedures. Following an initial staff review of the projects, a pre-application conference was held at COG on May 11, 1970. A summary of that conference is attached to these review comments.

The projects are consistent with the Ten-Year Water and Sewerage Plans and Six-Year Programs for Montgomery and Prince George's Counties adopted by the WSSC, the M-NCPPC, and the Montgomery County Council and Prince George's County Board of Commissioners, respectively. They are also consistent with the recommendations of the Report on Sanitary Sewers and Waste Water Disposal in the Washington Metropolitan Region adopted by COG in 1965 and Water and Sewerage Facilities Planning and Programming in the Washington Metropolitan Area approved by COG's Board of Directors on October 9, 1969.

The COG studies were based on population projections of about 5 million persons by the Year 2000. Since that time an economic base study sponsored by COG has suggested a much more rapid rate of growth. A special task force of COG members is currently assisting the impace of these projections; including their impact on planning for water and sewerage facilities.

The Blue Plains Water Pollution Control Plant, which treats approximately 80% of all municipal wastes in metropolitan Washington, plays a vital role in the protection of the Potomac River in the Washington metropolitan area. It treats wastes which drain naturally to its site from the District of Columbia (D.C.), and by virtue of agreements between D.C. and the Washington Suburban Sanitary Commission (WSSC), it treats wastes conveyed by interceptors through the Rock Creek and Anacostia valleys. This relieves those valleys from the need to carry treated effluent through District of Columbia parkland. Moreover, in 1961, in order to protect water supply intakes at Great Falls and Little Falls, Congress authorized the construction of the Potomac Interceptor to convey sewage to Blue Plains for treatment from Dulles Airport and adjacent territory in Virginia and Maryland. In 1961, the "no effluent policy", which discouraged the discharge of wastewaters to the Potomac and its tributaries between the Monocacy River and Little Falls, was adopted by the Regional Sanitary Advisory Board. That policy was amplified without change in concept in recognition of emerging waste treatment technology and the Federal requirements for adoption and enforcement of stream standards by the states in 1969. At the present time, studies by the Corps of Engineers and the Federal Water Quality Administration, and legislation pending in the Senate of the United States, suggest that the Potomac estuary itself may become a source of municipal water supply for the metropolitan region.

Protection of the estuary, especially as a possible water resource, must be the primary objective of all persons and agencies concerned with water pollution control in the Washington metropolitan area. To that end, the facilities under review represent critical components of a total system, and are desperately needed. Recommendations of the Enforcement Conference, in fact, call for their completion by 1975-1977. In order to protect the Potomac River, especially as a water supply source, preference for the restricted capacity available at the Blue Plains site must be given to jurisdictions draining naturally to the estuary and to those entitled to such capacity under agreements associated with the Potomac Interceptor. Whenever possible, capacity should also be made available for other flows which would otherwise need to be discharged to the Potomac river above water supply intakes. For the time when flows to Blue Plains will exceed the presently known limit of 419 mgd, all jurisdictions will need to consider the benefits to be achieved from the use of alternate locations for the treatment and discharge of sewage.

The need to protect the region's primary water supply, the feasibility of alternate treatment systems, the region's rapid growth rate, and the impact of the region's water and sewerage facilities system on its ability to maintain a desirable quality and quantity of growth are the main reasons why it is imperative that immediate consideration be given to alternative future roles for the Blue Plains facility and alternative systems of collecting and treating the region's liquid wastes.

The revision of COG's Water and Sewerage Facility Plan and Program, now in progress, must include these considerations. The agencies and jurisdictions affected must also consider such alternatives.

It should be noted that the Montgomery County Planning Board has historically supported efforts to improve the quality of the region's water resources through pollution abatement. Consequently, it endorses the proposed improvements to the Blue Plains facility, but feels that such expansion should include adequate provision for tertiary treatment even if the requested 51 acres of landfill are not secured.

STAFF RECOMMENDATION:

The staff recommends that its comments be endorsed by the Health and Environmental Protection Policy Committee and the Land Use Policy Committee.

PPLI ANTS' S ATEMENT
ON
PLANNING AG REVIEW
APPLIC I S FOR CO RU TI N GRANTS
UNDER 3 USC 466 et seq.

DATE: June 18, 1970

APPLICANT: Government of the District of Columbia

ADDRESS: District Building, 14th & E Streets, N.W., Washington, D.C. 20004

PROJECT DESCRIPTION: C nstruction of additional primary treatment facilities at the District's Water Pollution Control Plant. Included are grit removal facilities, preliminary sedimentation tanks, chlorine contact tank, and miscellaneous connecting conduits.

STATEMENT (Check Applicable):

X 1. Application is accompanied by comments and recommendations of planning agency which have been considered prior to submission. If the pro ect described above does n t conform with the comprehensi e plan de eloped or in process of devel pment for the metropolitan area in which it is located pro ide expl na- tion on attached sheet.

X 2. Applicant wishes to be considered for a 10 per ent increase in grant pursuant to Section 8(f) of the Federal Water Pollution Control Act.

___ 3. Application is not accompanied by comments and recommendations of planning agency, because:

___ (a) no agency has been designated to perform metropolitan or regional planning for the area in which the project is located, or

___ (b) the application has lain before an appropriate planning agency for a period of sixty days without comment or recommendations.

RECEIVED
JUN 19 1970
WATER QUALITY CONTROL
DIVISION

Norman E. Jackson
(Signature)
Authorized Representative of Applicant

RECEIVED
JUN 23 1970
FWQA

M11

PPLI. ANTS' S:ATEMENT
ON
PLANNING AGENCY REVIEW
APPLICATIONS FOR CONSTRUCTION GRANTS
UNDER 3. USC 466 et seq.

DATE: June 18, 1970

PPLICANT: Government of the District of Columbia

DDRESS: District Building, 14th & E Streets, N.W., Washingtion, D.C. 20004

ROJECT DESCRIPTION: Construction of additional secondary treatment facilities of the District's Water Pollution Control Plant. Included are six aeration tanks, fifteen secondary sedimentation tanks, expansion of existing blower facility, additional blower facility, modifications to existing sedimentation tanks, and miscellaneous connecting conduits.

TATEMENT (Check Applicable):

x 1. Application is accompanied by comments and recommendations of planning agency which have been considered prior to submission. If the project described above does not conform with the comprehensive plan developed or in process of development for the metropolitan area in which it is located provide explanation on attached sheet.

X 2. Applicant wishes to be considered for a 10 percent increase in grant pursuant to Section 8(f) of the Federal Water Pollution Control Act.

____ 3. Application is not accompanied by comments and recommendations of planning agency, because:

____ (a) no agency has been designated to perform metropolitan or regional planning for the area in which the project is located, or

____ (b) the application has lain before an appropriate planning agency for a period of sixty days without comment or recommendations.

Norman E. Jackson
(Signature)
Authorized Representative of Applicant

RECEIVED
JUN 1? 1970
WATER QUALITY CONTROL
DIVISION

RECEIVED
JUN 2? 1970
FWQA

PPLI ANTS' S ATEMENT
ON
PLANNING AGENCY REVIEW
APPLICATIONS FOR CONSTRUCTION GRANTS
UNDER 3 USC 466 et seq.

DATE: June 18, 1970

APPLICANT: Government of the District of Columbia

ADDRESS: District Building, 14th & E Streets, N.W., Washingtion, D.C. 20004

PROJECT DESCRIPTION: Construction of new Sludge Processing Facilities to replace existing facilities at the District's Water Pollution Control Plant. Included are eight flotation thickening tanks, four sludge blending tanks, twenty vacuum filters, six multiple hearth furnaces, and necessary and required structure to house same.

STATEMENT (Check Applicable):

X 1. Application is accompanied by comments and recommendations of planning agency which have been considered prior to submission. If the pro ect described above does not conform with the comprehensive plan developed or in process of development for the metropolitan area in which it is located pro ide explanation on attached sheet.

X 2. Applicant wishes to be considered for a 10 percent increase in grant pursuant to Section 8(f) of the Federal Water Pollution Control Act.

____ 3. Application is not accompanied by comments and recommendations of planning agency, because:

____ (a) no agency has been designated to perform metropolitan or regional planning for the area in which the project is located, or

____ (b) the application has lain before an appropriate planning agency for a period of sixty days without comment or recommendations.

Norman E. Jackson
(Signature)
Authorized Representative of Applicant

RECEIVED
JUN 19 1970
WATER QUALITY CONTROL DIVISION

RECEIVED
JUN 23 1970
WQA

M13

APPLICANTS' STATEMENT
ON
PLANNING AGENCY REVIEW
APPLICATIONS FOR CONSTRUCTION GRANTS
UNDER 33 USC 466 et seq.

DATE: October 28, 1970

APPLICANT: Washington Suburban Sanitary Commission

ADDRESS: 4017 Hamilton Street, Hyattsville, Maryland 20781

PROJECT DESCRIPTION: Expansion of District of Columbia's Water Pollution Control Plant at Blue Plains

STATEMENT (Check Applicable):

_*_ 1. Application is accompanied by comments and recommendations of planning agency which have been considered prior to submission If the project described above does not conform with the comprehensive plan developed or in process of development for the metropolitan area in which it is located provide explanation on attached sheet.

_x_ 2. Applicant wishes to be considered for a 10 percent increase in grant pursuant to Section 8 (f) of the Federal Water Pollution Control Act.

___ 3. Application is not accompanied by comments and recommendations of planning agency, because:

___ (a) no agency has been designated to perform metropolitan or regional planning for the area in which the project is located, or

___ (b) the application has lain before an appropriate planning agency for a period of sixty days without comment or recommendations.

* Comments and Recommendations by the Metropolitan Washington Council of Governments forwarded through District of Columbia Government.

Robt J McLeod

(Signature)
Authorized Representative of Applicant
Robert J. McLeod, General Manager and
Chief Engineer

OCT 30 1970
FWQA

D.C.-44
May 1967

Memorandum • Government of the District of Columbia

TO:	Norman E. Jackson, Director Department of Sanitary Engineering	Department, Agency, Office:	Executive Office Budget & Executive Management
FROM:	Comer S. Coppie Budget Officer, D. C.	Date:	MAR 10 1971

SUBJECT: Clearinghouse Review of Project WPC-DC-26

This Office has concluded its review of your request for a federal construction grant to modernize and expand the Water Pollution Control Plant at Blue Plains. The construction of an adequate waste treatment facility is greatly needed to improve the water quality in and around the District of Columbia.

This project is in accord with the interests of the District of Columbia; therefore, we recommend that you proceed with the necessary action to obtain funding for this project.

MR. Frese
MR. Robertson
MR. Reed

RECEIVED
MAR 19 1971
FWQA

W-8

D.C.-44
May 1967

Memorandum • Government of the District of Columbia

TO:	Norman E. Jackson, Director Department of Sanitary Engineering	Department, Agency, Office:	Executive Office Budget & Executive Management
FROM:	Comer S. Coppie Budget Officer, D.C.	Date:	MAR 11 1971
SUBJECT:	Clearinghouse Review of Project WPC-DC-23		

This Office has concluded its review of your proposed project for the construction of new Sludge Processing Facilities to supplement existing facilities at the District of Columbia's Water Pollution Control Plant.

As specified in Section 401(a) of the Intergovernmental Cooperation Act of 1968, it is our finding that this project contributes to the achievement of the objectives of the District of Columbia.

We recommend that you proceed with the necessary action to obtaining funding for this project.

RECEIVED
MAR 25 1971
FWQA

W-8

D.C.-44
May 1967

Memorandum ● Government of the District of Columbia

'71 ... 58

TO:	Norman E. Jackson, Director Department of Sanitary Engineering	Department, Agency, Office:	Executive Office Budget & Executive Management
FROM:	Comer S. Coppie Budget Officer, D. C.	Date:	MAR 11 1971
SUBJECT:	Clearinghouse Review of Project WPC-DC-24		

This Office has concluded its review of your proposed project for the construction of additional secondary treatment facilities at the District's Water Pollution Control Plant.

As specified in Section 401(a) of the Intergovernmental Cooperation of 1968, it is our finding that this project contributes to the achievement of the objectives of the District of Columbia.

We recommend that you proceed with the necessary action to obtain funding for this project.

RECEIVED
MAR 25 1971
FWQA

W-8

metropolitan washington
COUNCIL OF GOVERNMENTS
1225 Connecticut Avenue, N.W., Washington, D.C. 20036 223-6800

April 27, 1971

Mr. Norman E. Jackson, P.E.
Director of Sanitary Engineering
District of Columbia
415 12th Street, N.W.
Washington, D.C. 20004

Dear Mr. Jackson:

We have concluded our review of the Environmental Statement for the project cited below. Six copies of our comments on the Environmental Statement are enclosed. These comments were endorsed by the Health and Environmental Protection Policy Committee at its April 23, 1971 meeting.

In endorsing the staff comments, the Committee strongly emphasized the need to proceed with the project with all appropriate environmental safeguards in view of the adverse economic and environmental consequences of delay in the expansion and upgrading of Blue Plains.

Subsequent to the consideration of this project by the Health and Environmental Protection Policy Committee, the Council of Governments received your letter dated April 22, 1971, responding to our earlier comments. We are pleased to note your willingness to provide environmental safeguards in the pursuit of this project, and trust that additional environmental controls will be applied if found necessary.

If we may be of further assistance, please call upon us.

Sincerely yours,

Walter A. Scheiber
Executive Director

RE: COG No. 71-DC-W/S-2
D.C. Water Pollution Control Plan Expansion - Dredging and Dock Facilities; General Excavation and Dewatering; Concrete Plant

cc: Hon. Walter E. Washington, Mayor
District of Columbia
Hon. James P. Gleason, County Executive
Montgomery County
Hon. Idamae Garrott, President
Montgomery County Council

Hon. William W. Gullett, County Executive
Prince George's County
Hon. Winfield M. Kelly, Jr., Chairman
Prince George's County Council
Hon. Achilles M. Tuchtan, Mayor
City of Rockville
Hon. George M. Miller, Mayor
City of Takoma Park
Hon. William R. Reading, Mayor
City of College Park
Hon. Edgar L. Smith, Mayor
City of Greenbelt
Hon. William S. Hoofnagle, Chairman
Fairfax County Board of Supervisors
Hon. Joseph L. Fisher, Chairman
Arlington County Board
Hon. Thomas G. Eastham, Mayor
City of Falls Church
Hon. Donald R. Bowman, Chairman
Northern Virginia Planning District Commission
Mrs. Caroline Freeland, Chairman
Maryland-National Capital Park and Planning Commission
Mr. Charles J. Jeckell, Chairman
Regional Sanitary Advisory Board
Mr. Robert B. Russ, Chairman
Waste Water Committee, RSAB

METROPOLITAN CLEARINGHOUSE REVIEW COMMENTS

COG PROJECT NUMBER: 71-DC-W/S-2

PROJECT NAME: D.C. Water Pollution Control Plant Expansion - Dredging and Dock Facilities; General Excavation and Dewatering; Concrete Plant

APPLICANT: District of Columbia Government

FEDERAL AGENCY: Environmental Protection Agency-Water Quality Office

FEDERAL PROGRAM AND AUTHORIZATION: Construction Grants for Wastewater Treatment Works, Federal Water Pollution Control Act, as amended.

PROJECT DESCRIPTION:

The District of Columbia Department of Sanitary Engineering is making application to the Water Quality Office for financial assistance to support a number of activities that will facilitate the construction involved in the expansion of the D.C. Water Pollution Control Plant (Blue Plains). These activities involve dredging and shoreline adjustments of the Potomac River to provide access to the Plant site by water. The dredging would create an entrance channel and turning basin with a uniform depth of 16 feet below mean low water, which is generally less than two feet.

Docking facilities, 1200 feet long by 75 feet wide would be constructed, over the water, adjacent to the turning basin. During construction, the dock would be used in transporting excavated materials downriver and in receiving raw materials for the concrete batch plant, thereafter it would be used to transfer chemicals used in the treatment processes and residue resulting from the processes.

This project, in addition would support advance preparation of the construction site, including excavation for all facilities, sheeting and dewatering, utilities, roads and lighting. The excavated materials would be used to restore Dyke Marsh. The project also would allow the construction of a plant for bulk batch concrete processing adjacent to the proposed docking facilities. Total project costs are estimated at $46,900,000 of which the District of Columbia would provide $10,450,035 in cash and seeks $12,772,265 in grant funds. An additional $22,463,460 would be provided by the Washington Suburban Sanitary Commission and $1,214,240 by Fairfax County.

RELATIONSHIP TO THE METROPOLITAN PLANNING PROCESS AND THE ACHIEVEMENT OF AREAWIDE GOALS AND OBJECTIVES:

The need for expanded and upgraded waste water treatment facilities at the Blue Plains site is undeniable, and is supported by the recommendations of the Potomac Enforcement Conference and by the Memorandum of Understanding prepared by responsible participants in the Conference. The expansion of Blue Plains was endorsed by the Council of Governments on June 12, 1970. Maryland-National Capital Park and Planning Commission, in a letter dated April 6, 1971, has urgently recommended approval of the project.

The limited space available at the Blue Plains site, along with the compressed time schedule for completion of the Blue Plains plant expansion are each factors which can create adverse environmental effects if proper precautions are not taken.

The need to dredge portions of the Estuary, occasioned by the compressed time schedule and space limitations, could create environmental impacts at both the dredging and disposal points. The river bottom in the vicinity of the Water Pollution Control Plant is almost certainly covered with a blanket of sludge which may, in turn, contain pathogenic organisms as well as high concentrations of nutrient materials and possibly heavy metals and pesticides, as well as being a source of immediate oxygen demand, if disturbed. The staff understands that the D.C. Community Health Services Administration has reviewed this proposal and concluded that the dredging operations will not contravene the water quality standards of the District of Columbia. It would be desirable that more adequate discussion of this matter be included in the Environmental Impact Statement.

It also appears that a large volume of spoil will be created in carrying out excavation on the dry land portion of the site. The plans for disposal of such spoil should be more clearly addressed in the statement, and the techniques to be used to prevent erosion and sedimentation of excavated materials and to meet the sediment control regulations of the District of Columbia should be specified.

The concrete batching plant necessitated by the unusual construction requirement at the site could, if not properly designed, contribute to air pollution. The D.C. Department of Sanitary Engineering is encouraged to include a discussion of the steps to be taken to ensure compliance of the batching plant with all appropriate air pollution control standards.

STAFF RECOMMENDATION:

The staff recommends the endorsement of these comments by the Health and Environmental Protection Policy Committee.

MARYLAND

DEPARTMENT OF STATE PLANNING

MARVIN MANDEL
GOVERNOR

301 WEST PRESTON STREET
BALTIMORE, MARYLAND 21201
TELEPHONE: 301-383-2451

VLADIMIR A. WAHBE
SECRETARY OF STATE PLANNING
NORMAN PEDDER
DEPUTY SECRETARY

July 7, 1971

Mr. Straty Zervakos
Principal Engineer
Washington Suburban Sanitary Commission
4017 Hamilton Street
Hyattsville, Maryland 20781

Dear Mr. Zervakos:

SUBJECT: PROJECT NOTIFICATION AND REVIEW

Applicant: WSSC

Project: Docking Facilities at D. C. Plant

State Clearinghouse Control Number: 405

State Clearinghouse Contact: Allen Miles (383-2471)

The State Clearinghouse has reviewed the above project. In accordance with the procedures established by the Office of Management and Budget Circular A-95, the State Clearinghouse received comments (copies attached) from the following:

Department of Health and Mental Hygiene: recommended approval, noting that this project provides facilities to be used for the massive construction techniques required to complete plant expansion by 1974.

Department of Natural Resources: recommended approval.

As a result of the review, it has been determined that the proposed project is in accord with State plans, programs, and objectives as of this date.

You should now complete and file your formal application. A copy of this letter must be attached to your application. Please notify this State Clearinghouse of the filing date as soon as the application is submitted by completing and forwarding the enclosed, self-addressed card. If you have any questions, please contact the State Clearinghouse member named above.

RECEIVED 1971

Sincerely,

Vladimir Wahbe

Enc.
cc: Joseph Anastasi
Gerard Devlin
W. McLean Bingley
Herbert M. Sachs

M22

MARYLAND

DEPARTMENT OF STATE PLANNING

301 WEST PRESTON STREET
BALTIMORE MARYLAND 21201
TELEPHONE 301-383-2451

MARVIN MANDEL
GOVERNOR

July 7, 1971

Mr. Straty Zervakos
Principal Engineer
Washington Suburban Sanitary Commission
4017 Hamilton Street
Hyattsville, Maryland 20781

SUBJECT: PROJECT NOTIFICATION AND REVIEW

Applicant: Washington Suburban Sanitary Commission

Project: New Sludge Processing Facility at D. C. Plant

State Clearinghouse Control Number: 406

State Clearinghouse Contact: Allen Miles (383-2471)

Dear Mr. Zervakos:

The State Clearinghouse has reviewed the above project. In accordance with the procedures established by the Office of Management and Budget Circular A-95, the State Clearinghouse received comments (copies attached) from the following:

Department of Natural Resources: recommended approval.

Department of Health and Mental Hygiene: recommended approval, noting that this plant expansion is in accordance with the recommendation of the Potomac Enforcement Conference and that a Federal grant offer of $7,358,170 was issued on May 20, 1971.

As a result of the review, it has been determined that the proposed project is in accord with State plans, programs, and objectives as of this date.

You should now complete and file your formal application. A copy of this letter must be attached to your application. Please notify this State Clearinghouse of the filing date as soon as the application is submitted by completing and forwarding the enclosed, self-addressed card. If you have any questions, please contact the State Clearinghouse member named above.

Sincerely,

Vladimir Wahbe

Enc.
cc: Joseph Anastasi   Herbert M. Sachs
    Gerard Devlin   W. McLean Bingley

MARYLAND
DEPARTMENT OF STATE PLANNING
301 WEST PRESTON STREET
BALTIMORE MARYLAND 21201
TELEPHONE 301-383-2451

July 7, 1971

Mr. Straty Zervakos
Principal Engineer
Washington Suburban Sanitary Commission
4017 Hamilton Street
Hyattsville, Maryland 20781

SUBJECT: PROJECT NOTIFICATION AND REVIEW

Applicant: Washington Suburban Sanitary Commission

Project: Additional Primary Treatment Facilities at D. C. Plant

State Clearinghouse Control Number: 407

State Clearinghouse Contact: Allen Miles (383-2471)

Dear Mr. Zervakos:

The State Clearinghouse has reviewed the above project. In accordance with the procedures established by the Office of Management and Budget Circular A-95, the State Clearinghouse received comments (copies attached) from the following:

Department of Natural Resources: recommended approval.

Department of Health and Mental Hygiene: recommended approval, noting that a $2,500,000 Federal grant for this project was approved on November 6, 1970, and increased by $250,000 on November 16, 1970.

As a result of the review, it has been determined that the proposed project is in accord with State plans, programs, and objectives as of this date.

You should now complete and file your formal application. A copy of this letter must be attached to your application. Please notify this State Clearinghouse of the filing date as soon as the application is submitted by completing and forwarding the enclosed, self-addressed card. If you have any questions, please contact the State Clearinghouse member named above.

Sincerely,

Vladimir Wahbe

RECEIVED
1971

Enc.
cc: Joseph Anastasi
Gerard Devlin
Herbert M. Sachs
W. McLean Bingley

CHARLES H. GRAVES
DIRECTOR

COMMONWEALTH OF VIRGINIA
GOVERNOR'S OFFICE
OFFICE OF ADMINISTRATION
DIVISION OF STATE PLANNING AND COMMUNITY AFFAIRS
1010 JAMES MADISON BUILDING
109 GOVERNOR STREET
RICHMOND, VIRGINIA 23219

...IVED
JUL - 8 1971
FWQA

FEDERAL PROGRAMS SECTION
TELEPHONE (703) 770-4851

MEMORANDUM

TO: Federal State Aid Coordinator
4100 Chain Bridge Road
Fairfax, Virginia 22030

FROM: A-95 Project Review Officer
Division of State Planning and Community Affairs

SUBJECT: Project Notification and Review
Applicant: County of Fairfax
Project: D.C. Water Pollution Control Plant (Blue Plains)
State Clearinghouse Control Number: 71 060 125
DSPCA Staff Contact: C. R. Burbach

The State Clearinghouse has reviewed the Summary Notification for the above project.

As a result of the review, it has been determined that the proposed project is in accord with State plans, programs and objectives as of this date. You should now complete and file your formal application with the appropriate Federal agency(s). A copy of this form must be attached to your application.

Please notify this State Clearinghouse of the filing date as soon as your application is submitted. If you have any questions, please contact the DSPCA staff member named above.

Comment: Div. of Engineering, Dept. of Health "endorses the projects for additional treatment facilities".

C. R. Burbach
A-95 State Review Officer

Copy to Regional Clearinghouse

Form SC-A95-4

DEPT. OF STATE PLANNING
RECEIVED
OCT 1 9 1971

Date: October 15, 1971

Maryland Department of State Planning
State Office Building
301 West Preston Street
Baltimore, Maryland 21201

SUBJECT: PROJECT SUMMARY NOTIFICATION REVIEW

Applicant: Washington Suburban Sanitary Commission

Project: Blue Plains - Chemical Handling Facilities and Operations Building (WPC-MD-299)

State Clearinghouse Control Number: 516

CHECK ONE

1. This agency does not have an interest in the above project. ______

2. The above project is consistent with this agency's plans or objectives and we recommend approval of the project. ______

3. This agency has further interest in and/or questions concerning the above project and wishes to confer with the applicant. ______
Our interest or questions are shown on enclosed attachment.

4. This agency does not believe a conference is necessary, but wishes to make favorable or qualifying comments shown on enclosed attachment. x

Signature W. McLean Bingley [illegible]

Title Chief, Division of Water & Sewerage

Agency Environmental Health Administration

WMcLB:CEG:dls
Attachment
cc: Department of Natural Resources

October 15, 1971

ATTACHMENT TO THE
PROJECT SUMMARY NOTIFICATION REVIEW

Blue Plains - Chemical Handling Facilities
and Operations Building (WPC-MD-299)

This project is a phase of the major expansion of the Blue Plains Treatment Plant. This plant is being expanded in accordance with the recommendations of the Potomac Enforcement Conference and the "Memorandum of Understanding" in order to meet water quality standards established for the Potomac River. You may be interested to know that the Federal grant for the District of Columbia portion of this project was approved on September 28, 1971, and the Federal grants for the Maryland and Virginia portions were approved on October 7, 1971. We also suggest that you change the project designation for this project to "Blue Plains - Secondary Treatment" as that title more adequately describes the work to be accomplished.

Signature [illegible]

Title Chief, Division of Water and Sewerage

Agency Environmental Health Administration

WMcLB:CEG:dls

cc: Department of Natural
Resources

Date: October 8, 1971

OCT 21 1971

Maryland Department of State Planning
State Office Building
301 West Preston Street
Baltimore, Maryland 21201

SUBJECT: PROJECT SUMMARY NOTIFICATION REVIEW

Applicant: Washington Suburban Sanitary Commission

Project: Blue Plains - Chemical Handling Facilities and Operations Building

State Clearinghouse Control Number: #516

CHECK ONE

1. This agency does not have an interest in the above project.______

2. The above project is consistent with this agency's plans or objectives and we recommend approval of the project. XXXXX

3. This agency has further interest in and/or questions concerning the above project and wishes to confer with the applicant.______
Our interest or questions are shown on enclosed attachment.

4. This agency does not believe a conference is necessary, but wishes to make favorable or qualifying comments shown on enclosed attachment.______

The Maryland Environmental Service is involved in the disposal of raw sludge resulting from the chemical treatment of the sewage for approximately twenty months before incinerators are completed at the end of 1973. Investigation of alternate methods and sites of disposal are being conducted in cooperation with E.P.A., Department of Health and Mental Hygiene, Department of Water Resources, and representatives of the Water Pollution Control Division of Blue Plains.

Signature [signature]

Title Assistant Secretary

Agency Dept. of Natural Resources

cc: Thomas C. Andrews, MES
Edgar H. Hollis, F&WA
Joseph Knapp, DWR
William A. Parr, F&P
W. McL. Bingley, SHD

MARYLAND
DEPARTMENT OF STATE PLANNING
301 WEST PRESTON STREET
BALTIMORE, MARYLAND 21201
TELEPHONE 301-383-2451

MARVIN MANDEL
GOVERNOR

VLADIMIR A. WAHBE
SECRETARY OF STATE PLANNING
NORMAN HEBDEN
DEPUTY SECRETARY

November 30, 1971

REVIEWED
DEC 2 1971

Mr. Straty Zervakos
Principal Engineer
Washington Suburban Sanitary Commission
4017 Hamilton Street
Hyattsville, Maryland 20781

SUBJECT: PROJECT NOTIFICATION AND REVIEW

Applicant: Washington Suburban Sanitary Commission

Project: Blue Plains - Secondary Treatment -
Chemical Handling Facilities and Operations Building

Funds: Federal - $11,755,582; State - $5,343,447; Local - $4,274,557

State Clearinghouse Control Number: 516

State Clearinghouse Contact: Edwin L. Powell, Jr. (383-2467)

Dear Mr. Zervakos:

The State Clearinghouse has reviewed the above project. In accordance with the procedures established by the Office of Management and Budget Circular A-95, the State Clearinghouse received comments (copies attached) from the following:

Department of Health and Mental Hygiene: recommended approval, noting that Federal grants for this project were approved for the District of Columbia (September 28, 1971) and for Maryland and Virginia (October 7, 1971).
Department of Natural Resources: recommended approval, noting the department's involvement in the development of sludge disposal programs.

As a result of the review, it has been determined that the proposed project is in accord with State plans, programs, and objectives as of this date. Approval and funding is recommended.

You should now complete and file your formal application. A copy of this letter must be attached to your application. Please notify this State Clearinghouse of the filing date and the amount of Federal funds requested as soon as the application is submitted by completing and forwarding the enclosed, self-addressed card. If you have any questions, please contact the State Clearinghouse member named above.

Sincerely,

Vladimir Wahbe

Vladimir Wahbe

Enc.
cc: Joseph Anastasi
Gerard Devlin
W. McLean Bingley
Herbert M. Sachs
Walter A. Scheiber

M29

COMMENTS AND RECOMMENDATIONS

OF

STATE, REGIONAL OR METROPOLITAN CLEARINGHOUSES

DATE: ____________________

Project Number: 516

Clearinghouse or planning agency:

Name: Maryland Department of State Planning

Address: 301 West Preston Street
Baltimore, Maryland 21201

Source of Authority for Establishment of Agency:
Chapter 155 - Maryland Laws of 1969

An application is to be made under 33 USC 466 et seq. to the Water Quality Office, Environmental Protection Agency. The estimated date the application will be filed: September 17, 1971

Applicant's Name: Washington Suburban Sanitary Commission
4017 Hamilton Street
Address: Hyattsville, Maryland 20781

Geographic Location of Project: In District of Columbia, south of confluence of Anacostia and Potomac Rivers at Blue Plains (D. C. Water Pollution Control Plant)

Project Description:
Additional Secondary Treatment, Chemical Handling Facilities and Operations Building at D. C. Plant.

Clearinghouse Certification:

The project described above does (X) does not ( ) conform with the comprehensive plan developed or in process of development for the metropolitan area in which it is located.

Comments and Recommendations:
The State Clearinghouse reviewed this project and made final comments in the letter of November 30, 1971 (copy attached). As a result of this review, we recommend that the project be approved and funded.

Vladimir Wahbe

Authorized Representative of Clearinghouse
(Signature)
Vladimir Wahbe
Secretary, Department of State Planning

GOVERNMENT OF THE DISTRICT OF COLUMBIA

EXECUTIVE OFFICE

SPECIAL ASSISTANT TO THE
MAYOR-COMMISSIONER
OFFICE OF BUDGET AND PROGRAM ANALYSIS

REPLY TO:
ROOM 423, DISTRICT BUILDING
14TH & E STREETS, N. W.
WASHINGTON, D. C. 20004

DEC 1 1971

Mr. James Alexander, Director
Department of Environmental Services
Presidential Building
415 12th Street, N. W.
Washington, D. C. 20004

Dear Mr. Alexander:

This Office has concluded its review of your application requesting Federal assistance to construct tertiary facilities at the District of Columbia's Water Pollution Control Plant (WPC-DC-27).

Our review has indicated that this project is consistent with the interests and objectives of the District of Columbia. We recommend that your proceed with the next step in the development of this project, namely, submission of your application to the appropriate Federal agency for funding consideration.

Sincerely yours,

Comer S. Copple

Comer S. Copple
Special Assistant to the
Mayor-Commissioner

GOVERNMENT OF THE DISTRICT OF COLUMBIA

EXECUTIVE OFFICE

SPECIAL ASSISTANT TO THE
MAYOR-COMMISSIONER
OFFICE OF BUDGET AND PROGRAM ANALYSIS

REPLY TO:
ROOM 423, DISTRICT BUILDING
14TH & E STREETS, N. W.
WASHINGTON, D. C. 20004

DEC 6 1971

Mr. James Alexander, Director
Department of Environmental Services
Presidential Building
415 12th Street, N. W.
Washington, D. C. 20004

Dear Mr. Alexander:

This Office has concluded its review of your request for Federal assistance to construct wastewater treatment facilities at the District of Columbia's Water Pollution Control Plant (WPC-DC-28).

Our review has indicated that this project is consistent with the interests and objectives of the District of Columbia. We recommend that you proceed with the next step in the development of this project, namely submission of your application to the appropriate Federal agency for funding consideration.

Sincerely yours,

Comer S. Copple
Special Assistant to the
Mayor-Commissioner

RECEIVED
JAN 17 1972
WQA

RECEIVED
JAN 10 1972
WATER QUALITY CONTROL
DIVISION

M32

COG 28 (8-10-71)

metropolitan washington
COUNCIL OF GOVERNMENTS
1225 Connecticut Avenue, N.W., Washington, D.C. 20036 223-6800

January 4, 1972

MEMORANDUM

TO: Mr. Paul V. Freese, Director
Water Resources Management Administration
D.C. Department of Environmental Services
415 12th Street, N.W.
Washington, D.C. 20004

SUBJECT: Review Comments on Final Application for

PROJECT: D.C. Water Pollution Control Plant Expansion - Tertiary facilities also site loaming, seeding and landscaping; wastewater treatment facilities

COG NO: 72-DC-W/S-3 and 72-DC-W/S-4

APPLICANT: D.C. Department of Environmental Services

As Metropolitan Clearinghouse for the Washington SMSA, the Council of Governments has concluded a review of the final application for the project noted above. The Council has endorsed the attached Metropolitan Clearinghouse Review Comments.

Endorsement of these Comments constitutes the Metropolitan Clearinghouse review that is required for this project. A copy of this Memorandum and the attached Comments should accompany your application when it is filed with the Federal Agency so as to indicate that this review has been completed.

Your cooperation with the Clearinghouse procedures is appreciated greatly.

Attachments

Executive Director

metropolitan washington
COUNCIL OF GOVERNMENTS
1225 Connecticut Avenue, N.W., Washington, D.C. 20036 223-6800

METROPOLITAN CLEARINGHOUSE REVIEW COMMENTS

COG PROJECT NUMBERS: 72-DC-W/S-3
72-DC-W/S-4

PROJECT NAME: D.C. Water Pollution Control Plant Expansion - Tertiary Facilities and site loaming, seeding, and landscaping

D.C. Water Pollution Control Plant Expansion - Waste Water Treatment Facilities

APPLICANT: Government of the District of Columbia

FEDERAL AGENCY: Environmental Protection Agency, Office of Water Programs

FEDERAL PROGRAM AND AUTHORIZATION: Federal Water Pollution Control Act, as amended

PROJECT DESCRIPTION:

The District of Columbia Government is making two related applications to the Environmental Protection Agency for grants totalling $47,518,062 for the purpose of constructing tertiary wastewater treatment and appurtenant facilities at its Water Pollution Control Plant at Blue Plains. Cost allocations in connection with these two projects are as follows:

District of Columbia	$ 28,195,300	$10,683,113
WSSC	60,608,634	22,964,427
Fairfax County	3,276,143	1,241,321
Federal	34,460,923	13,057,139
	$126,541,000	$47,946,000

Suburban jurisdictions and agencies participating in the upgrading and expansion of the facilities at Blue Plains are responsible for making their own independent applications for Federal grants.

RELATIONSHIP TO THE METROPOLITAN PLANNING PROCESS AND THE ACHIEVEMENT OF AREAWIDE GOALS AND OBJECTIVES:

Improvements to the District of Columbia Water Pollution Control Plant are being undertaken pursuant to water quality standards adopted by the District of Columbia and approved by the Secretary of the Interior in January, 1969, and recommendations of the Potomac Enforcement Conference. These standards are designed to provide recreational opportunities as a result

District of Columbia • Arlington County • Fairfax County • Loudoun County • Montgomery County • Prince George's County • Prince William County

of water quality improvement. Downstream uses to be benefited by upgrading wastewater treatment at Blue Plains include fish and wildlife propagation.

Loadings permitted by the Potomac Enforcement Conference at Blue Plains are as follows: BOD_5 - 12,700 pounds/day; phosphorus - 560 pounds/day; nitrogen - 6,130 pounds/day. In order to meet these effluent standards, construction of advanced waste treatment works (AWT) was recommended. Initially, it was envisioned that expansion of Blue Plains to 419 mgd (compared to 240 mgd existing design capacity) would be undertaken, but by a "*Memorandum of Understanding*" dated October, 1970 it was agreed that the plant would be expanded only to 309 mgd, with capacity to be allocated as follows:

District of Columbia	135 mgd
WSSC	148 mgd
*Dulles-Potomac Interceptor	18 mgd
Pimmit Run Interceptor	8 mgd
	309 mgd

*Seven mgd to be used by WSSC.

(An important corollary to the limitation of capacity at Blue Plains to 309 mgd is the necessity of the provision of additional treatment capacity in the Maryland suburbs.) Installation of AWT and other facilities will reduce BOD_5 loadings to Enforcment Conference effluent standards resulting in almost complete renovation of wastewater.

Improvement of water quality in the Potomac River will complement COG-adopted policies pertaining to the banks of the Potomac. By resolution of February 27, 1964, COG went on record in support of the preservation of scenic, historic, scientific, and recreational values of the Potomac shores. There are a number of existing open spaces and recreational facilities on the Potomac whose amenity will be directly increased by cleaner water--Fort Foote, Fort Washington, Pohick Regional Park, Fort Hunt, and the George Washington Memorial Parkway are examples.

Installation of AWT facilities at Blue Plains will directly contribute to the reduction of environmental pollution, one of COG's water resource goals. A second goal is the assurance of an adequate water supply. Construction of AWT facilities at Blue Plains may indirectly contribute to the future feasibility of utilizing estuary waters as emergency supplementary supplies during summertime low flow conditions. (The Corps of Engineers is at present designing an emergency estuary water intake.) In connection with the regional water supply question, reduced reliance upon the Blue Plains facility on the part of the Maryland suburbs will make necessary the construction of additional capacity to serve portions of Montgomery and Prince George's Counties which would otherwise be served at Blue Plains. Design of such facilities must be coordinated with due regard for regional water supply needs.

A third goal is the coordination of physical development. It has been demonstrated that the location and rate of urbanization in the Washington metropolitan area can be influenced by the location and timing of provision of sewer service. Until recently sewer service policy had not been used as a conscious tool of development policy, but the institution of ten-year sewer facilities planning in the Maryland suburban areas is rapidly changing this state of affairs. Reduced reliance upon Blue Plains will probably act to give suburban jurisdictions increased flexibility in local land use planning.

The environmental statement submitted in connection with this project states, "The proposed work is not expected to significantly affect population distribution or concentration even though land use plans in the tributary area were based on expansion and upgrading of the facility." This statement may be correct for those parts of Northern Virginia which are linked to Blue Plains via the Dulles-Potomac and Pimmit Run Interceptors and for whom capacity ceilings at Blue Plains appear sufficient, at least for the short run. The interim water quality management plan currently being prepared jointly by the Northern Virginia Planning District Commission, the Council of Governments, the Fairfax County Department of Public Works, the Alexandria Sanitation Authority, and the Arlington County Department of Public Utilities reaffirms the continued use of the Blue Plains facilities for affected Northern Virginia service areas and recommends no other alternative.

The Maryland suburbs, on the other hand, will need to develop additional treatment capacity in the relatively near future. To the extent that the removal of the Blue Plains alternative imposes a different set of regional or local constraints upon treatment plant site selection, location of future service areas, or other elements of facilities design, it is likely that allocations of households and employment will, in fact, differ from those afforded by the assumption of the unlimited expansion of the Blue Plains facility.

In order to evaluate the impact of public policies in transportation, sewer and water service, land use regulation, and open space, the EMPIRIC activity allocation model has been developed as part of the Council of Governments' comprehensive planning program. Through the model probable distributions of households and employment in response to major policy decisions, such as the location of a new freeway link, rapid transit line, or greatly expanded public sewer service, is determined. At present the EMPIRIC model is being used to examine four alternative growth configurations in connection with the re-evaluation of the original "Year 2000" policies plan adopted in January, 1964.

Two urban water resources projects are underway in COG's Department of Health and Environmental Protection that bear directly on water quality management planning. The first of these projects is a Demonstration Grant administered by the EPA. The objective of this project is to demonstrate that existing, but independently developed, mathematical models of different components of the urban water resource system can be operated in series in such a way as to estimate the impact of public policy on water quality in the Potomac River. Component models will simulate mathematically the growth of households and employment (EMPIRIC), water supply demand, water supply distribution, stormwater runoff and the Potomac Estuary.

This analysis package, in itself, is not intended to provide answers to the severe water quality problem in the Potomac. Rather it will be an operational "tool" for estimating and comparing the water quality implications of alternative metropolitan development patterns. It will be the kind of analysis that should be incorporated into metropolitan water quality management planning. Preliminary demonstrations of this methodology are anticipated before June, 1972.

STAFF RECOMMENDATION:

The staff recommends endorsement of these comments by the Health and Environmental Protection Policy Committee and the Land Use Policy Committee.

Dear Mr. Congressman!

BLUE PLAINS

WILL COST:

$35,770,000 per year

to operate the incinerator!

4,920 tons per day

(60% water) SLUDGE

$98,000 per day

PRODUCES STACK GAS

NOX 52-65 PPM (5.0 is ACCEPTABLE)

READ ON ------>

(#2.50/copy)

November 13, 1971

Dear Members of the 92nd Congress:

Environmentally concerned citizens call upon you to meet this national crisis:

*EVERY CONGRESSIONAL DISTRICT IN THE UNITED STATES HAS A SEWAGE OR WATER PROBLEM.

*A "CLEAN WATER" BILL IS BEING DISCUSSED BY THE HOUSE PUBLIC WORKS COMMITTEE. (the Senate bill is S. 2770) Passed 86-0. Muskie Bill.

*THIS STUDY OF THE BLUE PLAINS TREATMENT PLANT ON ROUTE 295 AND THE POTOMAC SHOWS WHY PHYSICAL-CHEMICAL TREATMENT AND RESULTANT BURNING OF SLUDGE WILL NOT SOLVE MUNICIPAL, INDUSTRIAL SEWAGE PROBLEMS, AND WILL TRANSFER THE POLLUTION PROBLEM FROM THE WATER TO THE AIR.

*PLEASE SUPPORT THE LAND-CONTAINED SYSTEM SECTIONS OF THE SENATE BILL (section 201, Section 209) BECAUSE THIS METHOD IS:

1. capable of handling industrial, municipal, storm water, agricultural wastes. See Muskegon studies. Document A.

2. not adding poisonous gasses (NOX), to the air by burning sludge. Document D--Washington Metropolitan Coalition on Clean Air.

3. it is cheaper both for capital outlay and operations. Document A Muskegon studies. Document C--Denver Metro Study.

4. it solves the problem of disposing of Viruses that escape the physical-chemical treatment method. Document E--Study of Viruses.

*PLEASE URGE YOUR COLLEAGUES TO REPORT THIS BILL OUT OF THE HOUSE PUBLIC WORKS COMMITTEE BEFORE THE END OF THIS SESSION OF CONGRESS.

Marian K. Agnew

Marian K. Agnew, President
Northern Virginia Conservation Council
BOX 304, ANNANDALE, VA. 22003

POTOMAC ENFORCEMENT CONFERENCE
November 10, 1971
Marian K. Agnew - Northern Virginia Conservation Council

Since we met here last month, I have received comments on my testimony that vary greatly both in content and in approach. I appologize to you for the fact that that document was a rather hasty job. We were not informed about the conference until several days before it convened, though we had monitored your publications. We therefore did not have time enough to do the research required to document fully our position. However, that situation has been rectified to the best of our ability. We therefore refer you to the reference materials at hand. Document A. is a cost and performance comparison for alternative treatment systems in Muskegon County, Michigan. These are the aerated lagoon spray irrigation facility versus two-stage activated sludge, chemical treatment and filtration system. The second document, B., contains pages from a report made for Congressman Vander Jagt by Battelle Laboratories, Richland, Washington, on the Lake Tahoe, California Plant. The third document, C., contains excerpts from a study made by Ronald McLaughlin, of Wright-McLaughlin Engineers, Denver, Edwin Bennett, Associate Professor, University of Colorado Department of Civil and Environmental Engineering, John Puntenney, Plant Superintendent and William Martin, Assistant Plant Superintendent, Metropolitan Denver Sewage Disposal District No. 1. This document is a study of the sludge incineration process at METRO, Denver.

Before our formal presentation, I feel that a philosophical comment on the nature of citizen organizations and their roles in this Conference is in order. We are both the taxpayers and the consumers of the systems which we will discuss. We are not the experts. You are paid to do that job. However, it is incumbent upon groups such as the Northern Virginia Conservation Council to raise questions relavent to both past activity and to future directions in wastewater management.

In our statements at the last Conference, the Water Quality Study Committee made three points. 1. The Corps of Engineers Permit Application for dredging a channel in front of the proposed facility varies from the Environmental Impact Statement by more than 600,000 cubic yards of sludge spoil. We questioned the impact of this toxic material on the ecology of Dyke's Marsh where it will be dumped. We have received no answer from your office on this point or any other. 2. We questioned whether Blue Plains when upgraded to AWT 309 MGD will have enough capacity to handle the wastewater problems of the Metropolitan area. Thursday, November 4, when we visited the plant, it had been running at 300 MGD hydraulic for 6 hours, and at 295 hydraulic all night. Mr. Noman Cole, Chairman of the Virginia State Water Control Board, has told us that the flow may even exceed these figures intermittently. In the AWT process, sewage must be retained for 18 hours, and no provision has been made to handle flows that exceed 309 MGD. When we asked our guide at the plant, a bypass to Piscataway was suggested as the answer. 3. We stated that the Blue Plains Plant is not part of a totally integrated system that respects the integrity of the natural system. We have studied this aspect of our last statement and concluded that conventional treatment is at best an interim solution. Blue Plains may treat water to an acceptable standard, but the resultant sludge problems attendant to this treatment require careful evaluation. Such facilities are overtaxed easily, their life expectancy is relatively short and they are expensive to operate.

Alternative waste treatment methods, which requires the return of pollutants to natural cycles, are only new in the sense that they have re-emerged for modern application, adapted to today's technology. 1600 such facilities are in use in the United States today. Disney World in Florida is perhaps the best known. The plant now under construction at Muskegon, Michigan, a 35 MGD facility will combine a waste water treatment facility for both municipal and industrial byproducts with a 33 megaton Nuclear reactor, and a sanitary landfill that will serve the area for more than a hundred years. Work has been done on this method at Penn State and at

Michigan State University. Under the direction of the Corps of Engineers, studies are now being made to apply this methode to five urban areas totaling 15% of the U.S. population; they are Boston, Cleveland, Detroit, Chicago, San Francisco. The report of the Senate Public Works Committee states, "The ground disposal systems have the great virtue of recycling the materials so disposed, both by replenishing water tables and by converting and utilizing organic waste matter in natural life processes of decay and growth." "Their secondary merit is more germane to this discussion. Water reaching watercourses after passage through the filtering and decomposition processes afforded by soil is far purer - provided that soil loading rates are not exceeded - than any waste treatment process short of distillation could make them." Senate Public Works Committee Report

An examination of document A, the comparative study of the two systems, reveals the following salient differences:

(1) comparable levels of treatment can be achieved with both technologies with some exceptions. One of these is in the level of expected Nitrogen removal which is 85% in the aerated lagoon or land contained system, but only 50% in the conventional system. It is possible, by the addition of the methanol nitrogen removal process to up conventional plant Nitrogen removal to a level comparable to the land contained system, but at an additional cost of approximately 100,000 dollars a years for an average flow of 35MGD (p. 11, Document A).

(2) Total elimination of viruses was considered reliable only in the land based system (p. 12, Document A & Document E).

(3) Failures from accidental spillages or toxic surges are more of a hazard to the conventional activated sludge plant than to the land contained system as weekly analyses winter and summer of the aerated lagoons indicated BOD and TSS reduction of 80 to 90 per cent on four days detention in summer and 6 days in winter. (Engineering Feasibility Demonstration Study for Muskegon County, Michigan, "Wastewater Treatment-Irrigation System.")

(4) Conventional treatment is also far more susceptible to failure resulting from reduction in efficiency of treatment when normal flows are exceeded whereas the irrigation system would achieve full treatment up to and including peak flows of 88 MGD (p. 12, Document A).

(5) The occasional need for a high degree of chlorination in the conventional plant, discharging into a natural river or stream results in severe problems with fish or other aquatic forms of life. In the land contained system chlorination of the effluent never poses a problem as it is done in the lagoons, before irrigation and no chlorine is discharged into streams or rivers (p. 12, Document A).

(6) Although color is not a problem presently at the D.C. sewage treatment plant, it has been demonstrated that both color and heavy metals will be effectively removed by the land contained system (p. 12, Document A). We are all well aware that the build up of heavy metals in the bottom deposits of the Potomac adjacent to the Blue Plains sewage treatment plant pose a serious environmental threat. The very real danger posed by these heavy metals concentrated by sewage treatment plants is that they may enter aquatic food chains.

COST COMPARISONS

Because we are both taxpayers as well as consumers, a comparison of relative investments might be considered for these two systems to demonstate relative costs of conventional vs. land-contained systems. The following figures from Muskegon study (Document A) and approximately extrapolated to Blue Plains will indicate our concern: (pp. 15-18, Document A)

	35 MGD (Muskegon)	309 MGD (Blue Plains)
Capital Costs of Land-contained systems	$34,000,000	$299,200,000
Conventional A.W.T. However, lowest bid	$23,000,000(estimate) $43,000,000	$359,000,000 (WSSC estimate)
Operating costs of Land-contained systems	$ 1,100,000	$ 9,700,000
Conventional A.W.T.	$ 2,200,000	$ 19,400,000

The most troublesome feature, perhaps, of the conventional AWT plant is the volume of wet sludge produced per day, amounting to 560 tons/day (p. 18, Document A) which, when extrapolated for the proposed 309 MGD Blue Plains facility becomes 4,928 tons per day of wet sludge!

It would appear then that the proposed land-based system is not only superior on the basis of reliability and degree of treatment, but it also cost a great deal less. Table 3, Document A (p. 21) indicates the total annual local cost is on the order of magnitude of one million dollars less, not including profits from crop production on irrigated lands. To summarize the superiority of this kind of system over the water-oriented system presently envisioned for Blue Plains:

(1) It is possible to obtain tremendously valuable riverfront property by relocating Blue Plains away from the present site it occupies and at the same time enhance the aesthetic value and quality of the river through improved water quality. The technology presently exists for pumping sewage for the lagoons at least 100 miles. Thus many possible sites for such a regional plant exist anywhere within a radius of 100 miles. The desirability of substituing land of much lower value for the required land-sewage ration of 130 acres per MGD is obvious.

(2) Since the primary capital investment in a land-based system is in land rather than capital costs and plant construction, the depreciation of the citizen's investment is minimal. In a conventional plant, however, where the primary capital investment is in the treatment plant, the expectation is that depreciation to a value approaching zero will take place as new technologies become available and present ones obsolete.

(3) An additional problem scarecely touched upon by conventional plant advocates is that of sludge incineration. (We have inserted a flow diagram (p. 9a, Document A, figure 3 and 4) in the body of Document A. The schematic of the proposed Blue Plains facility is placed directly behind that of the conventional Muskegon plant schematic in order to directly compare these two treatments. Except for some

unresolved N removal problems, the two processes seem directly comparable.) With the proliferation of conventional sewage treatment plants with increased emphasis on sludge production (physical-chemical processes) the problems of sludge incineration become ever more apparent. Recent studies on the Lake tahoe sludge incinerator reveal no visible emissions, but unbelievably dangerous levels of nitrous oxide emission, i.e. 52 to 65 ppm (see p. D-3, Document D). Since this is a multiple hearth sewage sludge incinerator very comparable to many others currently in operation, it may be assumed that similar emissions are occurring from other plants and that the air pollution standard of 5 ppm is being exceeded in many of these operations Furthermore, the very considerable fuel supplies consumed to keep these sludge incinerators in operation may, as extrapolated from the fuel costs of natural gas for Tahoe's incinerators, cost as much as $5,000 a day just to run the incinerator for the proposed Blue Plains sewage treatment plant. In winter when fuel shortages occur, it might become necessary to make the decision as to whether to incinerate sludge or heat homes. (See Washington Post clipping on gas shortage - Document F.) Additional data on incinerators from the Denver area (Document C) indicates that among the problems plaguing this incineration of wet sludge are low production efficiency coupled with dangers of explosion, severe odor problems and mechanical failure due to many corrosive substances in the wet sludge. Several installations have been abandoned because of these problems as well as difficulty in meeting air pollution standards, particularly for sulphur and nitrogenous oxides. No technology presently exists for removing these oxides from the stack gases. At the rate of $19.70 per ton for sludge incineration, the Blue Plains production of 4,900 tons/day will cost $98,000 per day.

This conference has already received a letter from John Winder of the Clean Air Coalition which I would like to read to you.

We of the Northern Virginia Conservation Council would like to second his request for an Environmental Impact Statement on the incinerator. We must also be assured that there is no intention by WSSC to use the channel to barge sludge out to sea and dump it. In the 102 statement we feel that an alternate land-contained facility must be considered and highest priority given to finding the proper place to put it. I understand from the Corps that there are several acceptable sites well within the range of pumping capability and for which technology is presently available.

Since before recorded history man has marveled at the wonderful facility of the Earth to support him and to supply his needs. Go asked of Job:

"Did you proclaim the rules that govern the heavens or determine the laws of nature upon Earth? Who is wise enough to marshall the rain-clouds and empty the cistern of heaven when the dusty soil sets hard as iron and the clods of earth cling together? Who has cut channels in the downpour and cleared a passage for the thunderstorm, for rain to fall on land where no man lives and on the deserted wilderness clothing land's waste and derelict with green and making grass grow on thirsty ground?" And Job answered the Lord: "I know that thou canst do all things and that no purpose is beyond thee."

Let us like Job learn the magnificence of interrelated natural systems that came with this Earth long before any of us arrived and which have been seriously damaged within the life span of most of us in this room. These life systems must be protected and preserved. Damage such as the improved Blue Plains facility will do both to the river and to the air above it cannot be allowed. We cannot solve one problem such as water pollution only to create another - pollution of the air. The land-contained waste treatment facility alone resolves the problems of human waste totally, sensiblily, cheaply and environmentally. Muskegon started with a letter from President Nixon in 1969 and is being constructed today.

If we start now, in 1971, we will have a clean Potomac by July, 1976. What greater gift for the Nation's Bicentennial!

MUSKEGON COUNTY WASTEWATER MANAGEMENT
SYSTEM NUMBER ONE

COST AND PERFORMANCE COMPARISON FOR ALTERNATIVE TREATMENT SYSTEMS

Aerated Lagoon-Spray Irrigation Facility

Versus

Two-stage Activated Sludge,
Chemical Treatment and Filtration System

By

Bauer Engineering, Inc.
Chicago, Illinois

April 1971

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

The following comparison of the alternative treatment systems for combined industrial and domestic wastewaters in Muskegon County, Michigan comes after two years of investigations and engineering design work. The style of the paper is intentionally terse and condensed. Those interested in greater detail are referred to the several reports listed at the end.

Alternative systems are compared to handle the following flows from the urbanized area around Muskegon Lake and Mona Lake:

Source	Avg. Flow Rate	Peak Flow Rate	Design BOD	Design S. S.
Domestic and commercial wastes (160,000 pop.)	18.5 MGD	46.2 MGD	190	190
S. D. Warren Co. (paper mill)	12.0 MGD	13.0 MGD	400	400
Other industrial wastes	11.5 MGD	28.8 MGD	190	190
	42.0 MGD	88.0 MGD	250	250

The design objectives for the quality of treated effluent discharged back to Lake Michigan (via streams) at this location are:

Muskegon-Flows

Parmeter	Project Objectives
BOD	< 4 mg/l
Suspended Solids	< 4 mg/l
Total Phosphorus	< 0.5 mg/l
Pathogenic Organisms	
(Bacteria and Viruses)	Total removal
Nitrogen	
Ammonia-N	< 0.5 mg/l
Nitrate-N	< 5.0 mg/l
Color	No evident color
Heavy metals	Concentrations well below thresh-hold levels for fish, wildlife and agre-culture*

*Accomplished through sewer ordinances and treatment processed.

These performance objectives have been established to provide protection for the shoreline lakes consistent

with conservation, recreational and economic development goals expressed by the community and with the opportunity potential of the County's water resources. They are higher than the minimum standards established by the Federal and State regulatory agencies.

Muskegon-Performance

Objectives

Federal regulatory requirements are presently in effect that require the elimination of 80 per cent of all phoshporus discharge by municipalities and industries that discharge to the Lake Michigan drainage basin. The State of Michigan has a first stage program in effect of requiring a minimum of secondary treatment of all municipal and industrial sources of organic pollution and higher levels of treatment in special areas where protection of the designated water uses require it.

Color is an important problem in the combined waste resulting form the S. D. Warren paper mill waste. Laboratory studies by the mills' consultant Quirk, Lawler and Matudky Engineers[1] showed that with activated sludge treatment alone there would be only a 50 per cent reduction in apparent color. Color is an important pollutant for aesthetic reasons as unnatural discoloration of lakes and streams can lead to substantial public dissatisfaction and loss of recreational value.

Although there are no present standards on virus or nitrates discharged to Lake Michigan (via streams), it was considered desirable to minimize these as much as is practicable. In the case of the....................................

---

[1] Quirk, Lawler & Matusky Engineers, Laboratory Scale Treatment Studies, for S. D. Warren Company, New York, New York, July 1969

irrigation system, up to 85% of nitrates and 100% of virus are expected to be removed. In the case of the alternative system, an estimated 50% of nitrates and as much virus as possible are to be removed.

In both systems there are pumping stations and force mains to convey wastewater to the place of treatment. Differences in these costs are included in the comparsion.

DESCRIPTION OF ALTERNATIVE SYSTEMS

Aerated Lagoons plus Irrigation

This system (located about 10 miles east of muskegon Lake) employs 3 days detention in mechanically aerated open lagoons followed by further treatment in large naturally aerated storage lagoons. The schematic layout is shown in Figure 1. Sufficient storage is provided to contain 4 months of flow at the full design rate of flow in two 9 foot deep, 850 acre storage laggons. During the warmer 8 months, the full year's volume of wastewater would be first chlorinated and then irrigated over 6,000 acres of land using mechanical irrigation machines to achieve a relatively uniform distribution of the water. The maximum design rate of irrigation is 4 inches per week. At ultimate design

MUSKEGON- AERATED LAGOON

-5- TERTIARY TREATMENT BY IRRIGATION

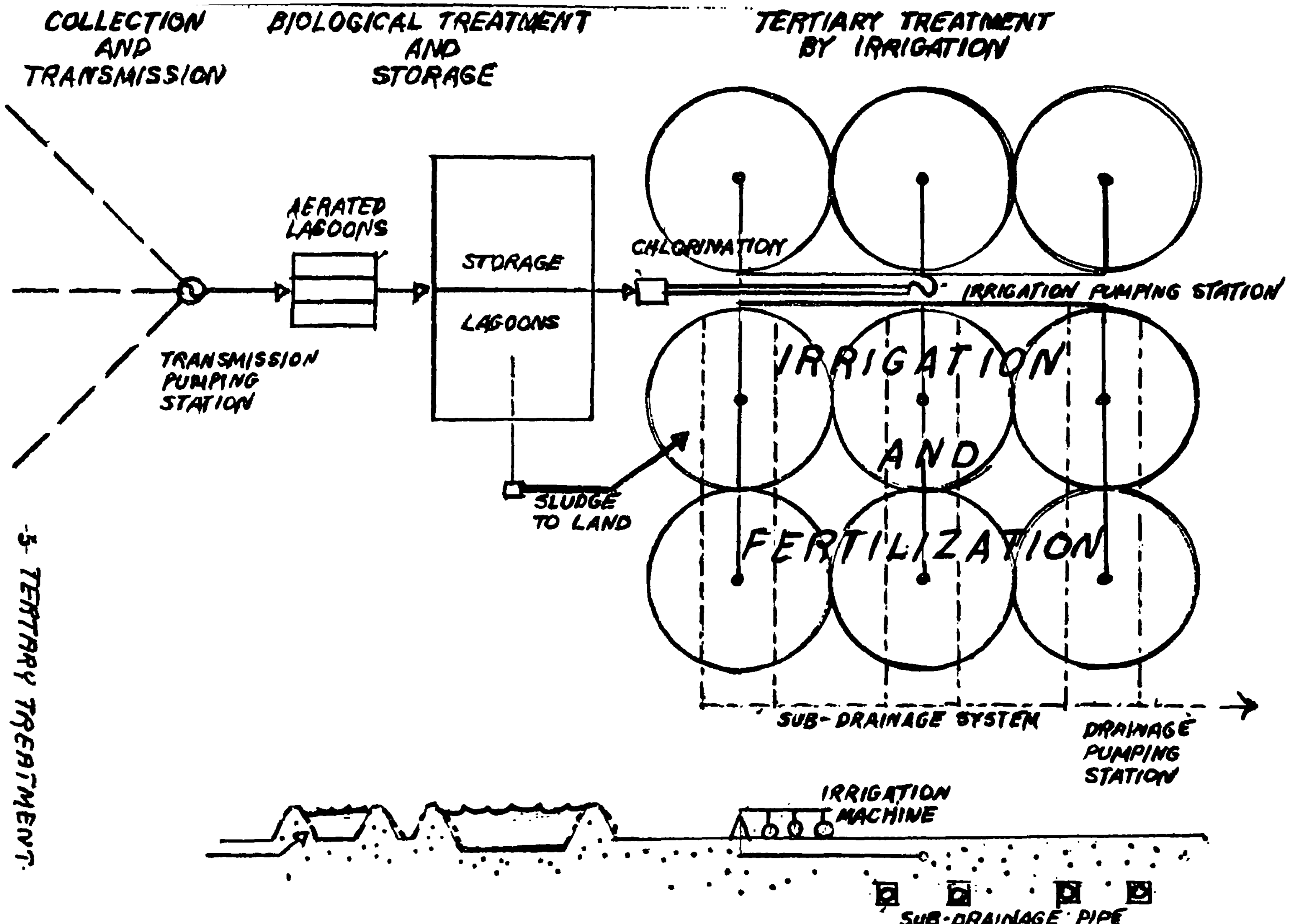


FIGURE 1

AERATED LAGOON
SPRAY IRRIGATION SYSTEM

M53

conditions, about 45,000 acre-foot of water be irrigated, most of it in 6 months at an average rate of 3.4 inches per week.

The nitrogen content of the wastewater is estimted to be ultimately about 30 mg/litre, which would result in about 3,600,000 pounds per year of N being delivered to the treatment site. Of this, approximately 2/3 is expected to be converted to organic form in the sludge which is produced in the lagoons and is to be dredged out for land application. This fraction would be converted slowly to available N at the rate of 3% per year. The remaining 1/3 or about 200 lbs. per acre per year would be applied to the land with the treated wastewater. It is likely that very high crop yields can be expected ultimately. Initially, however, there may be insufficient N for such crops as corn or grass. For this reason, alfalfa and soybeans may be used in the early years.

The site is underlain by a permeable sand (having a permeability of about 400 gpd/ft^2) in thicknesses ranging from 25 to 100 feet. An extensive drainage system is provided to receive the large quantity of infiltration which is expected. The capacity of the drainage system is at least 0.4" per day, or 0.016 cfs/acre.

Plans and specifications for this system have been completely drawn up, and detailed cost estimates based upon these documents have been made.

Two-stage Activated Sludge with Chemical Treatment plus Filtration

This system is assumed to be located on the nearest available site of adequate size. A 200-acre site on the Muskegon River east of the urbanized area was selected (figure 2). The treatment processes employed would include primary sedimentation, activated sludge biological treatment, biological nitrification, lime settling and sand filtration. The final effluent would be chlorinated before discharge to the Muskegon River. A schematic layout of the processes is shown in Figure 3 and Table 1 summarizes the bases of design and the functional purpose of each of the processes employed. A downtown pumping station-located in the same location as for the alternative system-would pump the flow about 2 miles through a 66" force main to the plant. The treated effluent would be discharged into the Muskegon River. The sludge would be utilized on farm land in Muskegon County as for the other system.

Plans and specifications for this system have not been drawn up. Cost estimates are based upon experience with other plants of similar nature and size.

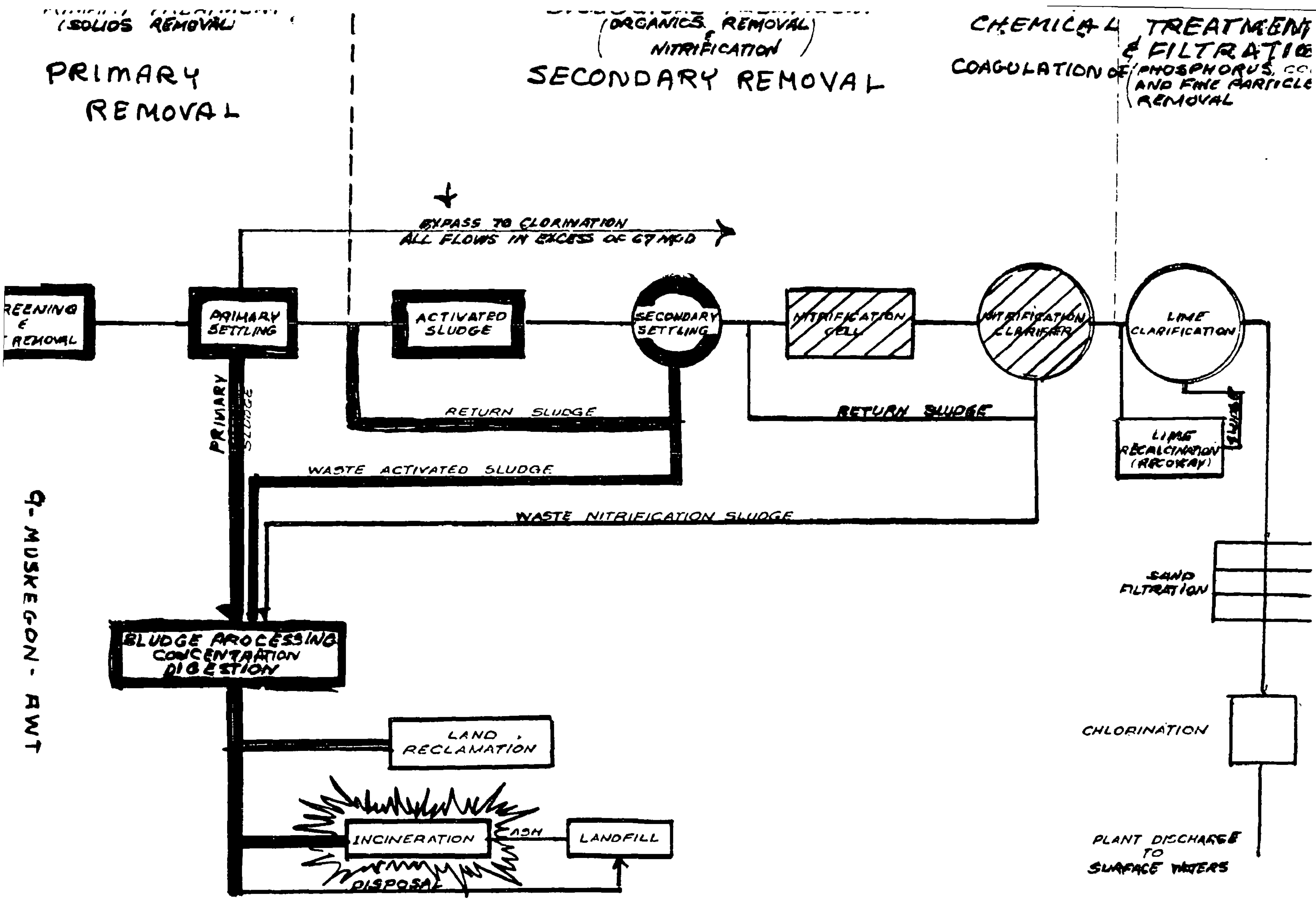
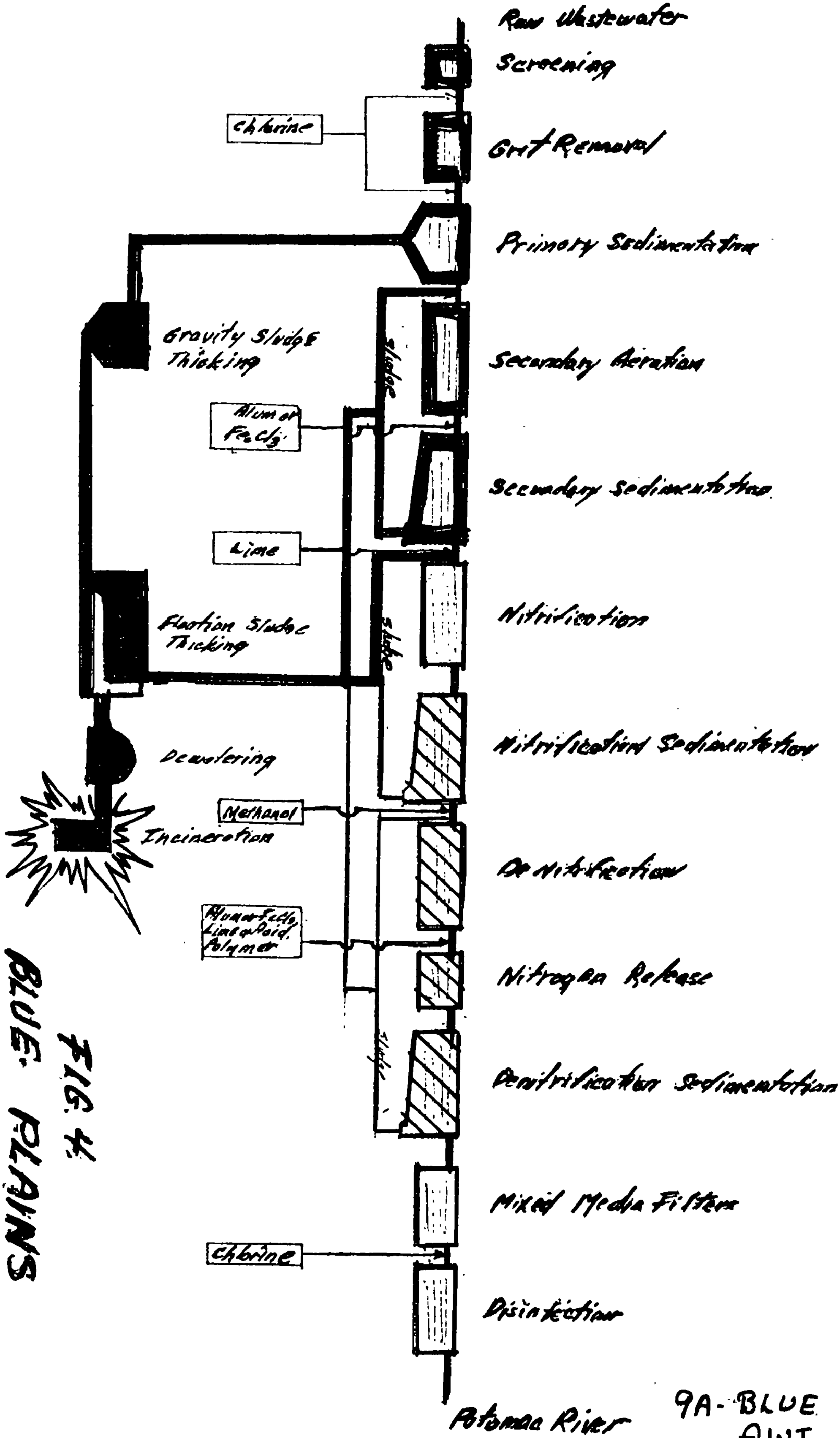


FIGURE 3
ALTERNATE TREATMENT SYSTEMS



BLUE PLAINS
WATER POLLUTION CONTROL PLANT

1975

FIG 4.
BLUE PLAINS
Water Pollution Control Plant
Process schematic Diagram

9A- BLUE PLAINS -
AWT.

TREATMENT AND FILTRATION SYSTEM
BASIS OF DESIGN AND FUNCTIONAL PROCESSES

Process Unit	Design Basis	Performance Function
Preliminary treatment	88 MGD - 1 ft/sec. controlled velocity grit chambers with mechanical grit removal equipment.	Debris, coarse particle removal, flow measurement.
Primary sedimentation	800 gal/ft^2 overflow rate for 67 MGD peak day flow.	Removal of settleable solids.
High rate activated sludge aeration tanks	3-hr aeration for 67 MGD with 25% return sludge.	Oxidation of carbonaceous BOD.
Activated sludge settling basins	100 gpd/ft^2 overflow rate for 67 MGD.	Settling of 1st stage aeration sludge.
Nitrification aeration tanks	3-hr aeration for 67 MGD with 25% return sludge.	Biological oxidation of ammonia to nitrate.
Nitrification settling basins	800 gpd/ft^2 overflow rate for 67 MGD.	Settling of 2nd stage aeration sludge.
Lime clarification basins and equipment	250 mg/l lime addition for 67 MGD, two upflow 1000 gpd/ft^2 overflow rate clarifiers in series with recarbonation.	Phosphorus, color and suspended organic matter removal.
Lime recalcination	70 ton/day capacity thickener centrifuge and kiln.	Recovery of spent lime.
Mixed-Media Filtration	6 gpm per square foot for 67 MGD, 20 gpm backwash rate.	Removal of solids suspended in the clarified water, some removal of pathogens.
Sludge thickening tanks	Concentration of 1% activated sludge to 4%	Reduction of required digestion volumes.
Sludge digestion and holding tanks	High rate-15 day heated digestors, 133,000 lbs. of solids per day at 4% 20% solids reduction, 5-month's sludge storage at 8% solids.	Reduction and concentration of solids, odor and pathogen elimination, winter storage.
Sludge transfer facilities	7 mo/yr-[illegible] tons/day capacity for 8% sludge.	Rapid loading for rail or truck transportation.
Chlorination facilities	Chlorination capacity up to 25 mg/l for 88 MGD, 15 minute detention of 88 MGD peak rate.	Bacteriologic and virologic disinfection.

PERFORMANCE OF ALTERNATIVE SYSTEMS

The two treatment systems were designed to accomplish the effluent objectives listed with as equal performance comparison as is reasonably practical. Lime settling was, therefore, specified for the conventional system to accomplish phosphorus, color and heavy metals removal in an efficient manner and to reduce the discharge of BOD and Suspended Solids incidentally. Filtration was specified to consistently remove suspended solids and suspended BOD to levels below 4 mg/litre.

Nitrification of ammonia was accomplished in the second stage activated sludge unit. A specific process of nitrogen removal was not specified for the conventional system as approximately 50 per cent removal can be obtained with proper operation of the biological processes. The expected nitrogen removal in the aerated lagoon-irregation system is greater than 80 per cent. With addition of methanol in the sand filter units, nitrogen removals can be increased in the conventional system to the same levels as obtained with the irrigation system. The additional cost for the chemical additive would be approximately $10 per million gallons or $1000,000 per year.

The aerated lagoon and storage lagoon system followed by spray irrigation and the action of the "living filter" soil system will effectively

MUSKEGON- PERFORMANCE

reduce suspended solids and phosphorus in the percolation water to virtually zero concentration levels; BOD will be reduced to well below 4 mg/1 and total nitrogen to between 2 and 5 mg/1. Color and heavy metals will also be effectively removed. The filtration and adsorption phenomena will totally remove bacteria and virus contaminants.

Although both systems would usually remove all viruses, only the irrigation system is considered reliable in this respect. Other differences are as follows:

1. The activated sludge system is far more susceptible to failure resulting from accidental spillages of industrial wastes which are toxic to the bacteria which are essential to this process.

2. At flow rates in excess of 67. MGD, the activated sludge process may not achieve the required degree of treatment, whereas the irrigation system would achieve full treatment up to 88 MGD.

3. Chlorination of effluent from the activated sludge process is assumed to take place just prior to discharge of the effuent into the effluent into the Muskegon River. The Quirk, Lawler and Matusky Report[1] identified the potential need for high levels of chlorine oxidation potential of the high COD effluent of the combined S.D. Warren and domestic waste. This may at times cause problems to fish in this area. On the other hand, chlorination of effluent from the lagoon process takes place before irrigation, insuring that there can be no chlorine in the water discharged to streams.

[1]Ibid.

COSTS OF THE ALTERNATIVE SYSTEMS

Aerated Lagoons plus Irrigation

The capital cost of this system, based upon detailed plans and specifications, is estimated as follows:

1.	Clearing and site preparation	[illegible],000
2.	Drainage pipes and wells	2,763,000
3.	Drainage ditches and pumping stations	1,098,000
4.	Irrigation piping and pumping	2,695,000
5.	Irrigation Equipment Test Program	542,000
6.	Irrigation machines	1,500,000
7.	Electric power distribution	791,000
8.	Force main to site	4,700,000
9.	Pumping station to site	1,350,000
10.	Lagoons and treatment facilities	,6,302,000
11.	Miscellaneous buildings and equipment	325,000
12.	Access pumping stations and force mains	5,373,000
	Subtotal	$28,364,000
13.	Land	3.200,000
	Subtotal	$31,564,000
14.	Engineering and administrative costs	3,000,000
	Total	$34,564,000

Muskegon-Costs

Note that the items numbered 1 through 7 may be considered to be permanent investments in agricultural production, remaining valuable even if the waste water treatment process should become obsolete.

The operating costs of the aerated lagoon plus irrigation system for the 1982 mid-point year flow of 35 MGD are estimated as follows:

OPERATING COST OF COUNTY WASTEWATER TREATMENT SYSTEM

Lagoon Treatment System

Labor	
Superintendent - 1	$ 20,000
Operators - 7 @ $12,000	84,000
Electrical and Mechanical Maintenance - 4 @ $12,000	48,000
General Maintenance - 3 @ $8,000	24,000
Laboratory	
Director	18,000
Assistant	22,000
	$ 216,000
Overhead 30%	64,000
Subtotal	$ 280,000
Electrical Power	
Lagoon Aerators and Mixers	100,000
Misc. other Utilities	25,000
Equipment and Facilities Maintenance and Repair	70,000
Chemicals - Chlorine Disinfection and Misc. other Chemicals	90,000
Sludge Application to Land - 520 tons/day @ $1/ton	190,000
Lagoon Treatment Total	$ 755,000

Irrigation and Drainage System

Labor	
Supt. of Operations	$ 17,000
Irrigation Rig Operators - 10 for 8 mo. @ $800/mo.	64,000
Irrigation Rig Maintenance - 4 @ $10,000	40,000
Irrigation Site and Drainage System general maintenance - 3 @ $9,000	27,000
	$ 148,000
Overhead 30%	45,000
Subtotal	$ 193,000
Power	
Irrigation Pumping Station	70,000
Drainage System Pumping	20,000
Equipment Maintenance and Repair (Irrigation Rigs, Drainage System, Irrigation and Drainage Pumps)	100,000
Subtotal	$ 190,000
Irrigation Total	383,000
Treatment System Total	$1,138,000

Spread over the 1982 average flow of 35 MGD, these costs work out to be about $90 per million gallons. No credit is taken for possible return from crop production.

Two-stage Activated Sludge with Chemical Treatment plus Filtration

The capital cost of this system is estimated as follows:

Treatment Plant

Preliminary Treatment (screening, grit removal, metering)	$ 350,000
Primary Sedimentation Basins	1,150,000
High Rate Activated Sludge Aeration Tanks	1,150,000
Activated Sludge Settling Basins (including return sludge pumping facilities)	1,600,000
Nitrification Aeration Basins	1,500,000
Nitrification Settling Basins (including return sludge pumping facilities)	1,900,000
Lime Clarification Basins and Equipment	3,300,000
Lime Recalcination	2,300,000
Mixed-Media Filtration Facilities	2,000,000
Sludge Thickening Tanks	500,000
Sludge Digestion and Holking Tanks	4,050,000
Sludge Transfer Facilities (rail or truck loading)	200,000
Chlorination Facilities (equipment and contact tank)	200,00
Yard Piping and Electrical	2,000,000
Control and Laboratory Building	300,000
Site Preparation	500,000
Outfall	200,000
Site Acquisition	400,000
Subtotal	$23,950,000

Collection and Transmission Facilities

Main Transmission Pumping Station (C)	1,200,000
66" Pipeline	1,640,000
Access Pumping Stations and Force Mains	5,373,000
Subtotal	$8,213,000
Engineering and Administration Costs	3,000,000
Project Total	$35,163,000

This capital cost is not based upon an actual detailed set of plans as was the case for the alternative system. By way of comparison, the Salt Creek Sewage Treatment Plant of the Metropolitan Sanitary District of Greater Chicago has a design average day capacity of 30 MGD and 50 MGD peak day capacity. Phosphorus removal, nitrification and filtration facilities are provided. However, the lime settling process was not included. The Engineer's construction extimate for just the treatment plant was $24,000,000 in 1968 when the Engineering News Record (ENR) cost index was 1300. The present index is over 1600. This cost estimate does not include engineering, land or collection and transmission sewers

The operating cost of the two-stage activated sludge system with lime settling and filtration is estimated for the 1982 mis-point flow of 35 MGD as follows:

	Unit Cost	Amount	Total Annual Cost
Primary sedimentation, carbonaceous an nitrification activated sludge treatment, and sludge digestion	$65/mg	35 MGD	$830,000
Lime settling and recalcination (lime recovery)	$30/mg	35 MGD	380,000
Replacement Lime	$ 5/mg	35 MGD	60,000

(Continued)

	Unit	Amount	Total Annual Cost
Filtration (mixed media)	$25/mg	35 MGD	320,000
Chlorine disinfection	$ 5/mg	35 MGD	60,000
Digested sludge haulage for land application	$ 3/ton	560Tons/day* (wet)	610,000
Total Annual Cost for 1982 Flow			$2,260,000

*Blue Plains would produce 4,900 Tons per day of sludge!

SUMMARY

The proposed aerated lagoon plus irrigation system is not only superior to the activated sludge plus filtration system in terms of reliability and degree of treatment, it also costs a great deal less. Table 2 shows the savings in cost to all taxpayers, and Table 3 shows the saving to the taxpayers and users in Muskegon County alone with and without returns from crop production.

It is obvious that wastewater irrigation systems are applicable to many other locations in this country and that they are likely to become widely used. Evidence of this trend is already at hand in the current studies by the Corps of Engineers, the Environmental Protection Agency, and many consulting engineering firms. The ability of soil-plant systems to receive, hold, and selectively utilize troublesome

MUSKEGON TOTAL COSTS

pollutants such as nutrients, viruses and heavy metals is gradually coming to be recognized as a largely untapped resource in the effort to control water pollution. Rejections of such pollutants into the air and water is becoming less acceptable. Use of land as the ultimate place of disposal and utilization is the only apparent alternative. Fortunately for us, the potential capability of soil-plant systems to handle these pollutants without adverse effects is very large compared to the size of our problem, and the cost of using these systems as part of the pollution control process is less than persently available alternatives.

TABLE 2

COMPARISON OF COSTS OF SYSTEMS

Cost Component	Two-stage Activated Sludge With Chemical Treatment Plus Filtration	Aerated Lagoons Plus Irrigation
Capital cost, including land, access system pumping stations and force mains, engineering and administration	$35,163,000	$34,564,000
Annual capital cost, assuming 20 years @ 5%	2,821,000	2,773,000
Annual operating cost	2,260,000	1,138,000
Total annual cost	5,081,000	3,911,000

Annual Savings with
Aerated Lagoon
Irrigation System = $1,170,000

Total Savings over 20 years = 20 x $1,170,000 = $23,400,000

TABLE 3

COMPARISON OF COSTS TO RESIDENTS OF MUSKEGON COUNTY

Cost Component	Two-stage Activated Sludge With Chemical Treatment Plus Filtration	Aerated Lagoons Plus Irrigation
Construction costs eligible for State and Federal grants (land excluded)	$ 34,767,000	$31,364,000
Local share @ 30%	10,430,000	9,909,000
Land costs	400,000	3,200,000
Subtotal	10,830,000	12,609,000
Capitalized interest (16.7%)	1,808,000	2,106,000
Facilities acquisition	300,000	300,000
Total Local Project Cost	$12,938,000	$15,015,000
Annual Capital Cost 20 yr @ 5%	1,038,000	1,205,000
Annual Operating	2,260,000	1,138,000
Total Annual Local Cost	$ 3,298,000	$ 2,343,000
Annual Charges to Residents (1)	1,568,000	1,226,000
Annual Charges to Industries (1)	1,730,000	1,117,000
Annual Charge per family of 4 (130,000 people presently in service area)	48.25	37.72
Reduction in charge per family with $300,00 per year return from agriculture	--	$ 4.50

(1) Based on industrial/residential flow ratio of 60/40 with 40% of capital costs reaovered by user fee and 20% of acreage charge assigned to industires.

REFERENCES

1. The Metropolitan Sanitary District of Greater Chicago, Report on Salt Creek Water Reclamation Plant by Camp, Dresser & McKee, Boston, Massachusetts, January, 1968.

2. U. S. Department of the Interior, Federal Water Pollution Control Administration, Cost of Wastewater Treatment Processes by Dorr-Oliver, Incorporated, Taft Water Research Center, Cincinnati, Ohio, December, 1968.

3. U. S. Department of the Interior, Federal Water Pollution Control Administration, Cost and Performance Estimates for Tertiary Wastewater treating Processes by Robert Smith and Walter F. McMichael, Taft Water Research Center, Cincinnati, Ohio, June, 1969.

4. Quirk, Lawler & Matusky Engineers, Laboratory Scale Treatment Studies, for S. D. Warren Company, New York, New York, July, 1969.

5. Hackett, James E. and Dumper, Thomas A., in association with John R. Sheaffer & Associates, Environmental Characteristics: A Study of Muskegon County Official and Subterranean Physical Characteristics and their Implications Upon Land Development and Resources Management Opportunities, Wheaton, Illinois, August, 1970.

6. U. S. Department of the Interior, Federal Water Quality Administration, Engineering Feasibility Demonstration Study for Muskegon County, Michigan Wastewater Treatment Irrigation System, Water Pollution Control Series Report 11010 FMY, Washington, October, 1970.

7. Muskegon County Board and Department of Public Works, prepared by Bauer Engineering, Inc., Muskegon County Wastewater Management System Number One, WPC-Mich-1503 and Environmental Protection Agency Demonstration Project 11010 GFS, Environmental Assessment Report, Muskegon, Michigan, March, 1971.

8. Bauer Engineering, Inc., for Federal Water Quality Administration. Muskegon County Wastewater Management System Demonstration Grant 11010 GFS Detailed Work Program and Special Conditions, Chicago, Illinois, March, 1971.

9. Bauer Engineering, Inc., Muskegon County Wastewater System No. 1, Basis of Design, Chicago, Illinois, March, 1971.

BATELLE LAB April 26, 1971

Table 13-9 (Continued)

* *

Factors:	Blue Plains x 41.1	Units	Costs at	Blue Plains
	Muskegon x 5		7.5 mgd	equivalent
Electricity		$/day	321.26	
Natural Gas		$/day	322.72	13,162
Chemicals (Alum and polymer)		$/day	273.99	
Chlorine		$/day	13.28	
Make-up Lime		$/day	233.00	
Make-up Carbon		$/dav	24.63	
Operational Labor		$/day	426.00	
Maintenance Labor		$/day	97.40	
Repair Materials		$/day	100.10	
Total Cost per day		$/day	1,814.42	
Total Cost per MG plant influent		$/day	242.76	

Note: Multiply right column by 41.1 to get costs of Blue Plains:

Multiply by 5.0 to get costs of Muskegon AWT plant

N.B. In winter fuel shortages will pose crisis situation

TABLE 13-9 (Continued)

	Units	Costs at 7.5 MGD Flow
RGANIC SLUDGE TREATMENT		
ANDLING and DEWATERING		
Electricity	$/day	16.63
Chemicals --Polymer	$/day	193.53
Operational Labor	$/day	26.75
Maintenance Labor	$/day	26.08
Repair Material	$/day	49.65
Total Cost per day		312.66
Total Cost per MGPlant Influent		41.68
Total Cost / Ton Dry Solids	$/ton	17.66
NCINERATION and DISPOSAL		
Electricity	$/day	5.90
Natural Gas	$/day	138.71
Operational Labor	$/day	17.84
Maintenance Labor	$/day	13.36
Repair Material	$/day	1.50
Total Cost /Day	$/day	177.32
Total Cost per MG Plant Influent	$/MG	23.64
Total Cost per ton Dry Solids	$/Ton	10.01

Table 13-9 (Cont.)

	UNITS	Costs at 7.5 mgd Flow
ORGANIC SLUDGE TREATMENT		
HANDLING AND DEWATERING		
ELECTRICITY	$/DAY	16.63
CHEMICALS - BOLYMER	$/DAY	193.53
Operational Labor	$/DAY	26.75
MAINTENANCE LABOR	$/DAY	49.65
REPAIR MATERIAL	$/DAY	312.66
TOTAL COST PER DAY	$/DAY	41.68

The experience of Metro Denver parallels in many ways the collective experiences of of the cities contacted.

AIR POLLUTION PROBLEMS

The gas cleaning system is a wet scrubber which was designed to produce a stack gas meeting the air pollution standards that were then in effect. The scrubber was intended to result in a particulate concentration of not greater than .3 grains per cubic foot at standard conditions. The specifications also provided that no smoke exceeding 40 per cent opacity (Ringleman No. 2) was to pass from the stack. The governing regulatory agency is the Colorado Department of Public Health. This department has notified the District than on several occasions the stack has been observed to exceed standards and that they have never observed the stack to be in compliance with State regulations. The Air Pollution Variance Board ordered the District to show progress toward controlling air contamination to within the State standards. Later, the Board issued a conditional variance requiring the District to limit incineration to only half of the sludge produced, the remainder to be hauled away.

Effective March 15, 1971, air pollution control standards, as provided by the Air Pollution Control Act of 1970, will become effective. Under these standards, stationary sources shall not emit a density which will obscure an observer's vision in excess of 20 per cent opacity. In addition, these standards provide a maximum limit of .2 grains per cubic foot corrected to 12 per cent CO_2 concentration. Water slot manifolds were added to the scrubbers to increase particulate capture. Test results indicate that the District was not, and is not now, in compliance with present State standards. The District is presently awaiting consultant recommendations regarding plans and specifications for additional air pollution controls.

The Denver area has experienced increasingly serious atmospheric contamination. Aside from the legal restrictions to air pollution, the residents now recognize the practical desirability of air pollution abatement.

It is known that equipment can be added to remove particulate matter from stack gasses, as required. However, the incineration of sludge produces sulphur and nitr gen oxides which are also undesirable. The technology for removal of these fractio (either from gasses or sludge) is not yet well developed - and probable costs are unknown.

OPERATIONAL EVALUATION

The past Metro accounting procedures have not been adequate to permit segregation of the unit costs of various sludge disposal and treatment processes. The total sludge disposal system costs have included concentration, filtration, incineration, pumping, etc. so that it is impossible to specifically determine the costs of incineration only. These total costs have averaged about $57. per ton of dry solids. Recently, the staff has placed into operation an accounting system which will provide feedback as to the unit cost of each individual operation.

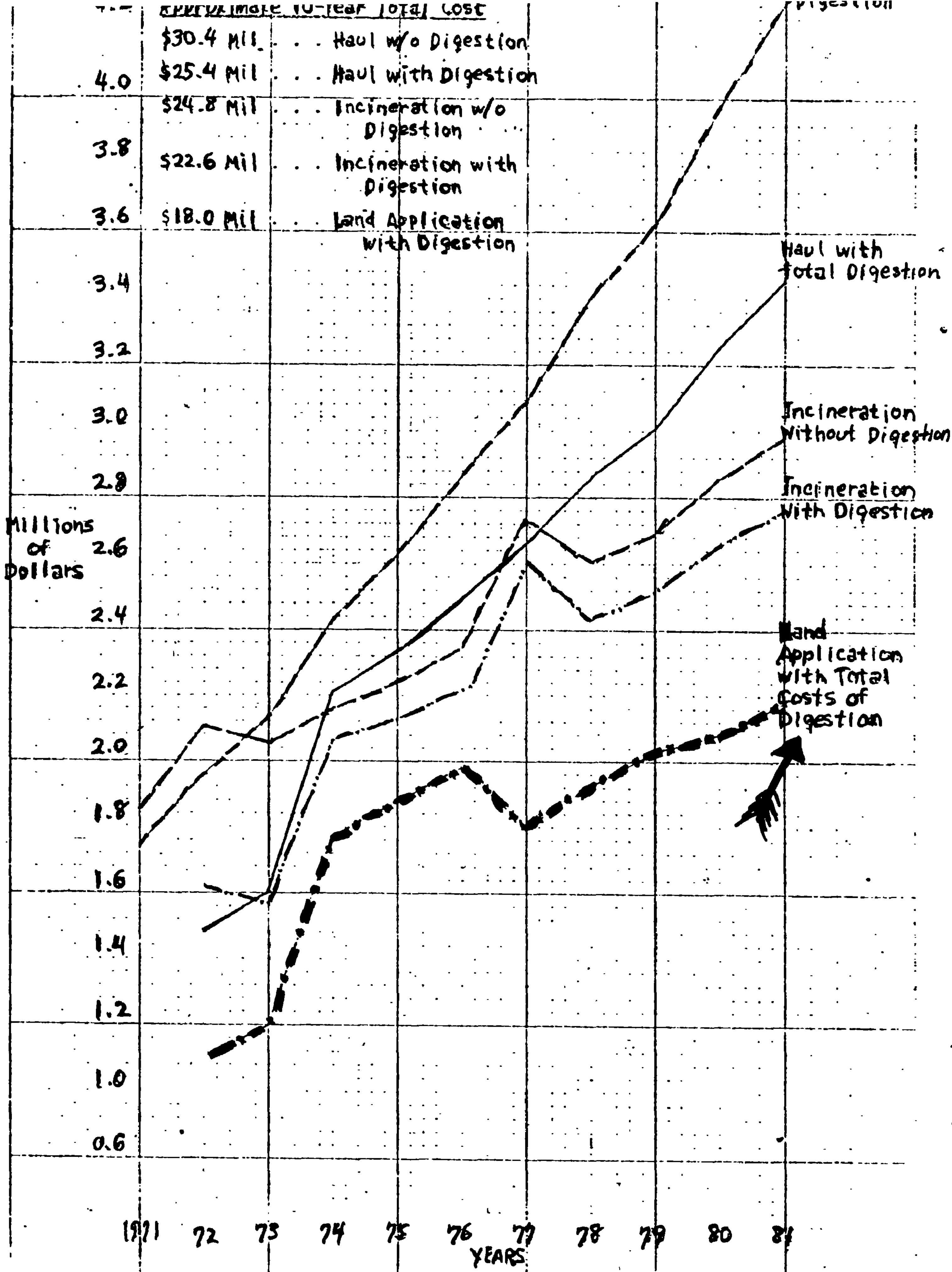
For budget purposes, the staff has analyzed all of the past costs and made an estimate of future unit costs. During 1972, it is projected that the operation and maintenance cost of the incineration system only (including the ash lagoon) will be $727,000. This cost relates to a total sludge load of 36,865 tons of dry waste solids. The resulting unit cost is $19.70 per ton. Note that this cost does not include capital or operation and maintenance costs for future air pollution control corrections.

For comparison, the historic and projected and estimated costs for sludge haul-off are presented following. The sludge now hauled off is identical to that incinerated being the discharge from the vacuum filters. The 1970 costs for sludge haul-off, including disposal site preparation work, amounted to approximately $24.80 per ton. Note that this was contract work, so the $24.80 per ton, includes all costs, including capital amortization. Recently, a new method of site handling and spreading has been adopted which will cut disposal site costs. Also, the 1970 figure was for disposal at the Lowry Bombing Range, which caused a 54- mile round trip haul distance. Projecting these figures to 1972 for comparison purposes, it is estimated that the total costs of sludge haul-off to the Lowry site would be $23.50 per ton of **dry solids**. A closer site is being investigated, and, if approved, would result in an estimated cost of $17.50 per ton of dry solids. The closer site involves a round trip haul distance of 28 miles. Again, these figures represent total cost, including operation, maintenance, and capital amortization.

Based on past costs and estimates of future costs, the Metro staff put together (January, 1971) an approximate projection of costs of the various methods of sludge disposal. The relative cost estimates are indicated on Figure 3 following. This curve indicates cost ranges specifically applicable only to the Metro Denver situation. This analysis did not contain input from outside design consultants - so that later optimization of each system design could change relative costs. The curves were intended to provide economic basis for selecting alternates reasonable for further consideration.

Alexander Potter Associates presented a report on Disposal of Sludge by Beneficial Recycle to Soil, dated February 25, 1971. This report included cost comparisons of various sludge disposal plans which are summarized in the following table.

Sludge Processing and Disposal Plan	Summation of 10-Year Costs 1972-81 Period
I Digestion with beneficial recycle to land	$22,671,000
II Incineration with digestion of all sludges	$30,600,000
III Incineration with sludge digestion except for raw Metro primary sludge	$29,177,000
IV Incineration without digestion of Metro sludge - but assuming "Optimistic" operating results	$24,641,000



PREPARED BY METRO DENVER SANITATION DISTRICT STAFF JANUARY 13 1971

STUDY CONCLUSIONS

1. Incinerators (at least those serving larger plants) should be designed to dispose of sludge at the produced rates; that is, storage should not be assumed to reduce the peak incineration capacity.

2. Incineration systems must have adequate excess capacity to compensate for actual attainable utilization rates. At Metro Denver, the past attainable utilization factor had been less than 70 per cent.

3. The incinerator stack discharges have not been in compliance with State of Colorado air pollution regualtions. Equipment can be installed to control the emission of particulate matter, but present technology does not offer proven methods for control of the sulphur and nitrogen oxides which are produced. Since air pollution control standards are becoming (rightly) more restrictive, good incinerator design must solve the sludge disposal problem without creating an air pollution problem.

4. Applicable to the Metro Dever plant, preliminary cost and results comparisons indicate that other sludge disposal methods merit detailed consideration for use.

METROPOLITAN WASHINGTON COALITION FOR CLEAN AIR, INC.

1714 MASSACHUSETTS AVENUE, N.W., WASHINGTON, D.C. 20036 (202) 785-2444

STATEMENT OF JOHN S. WINDER, JR., EXECUTIVE DIRECTOR
METROPOLITAN WASHINGTON COALITION FOR CLEAN AIR
RE: POTOMAC ENFORCEMENT CONFERENCE

November 11, 1971

Mr. Chairman:

My name is John Winder, and I am the Executive Director of the Metropolitan Washington Coalition for Clean Air. I appreciate this opportunity to bring to your attention the intense interests and concerns of this environmental polity and to comment on the Potomac Enforcement Conference.

The Coalition for Clean Air is a non-profit corporation, sponsored by the D.C. Tuberculosis and Respiratory Disease Association. Our membership includes approximately 800 individual citizens and over 90 civic, conservation, health, labor, and other organizations throughout the National Capital metropolitan area. We are fully committed to a policy of citizen education and citizen action to insure the development and enforcement of a strong, effective air pollution control program in the entire D.C. metropolitan area. We sincerely urge the Environmental Protection Agency to respond to and reflect this growing citizen concern.

EPA was established to provide a coordinated federal effort to deal with inextricably related environmental problems which heretofore had been monitored on a piecemeal, shotgun basis. It is ironic, therefore, to consider the proposed Blue Plains sewage treatment facility in the context that water pollution problems may be reduced while air pollution problems may be increased.

In this context, we are particularly concerned about the proposed facet of this facility which would incinerate large quantities of sewage sludge. This disposal method is clearly inconsistent with the efforts of many municipalities across the country which have rejected the outmoded concept of incineration for solid waste disposal. In the specific context of sewage treatment and disposal, a total biological treatment and recycling pattern, as is currently being designed in a treatment facility in Muskegon, Michigan, is a far more practical, economical, and environmentally protective method than incineration.

In conclusion, we urge EPA to provide, at the very least, a comprehensive environmental impact (102) statement on the potential air pollution impact of the Blue Plains facility, including an analysis of the potential impact the increased air pollution will have on the ambient air quality standards for the National Capital Interstate Air Quality Control Region, and including a comprehensive analysis of feasible alternatives to incineration and any other sources of increased air pollution from this facility.

ADDENDUM TO INDUSTRIAL REPORT #23409

Subject: Stack sampling and analysis for Los Angeles County APCD, Rule 53 Compliance

SUMMARY SHEET

Name of firm: BSP Corporation
Location of Plant: South Lake Tahoe, California
Equipment tested: Multiple hearth sewage sludge incinerator; effluent from wet scrubber
Date tested: November 10, 1970

	Test A	Test B	Test C
Process weight lb/hour wet: 88% H_2O	780	750	650

Sample station: One sampling port in the 13 in. cylindrical duct between sly impinjet crubber fan and the outlet stack

	Test A	Test B	Test C
Time of Test: Begin	11:06	2:01	3:41
End	12:06	3:01	4:41
Elapsed time (min.)	60	60	60
Gas volume SCFM	813	902	952
Stack Temp. ^{o}F	70	70	70
Material Collected:			
Grains /SCFM	.011	.009	.010
Grains/SCFM 12% CO_2	.026	.014	.014
Weight (grams) first thimble	.014	.014	.014
second thimble	.002	.001	.001
third thimble	.000	.000	.000
Total	.016	.015	.015
Percent moisture in gases	2.8	2.8	2.8
Gas analysis (dry basis)			
Percent CO_2	5.2	7.7	8.4
Percent O_2	10.4	9.6	9.6
Oxides of sulfur (as SO_2)	2.2	2.3	3.2
Oxides of nitrogen (as NO_2) ppm	52*	65	--

*Allowable standard only 5.0 ppm

Battelle Labs Report to Congressman Vanderjagt on Tahoe Multihearth Incinerator

PUBLIC HEALTH ASPECTS

The capability of soil as a biological filtering medium for the removal of bacteria is a long recognized principle utilized in septic tank disposal systems and in the sand filtration of raw water supplies. Studies in conjunction with the Santee reclamation project in California have demonstrated the great ability of a biological soil system to also effectively eliminate viruses. The following findings from this study as reported by McGauhey[1] document this capability:

VIROLOGIC TESTS CONDUCTED IN THE PERIOD 1962 - 1964 AT THE SANTEE PROJECT

(a) Samples of raw sewage, primary effluent, and activated sludge effluent were 100 percent positive. (Thirteen different viruses were identified.)

(b) Effluent from oxidation pond (30 days detention) showed 30 percent of samples positive.

(c) Recreational pond influent, after 2,500 ft. in soil system was 100 percent negative.

In 1964 a special study involving the introduction of attenuated polio virus in the water reaching the spreading ground was conducted.[2] Sampling wells were located at distances of 200, 400, and 1,500 ft. down the wash. No virus was recovered at any of the sampling wells. These data provide effective documentation that soil systems are capable of removing viruses.

---

[1] P.H. McGauhey, Engineering Management of Water Quality (New York: McGraw-Hill Book Co., 1968).

[2] Microbiological Content of Domestic Waste Waters Used for Recreational Purposes, California State Water Quality Control Board Publication 32, 1965.

F

Gas Company Limits Sales, Cites Shortage

By William H. Jones
Washington Post Staff Writer

Washington Gas Light Co. announced yesterday that new sales of gas, "for an indefinite period of time," will be restricted to single-family residences.

Citing a severe shortage of natural gas throughout the nation, Washington Gas said the drastic new policy is the only method by which it can assure adequate service or present customers.

The ban on new sales applies to businesses, industry, overnment and apartment ouses. Washington Gas had aken action in April, 1970, to mit new business to a maxiium of 300,000 cubic feet per ustomer per day.

That earlier limitation affected only the biggest potenial users of natural gas—an partment project the size of he Watergate, for example, or huge government office tructure.

Yesterday's decision affects nost apartment projects and usinesses—from laundromats o department stores. Washngton Gas said it will main ain commercial customers' resent usage although there an be no expansion in such ervice.

The gas utility has made sigificant inroads in recent ears into the electric utility's ominance as the supplier of uel for apartments and ofces; for example, in 1970, 29 er cent of new apartments ere contracted for gas air onditioning instead of elecicity, up from about zero a ecade ago.

Yesterday's action could ave a significant impact on perations of the Potomac lectric Power Co. (Pepco), hich has been concentrating ecent promotions on attractig large businesses and apartlent projects for "all-electric" evelopment, including heatig.

Pepco says it needs more insified and constant uses of lectrical power to improve its oad" factor; at present, the reat "load" on generating falities is concentrated in the ummer months, because of r-conditioners. The rest of e year, Pepco's expensive quipment is not used to full apacity. With more efficient se of generators, Pepco offiers argue, rates for consumrs can be kept lower.

Eugene Otto, a Pepco spokesman, said the electric utility may have to revised upward its projected needs for added electrical output.

Pepco's main competition for new business turned away at Washington Gas will likely be heating oil companies.

Similar gas limitations have been imposed by utilities in Pennsylvania, Ohio, New Jersey, Michigan and Illinois; some firms have waiting lists for all new customers. In New York State, the Public Service Commission recently ordered utilities to give residential customers first claim.

The shortage of gas supplies has been a source of sharp controversy surrounding the natural gas industry for several years. As Paul E. Reichardt. Washington Gas president, pointed out yesterday, "there's plently of natural gas in the ground."

Producing the gas is another problem. Generally, natural gas firms have taken the position that they are not allowed to make enough money from their output and have not increased their exploration for new reserves. As a result, natural gas reserves have declined for three years Critics have accused the producers of purposely withholding reserves, creating an artificial shortage and trying to force gas prices higher.

There is even controversy about whether a severe natural gas shortage exists. The Federal Power Commission which earlier this year detailed a significant decline in gas reserves, bases its surveys on reports from an industry trade group, the American Gas Association. But a consumer group, the American Public Gas Association, has charged that "alleged" shortages are based on "unverified" industry reports, and that industry might have understated reserves by as much as one-third in some recent rate cases.

In a series of major rulings this year, the FPC has raised the rates producers may charge pipeline companies for natural gas produced in most regions of the nation.

In a key July decision on production in the southern Louisiana area—a source for some Washington area gas—the FPC said there was a "critical shortage" and that the higher rates were necessary to encourage producers to find and make ready gas reserves for sale in the U.S.

In any event, the major supplier to Washington Gas—Columbia Gas Transmission Corp. —announced last month it would be able to supply only enough gas to serve present customers and a "portion" of normal growth. Another local supplier, Transcontinental Gas Pipe Line Corp., has been unable to deliver as much gas as Washington Gas contracted for, said Reichardt.

"Faced with this situation," the gas company president continued, "we're doing what we consider the fairest thing . . . commercial and industrial buildings can more readily use substitute fuels, and large users can better arrange for the pollution control devices which other fuels often require."

Although the limitation is bound to have an "adverse" impact on the utility's growth projections, said spokesman Jack Raymond yesterday, the D.C. utility won't be affected as much as gas companies in industrialized centers since some 80 per cent of Washington Gas volume is already from residential customers.

Reichardt said yesterday that in an "ecology conscious" society, the "clean-burning qualities of natural gas make it a premium fuel . . . ironically the big jump in demand . . . has come at just the time when new supplies are trending downward."

The reduced availability, Reichardt charged, resulted "largely because prices of natural gas in the producing fields in the past have been kept unreasonably low by regulation."

Last August, Washington Gas took another interim step to discourage new business by declining to give a special rate for commercial customers who agree to forego use of gas when demand from other customers is at a peak.

All sources of energy—oil, gas, electricity, coal—in the U.S. have faced increasing demands in recent years, and quite often demand has exceeded the supply—not always because there is a lack of resources but often because of lagging production.

One result has been concentration on the potentials of nuclear power as a future major energy source. But fears of the radiation effects of nuclear generating stations have slowed development in that sector. Electric utilities—which halted long-term coal purchase accords, severely crippling that industry's future plans—are now expressing more need for coal.

WASH. POST NOV. 10, 1971

7 December 1971

On page 7 of Mrs. Agnew's statement of 10 November to the Potomac Enforcement Conference is the following: "...I understand from the Corps that there are several acceptable sites well within the range of pumping capability and for which technology is presently available."

At a meeting at the Chesapeake Field Station, Annapolis, Md. with Johann Aalto and others on 6 December 1971, Mrs. Agnew stated that she had inside information that the Corps was considering sites for spray-irrigation in the metropolitan Washington area. She refused to give the source of her information.

SEE ATTACHED REGARDING THE ABOVE.

C O P Y

DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
P.O. Box 1715
Baltimore, Maryland 21203

NABPL-P

7 January 1972

Mrs. Elizabeth Hartwell
Board Member
7968 Bolling Drive
Alexandria, Virginia 22308

Dear Mrs. Hartwell:

Colonel Prentiss has asked me to reply to your letter of 7 December 1971 requesting information on site studies in the metropolitan area of Washington, D.C., for waste water disposal systems using the spray irrigation process.

I regret that I am not able to furnish you this information. The Corps of Engineers is not involved in this activity, and I have no additional knowledge on these studies.

If I can be of further assistance, please feel free to call me.

Sincerely yours,

/s/ William E. Trieschman, Jr.

WILLIAM E. TRIESCHMAN, Jr.
Chief, Planning Division

C O P Y

COMMONWEALTH OF VIRGINIA

STATE BOARD OF AGRICULTURE AND COMMERCE

7968 Bolling Drive
Alexandria, Va. 22308
January 4, 1972

Colonel Louis W. Prentiss, Jr.
District Engineer
Corps of Engineers, Baltimore District
Department of the Army
P.O. Box 1715
Baltimore, Md. 21203

Dear Colonel Prentiss:

I understand that the Corps of Engineers is presently conducting studies of sites in jurisdictions nearby or adjacent to the District of Columbia for the purpose of determining their suitability for the spray-irrigation process connected with the land-contained waste water disposal system. I further understand that this process, if applied, would involve spray-irrigation of farmlands.

I would appreciate your informing me of the location and size of Virginia sites under consideration, the assessment value of the land, whether or not the present owners have been contacted, and if the sites are working farms or vacant land.

I would appreciate your sending me this information, and any other pertinent data, as soon as possible.

Sincerely yours,

(Mrs.) Elizabeth Hartwell
Board Member

January 12, 1972

Re: rumored site study of spray irrigation of sewage effluent in the Washington metropolitan area.

"There are no studies of this sort being conducted in the D.C. area by the Baltimore District" of the U.S. Army Corps of Engineers.

--Ronald Cucino, asst. to Col. Prentiss, District Chief (301-962-4646)

Information obtained from Irwin Raisler, chief, Planning Division, Office of the Chief of Engineers, Forrestal Building: (OX-3-7251)

There are five studies of waste water management being conducted throughout the country which include spray irrigation as one factor, but none are being conducted in the Washington metropolitan area and none have anything whatsoever to do with Blue Plains. They are: Cleveland, Detroit, Chicago, San Francisco, and the Cadoras Creek area of the Susquehanna River Basin.

These studies are being conducted in cooperation with the states involved. Consideration is being given to a combination of land and water disposal methods. They are looking for a total system. This is basically the message of S. 2770 (the Muskie bill), which states no discharge of pollutants by 1985. Even with AWT, there is some miniscule amount of contamination, so they are looking for a possible method to eliminate it -- "ASSUMING THE RIGHT KIND OF SOILS. It has never been tried on a large scale, such as with the D.C. plant."

For more information, Raisler says to call Robert Gidez, asst. chief, Planning Division, OCE, OX-3-0039.

At EPA, Ken Mackethum, chief of Applied Technology group, says there is no such study being conducted in the Washington metropolitan area.

7968 Bolling Drive
Alexandria, Va. 22308
February 13, 1972

Miss Linda Upton
Air & Water Program Div.
Environmental Protection Agency
Region III
6th & Walnut Sts.
Philadelphia, Penna. 19106

Dear Miss Upton:

I understand that you are preparing an Environmental Impact Statement (102) on the District of Columbia's Blue Plains treatment plant.

I feel sure you have seen the statement made on 10 November 1971 by Mrs. Marian Agnew, president of the Northern Virginia Conservation Council, to the Potomac Enforcement Conference, in which Mrs. Agnew proposed to stop construction of the Advanced Waste Treatment upgrading and expansion of Blue Plains and substitute instead the still-experimental land-contained spray-irrigation wastewater disposal system. Enclosed is rebuttal documentation to show that this proposal is technologically, financially and politically infeasible.

I would be very happy to furnish you with any other information I may have on Blue Plains, Dyke Marsh, etc. Please feel free to call on me.

Sincerely yours,

(Mrs.) Elizabeth Hartwell

Enclosure

EIS, DAWP

Regarding the statement to the POTOMAC ENFORCEMENT CONFERENCE by MARIAN K. AGNEW, President, NORTHERN VIRGINIA CONSERVATION COUNCIL, of November 10, 1971:

FALLACIES IN MRS. AGNEW'S STATEMENT
(Summary - Documentation Attached)

A. Removal of Viruses
No measurable viruses have been detected in treated effluent from Lake Tahoe AWT plant.

B. Incinerator Operating Costs
D.C. Department of Environmental Services states it would cost \$2.45 million (not \$35.77 million as claimed by Mrs. Agnew) annually to operate the incinerator, or a daily cost of \$6,700.

C. Air Quality Standards
There are no presently adopted ambient air standards for NO_x by either the Federal government or D.C.

D. Land Area Requirements
Total land area requirements at Muskegon are 10,000 acres - not 6,000. The 309 mgd generated at Blue Plains would require 73,600 acres or 115 square miles. The 1980 projected wastewater flows for the metropolitan area (475 mgd) would require 113,100 acres or 177 square miles - more than twice the area of D.C. and Arlington County combined.

E. "Primary capital investment in a land-based system is in land rather than capital costs and plant construction. . ." Mrs. Agnew states. Muskegon report states total cost of aerated lagoon plus irrigation system is \$34,654,000. Of this only \$3.2 million is land cost - or 9.3%.

F. Failure to Acknowledge There are Other Treatment Plants in Metropolitan Area
All of which increase land area required, size of pipelines, costs, etc.

G. Profits from Crop Production on Irrigated Land
Profits to whom - for what - how paid?

H. Sludge Generated at Blue Plains
Amount of sludge will be 2,390 tons, not 4,920 claimed by Mrs. Agnew
Water content will be 82%, not 60% claimed by Mrs. Agnew.

I. What is the Land-Sewage Ratio of 130 Acres per MGD?
Source? Muskegon is a 42 mgd plant occupying 10,000 acres - 238 acres per mgd.

J. Assumption that the Federal Government, District of Columbia, Maryland and Virginia all would be willing to scrap years of negotiations, planning, engineering studies, contractural agreements, etc. and to "start in 1971" on a completely different concept to "have a clean Potomac by July, 1976."
Present program calls for advanced treatment at Blue Plains in operation by 1974.

DOCUMENTATION - Fallacies in Mrs. Agnew's Presentation

A. Removal of Viruses

Mrs. Agnew said, Total elimination of viruses was considered reliable only in the land based system."

Research is outdated - tests conducted in 1962-64.

Following is from a paper presented at the 1970 annual American Water Works Association meeting. "Annual Capital and Operating Costs for Advanced Waste Treatment," by David R. Evans, resident engineer for Cornell, Howland, Hayes and Merryfield; and Jerry C. Wilson, resident engineer for Clair A. Hill and Associates:

"Between 29 May and 2 Oct. 1969, nine sets of water samples (from Lake Tahoe AWT plant) were collected and submitted to the Federal Water Pollution Control Administration laboratory in Cincinnati for virus examination under the direction of Dr. Gerald Berg. Although viruses were found in the secondary effluent, all nine tests of the reclaimed water after chlorination were negative for virus. No virus has been recovered from the water being exported to Indian Creek Reservoir in two summers of sampling."

B. Incinerator Operating Costs

Mrs. Agnew has extrapolated from costs of Lake Tahoe incinerator, directly relating them to Blue Plains.

The following figures were given by Paul Freese, D.C. Department of Environmental Services:

incinerator operation	Freese figures	Agnew figures
annual	$2,459,000	$35,770,000
daily	6,700	98,000

Cost estimates for Lake Tahoe incinerator operation between Battelle Laboratories (1971) and Evans-Wilson (1969) show gross differences, which require careful research:

Daily Costs	Battelle	Wilson-Evans
electricity	$321.26	$189.73
natural gas	322.72	150.14
chemicals	273.99	94.12
total cost per day per MG influent	$242.76	$137.59

C. Air Quality Standards

Mrs. Agnew states several times that "the air pollution standard of 5 ppm" for NO_x. We are unable to find any documentation for this figure - either for stack emissions or ambient air standards, which she seems to have confused. National ambient air quality standards published by the Administrator of the Environmental Protection Agency as prescribed by the 1970 amendment to the Clean Air Act are 0.053 ppm for primary standards. This national standard refers to an annual mean or average in several cases (see pp. 13 - 14, Virginia Air, published by the Virginia State Air Pollution Control Board, Sept. 1971).

Mrs. Agnew refers to the 52 - 65 ppm stack emissions from Lake Tahoe as being "unbelievably dangerous levels of nitrous oxides. . ."

Letter from Whitman, Requardt and Associates, engineers-consultants, to Paul Freese, Director, D.C. Water Resources Management Admin., Nov. 23, 1971:

"There are no existing or proposed standards on the emission of oxides of nitrogen from either refuse incinerators or sludge incinerators. . . We believe the reported 52 to 65 ppm emission levels of oxides of nitrogen reported to you represent test data from only the Lake Tahoe plant using multiple hearth incinerators without the control refinements included in the D.C. design. While data from most sludge incinerators in this country show less than 50 ppm emission rates on the oxides of nitrogen, the 52 to 65 ppm is a reasonable range of values. These values are less than the planned limit of approximately 100 ppm set by the recently proposed federal emission standards for fossil fuel fired boilers as previously indicated. It is our belief that stack emission levels of 52 to 65 ppm will not exceed the ambient air levels on oxides of nitrogen being considered by the District of Columbia."

Los Angeles has one of the strongest emission standards in the country. For 1971 this standard for stack emissions was 325 ppm. Upgrading, to be completed by 1974, will produce an emission standard of 225 ppm.

A report prepared by Frank P. Sebastian of Envirotech Corp. for the Air-Water Subcommittee of the Citizens Advisory Committee on Environmental Quality, entitled "The World of Sewage as a Resource" (Nov. 16, 1970), gives a description of the Lake Tahoe tertiary process. It states:

"A significant step forward in compatibility of thermal reclamation processes used at Tahoe was the development of exhaust gas cleaning devices that cool and clean the gases so effectively that particulate matter is hardly measurable. No visible plume has been reported, and it is well within the most stringent air pollution codes. Normally, however, the exhaust gases are returned to the system to utilize the carbon dioxide to neutralize the highly-limed effluent following ammonia stripping. The final product water is of high quality and meets the U.S. Public Health Standards for potable water. . .

"The only waste product is a sterile, odorless ash from sludge incineration that can be used safely as fill and is experimentally being used for concrete blocks and bricks. The ash contains about 7% phosphate which was removed from the water but is in an insoluble form and even then is potentially available as fertilizer. . . While in the U.S. such ash has been used for land and road fill, similar material - without any phosphate content - from the Odai secondary sewage treatment plant in Tokyo, Japan, is sold for $1.35/ ton to a fertilizer manufacturer. In the U.S., research indicates that the waste lime content would aid the freeze-thaw characteristics of road fill. Also experiments at FWQA, Cincinnati, indicate the insoluble phosphate in the Tahoe ash is beneficial as a plant fertilizer."

Therefore this can be returned to the soil as well as watered sludge.

D. Land Area Requirements

Mrs. Agnew neglected to include the land required for lagoons and other purposes in her extrapolation of acreage from Muskegon to Blue Plains.

Muskegon requires 6,000 acres of land for irrigation PLUS two lagoons, buffer zones, border areas, etc., for a total of 10,000 acres.

Muskegon is also planned for 42 mgd, not 35, therefore her scale-up factor of 8.8 was wrong on two counts. Corect factor is 7.36.

Using EPA projected wastewater flows for the metropolitan area in their "National Capital Region Water and Waste Management Report," the following acreages would be required for the land contained system:

1980 - 475 mgd flow - 113,100 acres or 177 square miles
2000 - 860 " " - 205,000 " " 320 " "
2020 -1340 " " - 320,000 " " 500 " "

E. "Primary capital investment in a land based system is in land rather than capital costs and plant construction. . ." Mrs. Agnew says.

The primary savings in the Muskegon plant seems to be in annual operating costs, which could well not materialize when long-distance pumping is required.

See #3 in Major Problems

Land costs at Muskegon were only 9.3% of the total capital cost.

Land costs are <u>excluded</u> in federal and state grants for sewage treatment plants, according to County Executive George Kelley. Therefore the entire cost must be borne by local jurisdictions.

The 309 mgd flow from Blue Plains would require 73,542 acres (114 square miles) for spray irrigation system. Very conservative cost of permeable land in Fairfax or Loudoun counties is $3,000 per acre - some goes as high as $6,500 per acre.

73,542 acres @ $3,000 - $220,626,000 principal
115,828,650 interest*
TOTAL $336,454,650
average annual cost - $16,822,732 <u>just for Blue Plains</u>

Land costs for entire metropolitan Washington flow as estimated by EPA:

1980 - 475 mgd @ 238 acres/mg - 113,100 acres
113,000 acres @ $3,000 - $339,000,000 principal
117,975,000 interest*
TOTAL $516,975,000
average annual cost - $ 25,848,750

2000 - 860 mgd @ 238 acres/mg - 205,000 acres
205,000 acres @ $3,000 -$615,000,000 principal
322,875,000 interest*
TOTAL $937,875,000
average annual cost - $ 46,893,750

*interest figured for 20 years at 5%.

2020 - 1340 mgd @ 238/acres/mg - 320,000 acres
320,000 acres @ $3,000 - $960,000,000 principal
504,000,000 interest*
TOTAL $1,464,000,000
average annual cost - $ 73,200,000

All of these above costs would have to be borne by the taxpayers of the local jurisdictions.

COSTS OF SPRAY IRRIGATION SYSTEM

Title	Muskegon	factor	Blue Plains
Clearing (1)	$ 925,000	7.4**	$ 6,845,000
On-site improvements (2 - 7, 11)	9,714,000	7.4**	71,883,600
Force main to site (8)	4,700,000	74***	296,000,000
Pumping station to site (9)	1,350,000	7.4**	9,990,000
Lagoons & treatment facilities (10)	6,302,000	7.4**	46,634,800
Access pumping stations & force mains (12)	5,373,000	7.4**	39,760,200
Land (13)	3,200,000	****	220,626,000
Engineering & administration costs (14)	3,000,000	7.4**	22,200,000
	$34,564,000		$713,939,600

* - interest figured for 20 years at 5%
** - scale upward from 42 mgd (Muskegon) to 309 mgd (Blue Plains
*** - factor of 7.4 for sizing, plus factor of 10 for distance
**** - see analysis elsewhere

COMPARATIVE COSTS FOR BLUE PLAINS

Treatment	Principal	Interest (20 yrs. at 5%)	Total
conventional AWT	$359,000,000	$188,475,000	$547,475,000
spray irrigation	713,939,600	374,818,290	1,088,757,890

The spray irrigation-land contained system for Blue Plains would cost almost twice as much as precently planned AWT process now under consideration.

FAIRFAX COUNTY COSTS
(supplied by County Executive George Kelley)

If construction plans for Blue Plains were changed today, and implemented tomorrow Fairfax County would still be committed to the following charges:

1. Pimmit Run trunk - $8,000,000 plus
2. Capital contribution to Dulles Interceptor - $240 per million gallons
3. Increased cost for chemicals over next four years - $528,000 annually

STORAGE FACTS AND FIGURES

The Muskegon plant allows for storage of total flow for up to 4 months (120 days) for periods when it would be impossible to spray effluent - due to freezing weather, rain, etc.

Storage for Blue Plains flow:
- 309 million gallons per day for 120 days - 37,080,000,000 gallons
  - 1 gallon equals .1337 cubic feet
  - 37,080,000,000 gallons equals 4,957,596,000 cubic feet

The Fairfax Tower Building (12-storey county administration building) contains 1,920,000 cubic feet.
Therefore: It would take 2,582 Tower Buildings to hold the flow for 120 days.
21.5 buildings would be required to contain one day's flow.

Or:
Muskegon lagoons are 9 feet deep. Similar capacity at that depth for Blue Plains:
- 550,844,000 square feet or 12,645 acres.
- This is 31% larger than the City of Alexandria.

Or:
Total storage of Blue Plains flow for 120 days would cover Fairfax County's 400 square miles to an average depth of 5.3 inches.

F. Failure to Acknowledge There are Other Treatment Plants in Metropolitan Area
See documentation #6 in Major Problems.

G. Profits from Crop Production on Irrigated Land
Major agriculture in Delmarva is foodstuffs - do state and local health codes permit use of human wastes on food crops?

Closer agricultural lands are primarily tobacco and dairy production - do these lands need further enrichment?

H. Assumption that the Federal Government, District of Columbia, Maryland and Virginia all would be willing to scrap years of negotiations, planning, engineering studies, contractural agreements, etc., and to "start in 1971" on a completely different concept to "have a clean Potomac by July, 1976."
The first session of the Potomac Enforcement Conference was held in Aug., 1957, and the second the following February. The third session was in April and May, 1969, 11 years later. Since this third session it has met many times, and finally, primarily due to the efforts of the Virginia State Water Control Board, the involved jurisdictions signed a Memorandum of ~~Agreement~~ UNDERSTANDING (Oct. 1970) and a year later an Interim Treatment Agreement which begins a cleanup of the Potomac River in earnest.

It has taken 14 years for these jurisdictions to resolve their differences and reach a first agreement starting us on the long road to a clean river. Dare we risk scrapping this hard-won agreement and attempt to reach an understanding on a type of treatment that is still in the experimental stage?

MAJOR PROBLEMS NOT ADDRESSED IN MRS. AGNEW'S PROPOSAL
(Summary - documentation on following pages)

1. Water Supply for Metropolitan Area
   The metropolitan Washington area is faced with constantly increasing demands for water. EPA forecasts "Single day deficits (of water) of some magnitude will become a common occurrence by 1980-85."
   This predicated on the building of upstream dams proposed by the Corps of Engineers.

2. Salt and/or brackish Water Intrusion Farther Upstream
   If 309 mgd are removed from the Potomac estuary, there would be a change in salinity of the downstream water.
   What effect on the fishing industry?

3. Pipeline for Estimated 100 Miles
   Estimated cost for 100 miles is nearly a BILLION dollars.

   Siltation - massive environmental problems in laying the lines themselves.

   Pumping Stations - how many watersheds and subwatersheds must be crossed? Such stations cause operating costs to skyrocket.

4. Soil Characteristics
   Soils in the metropolitan area are not permeable, witness septic problems in Fairfax and Prince Georges counties. Muskegon soil is permeable sand 25 to 100 feet deep.
   How far must we go to find similar soils?

5. The Muskegon Plant is Not Yet in Operation
   Will it work as anticipated?

6. Other Treatment Plants Now Operating in Metropolitan Area
   At present there are 13 plants in the area between Chain Bridge and Gunston Cove. The Potomac River cannot be cleaned up until these problems are solved, along with Blue Plains.

DOCUMENTATION - Major Problems Not Addressed by Mrs. Agnew's Proposal

1. Water Supply for Metropolitan Area

The Environmental Protection Agency's "National Capital Region Water and Waste Management Report," April 1971, says, "Average water demand for 1970 was 381 mgd and is projected to rise to 600 mgd by 1980-85 and 1500 mgd by 2010-2020."

Every responsible proposal for future water supplies in the metropolitan area is based on usage of the Potomac estuary, even those advocated by the people who feel the upstream dams are a necessity. Therefore water quality standards within the region have been set extremely high by the Enforcement Conference - with absolute poundage limitations rather than removal percentages - so that the estuary water will be usable for water supply.

Mrs. Agnew stated in oral testimony at the Enforcement Conference that the acreage required for the land contained system could easily "be a trade-off - 52,000 acres" for the Muskegon approach traded for 50,000 acres estimated to be flooded by the upstream dams. Her implication seems to be that if we do not have sewage effluent from Blue Plains in the river, we will not require the upstream storage dams.

Following from transcript of Enforcement Conference proceedings, Dec. 8-9, 1970 (pp 240-241) between Chairman Murray Stein and Dr. Johann Aalto, Chief, Chesapeake Technical Support Laboratory:

Stein: ". . .in spite of all the dams you are asking for authorized in the upper estuary, we are still going to have to use or have available the water below Great Falls in the estuary for water supply in the metropolitan area during critical periods."

Aalto: "In spite of the fact that seven dams are constructed it will be necessary to use the estuary."

(Please see additional statement at end of this paper.)

2. Salt and/or Brackish Water Intrusion Farther Upstream

Following is from Report 92-414, Senate Committee on Public Works, regarding Sec. 209 - Waste Treatment Management - of the Federal Water Pollution Control Act Amendments of 1971:

"The present Federal water pollution control program does not consider degradation of water caused by reduction in fresh water flows which produce the intrusion of salt or brackish waters into estuaries and rivers. Salt water intrusion, no less than point sources of discharge, alters significantly the character of the water and the life systems it supports. Salt water intrusion often devastates the commercial shellfish industry. It must be accounted for and controlled in any pollution control program. It makes no sense to control salts associated with industrial or municipal waste point sources and allow, at the same time, similar affects to enter the fresh water as a result of intrusion of salt water. Fresh water flows can be reduced from any number of causes."

Following is from "Summary and Conclusions From a Water Resource-Water Supply Study of the Potomac River Estuary," April 1971, prepared by the Chesapeake Technical Support Laboratory, EPA:
"Data from the chloride, total dissolved solids, and other simulations where the estuary was used as a potable water supply source indicate the following:

"(1) The position of the salt wedge with respect to intrusion from the Chesapeake Bay is a function of (a) duration and magnitude of any selected flow, (b) location of the wastewater treatment facility discharges, and (c) consumptive losses in the water distribution system.

"(2) Even with no water supply withdrawals from the estuary, for comparable flow conditions, intrusion of chlorides and total dissolved solids from the Chesapeake Bay will occur farther upstream in the future as a result of the greater percentages of wastewater discharged downstream into the salt wedge and the projected increase in consumptive loss, with the latter having the most pronounced effect.

"(3) The number of days during which the estuary can be used for water supply depends upon (a) the position of the wedge prior to the withdrawal, (b) magnitude of the withdrawal, (c) fresh-water inflow during withdrawal, (d) location of the wastewater discharges, and (e) the increase in chlorides and total dissolved solids as a result of water use."

According to Johann Aalto, Director, Chesapeake Technical Support Laboratory:

There is a substantial loss of water returning to the river in a land-contained system.
Generally during the summer months 15% is lost by evaporation, 20% by transpiration, and 10% into ground water.
This means a total consumptive loss of approximately 45%.
With a oonventional AWT system, consumptive loss is only 10 - 15% (approximate).

<u>85% return of water to the river is necessary if we are to keep the salt wedge from moving upstream and therefore destroying the estuary as a potential water supply</u>.

3. Pipeline for Estimated 100 Miles

No cost estimates are included in Mrs. Agnew's paper, nor are they adequately treated in the documentation she included.

The proposed Occoquan regional tertiary treatment plant, to be built in Fairfax County, will be a 92 mgd plant. It will include 11 miles of pipeline at an estimated cost of at least $32 million EXCLUSIVE of pumping station costs.

We realize that direct extrapolations are always dangerous, and usually unreliable. However, in the case of such long-distance pipelines, we have been unable to acquire firm figures on short notice. Bearing in mind that these may not be particularly adequate:

Using a 3.3 scaleup (92 mgd vs. 309 mgd), a 100-mile pipeline would cost approximately $950 million - nearly a <u>billion</u> dollars!

According to Virginia State Water Control Board Chairman Noman Cole, the Muskegon land-contained system costs are very sensitive to:

1. The cost of land since it is required in great quantities. In Muskegon land was $320 per acre, and 10,000 acres were required for a 42 mgd plant.
2. The distance and land and elevation between the source of the sewage and the area where it is to be sprayed. This distance sets the length of force main transmission lines. The elevation and distance will set the number of pumping stations required. Muskegon's force main is only 11 miles long (over very flat and sandy land, no hills or rivers) and only one major pumping station (elevation in order of 25 feet). The cost of land will also affect the pipeline right-of-way costs.
3. The number of pumping stations and elevation of the lifts will have a major impact on operation costs, which are very sensitive.

It is imperative we know how many watersheds and subwatersheds must be crossed (each requiring at least one pumping station) before the land to be irrigated is reached.

Pipelines are sized for peak flows, not just average flows.
150 feet is generally considered the maximum practicable lift for standard sewage pumps (Metcalf & Eddy, 18 Mar 1971).

Siltation - one hundred miles of pipeline would be environmentally damaging in reference to the tremendous amount of siltation produced by such construction.

Especially in rural areas where there are few or no erosion control guidelines or ordinances.

5. The Muskegon Plant is Not Yet in Operation

Will a similar approach work in the metropolitan area?

More than one quarter of the Muskegon flow originates from a a paper mill, with types and amounts of organic wastes accurately calculated. This would not be true of a system handling municipal wastes such as Blue Plains.

6. Other Treatment Plants Now Operating in Metropolitan Area

The following all empty effluent into the Potomac River at this time: Pentagon - Arlington - District of Columbia - Alexandria - Andrews Air Force Base (2 plants) - Ft. Belvoir (2 plants) - Lower Potomac.

Although some of these are scheduled to be closed, their effluent will merely be piped elsewhere and still flow into the estuary after treatment.

There are also municipalities throughout the Potomac basin with primary or secondary treatment only - or no treatment at all.

WATER SUPPLY - continued

Mrs. Agnew's statement on page 3, purportedly quoting from an unidentified Senate Public Works Committee report (actually a quotation from EPA's 1971 report on "The Cost of Clean Water," Vol. II), says: "The ground disposal systems have the great virtue of recycling the material so disposed both the replenishing water tables (emphasis ours) and by converting and utilizing organic waste matter in natural life processes of decay in growth."

We will leave aside at this point the fact that the Senate Committee took this sentence out of context and therefore altered the entire thrust of this segment of the EPA report which deals with "Diseconomies in Public Waste Management Activities."

While there might be some ecological validity to the proposition that organic waste matter should be recycled into the local ecosystem, the implication that a land-contained system would replenish water tables in the metropolitan Washington area simply is not true. It would do so only if a major portion of the region's water supply were obtained from deep wells, thereby depleting the area's underground water supplies (aquifers). This is not the case.

The April 1971 EPA "National Capital Regional Water and Waste Management Report" states that about three-fourths of the water for the region is taken from the Potomac, and one-fourth from Patuxent, Occoquan and Goose Creek reservoirs and from wells. The Occoquan and Goose Creek are both tributaries of the Potomac River. An examination of the Fairfax County Water reports reveal that the proportion of its water supply from wells is statistically insignificant.

It is therefore apparent that a major portion of the region's water supply comes either from the Potomac River or its tributaries. Under present wastewater management practices all of this withdrawal of water is returned to the estuary at or above the confluence of the Potomac and the Occoquan.

In effect, this is a closed hydrologic cycle. A large quantity of water is withdrawn from the river, used by consumers (primarily residential) and returned to the river in the form of treated effluent from sewage plants. The small proportion of water table drawdown represented by deep well sources in public systems and by private users of wells is probably counterbalanced by those water uses which are returned to the water table; e.g. lawn watering, agricultural irrigation, and storm water drainage.

This existing natural balance of both river flow and aquifers would be completely upset by Mrs. Agnew's proposal. While not implicit in her written statement, her public answers to questions regarding the land-contained system proposal and a consideration of land use factors in the metropolitan Washington area make it clear that what she is proposing is the EXPORT of the region's wastewater to somewhere else. In response to questions as to where this somewhere else might be, she has responded that Corps of Engineers' studies indicate that the Delmarva Peninsula would be a suitable location for this enormous septic field.

In other words, 309 mgd of Potomac River flows - or considerably more than that if we are to be consistent and apply this proposal to every wastewater treatment process in the region - are to be exported out of the Potomac basin to the eastern shore of Maryland, Delaware, Virginia, or to York, Penn. All have been mentioned by the proponents of this plan as potential depositories for our sewage.

C O P Y

CITIZENS COUNCIL FOR A CLEAN POTOMAC

P.O. Box 1972 - Wheaton Station - Silver Spring, Md. 20902

WHEREAS, the political jurisdictions in the Washington metropolitan area have agreed on a program to upgrade and expand the Blue Plains sewage treatment plant in the District of Columbia with the objective of providing a high level of water quality in the Potomac River; and

WHEREAS, expansion of primary and secondary facilities and addition of advanced waste treatment to the plant promise much in the way of abating pollution in the Potomac from the Washington metropolitan area; and

WHEREAS, construction of advanced waste treatment facilities at other plants in the Washington metropolitan area is either planned or underway, promising the same benefits to the Potomac River as does the Blue Plains plant; and

WHEREAS, the use of the laternative disposal methods involving spray irrigation of effluent or land disposal is impractical both from a cost and technological standpoint for the Blue Plains service area due to the volume of waste water generated and the particular physical conditions in the area; now, therefore, be it

RESOLVED, that the Citizens Council for a Clean Potomac strongly urges the U.S. Congress and the political jurisdictions in the Washington metropolitan area to continue the Blue Plains expansion and upgrading program. The Council also resolves itself to an effort to ensure continued funding for and support of the Blue Plains program.

Adopted unanimously by the
Steering Committee

18 January 1972

THE WASHINGTON POST - 16 January 1972

[Letter to the Editor]

The Potomac Basin Inter-League Committee of the League of Women Voters is composed of representatives from the 21 state and local Leagues in the Potomac Basin. For almost seven years this committee has concentrated on the Potomac River and its myriad problems--with particular attention focused on the Metropolitan Washington portion of the river where the need for action is most crucial.

After months of discussion and political maneuvering, an agreement has finally been reached by the local jurisdictions and the states of Maryland and Virginia to take immediate interim measures to reduce the pollution to the river from both the overloaded regional plant at Blue Plains and the Georgetown Gap where raw sewage has poured into the river.

However, as important as these interim measures are, the river will not be really "cleaned up" until the plant at Blue Plains is expanded and upgraded to provide both secondary treatment and nutrient removal for the almost 300 MGD (million gallons per day) that flow through this facility from the Maryland suburbs, the District of Columbia, and the Dulles interceptor in Virginia. An agreement to upgrdde Blue Plains was also reached after many agonizing months of inter-governmental negotiations, and construction has now begin on what will be one of the most technically advanced physical-chemical waste treatment facilities in the United States. The Potomac Basin Leagues have supported this construction - and its financing - as we believe it is an imperative step in achieving a clean Potomac.

We are therefore dismayed that at just this point in time - when after years of talk there is real accomplishment - the Northern Virginia Conservation Council has launched an attack on this physical-chemical plant now under construction. We feel this group's alternative of a spray irrigation-land disposal system is unrealistic for the following reasons:

* The geographical suitability of this region for land disposal is questionable, especially for large amounts such as the 309 MGD which will be the flow to Blue Plains by 1975.

* Although the cost of the advanced treatment planned for Blue Plains is high, the cost of transporting 309 MGD of sewage to a disposal site - if a suitable site could be found - would be much more expensive.

* The land area required would be more than 100 square miles, larger than the District of Columbia itself.

* 309 MGD would be removed from the estuary where it is needed in times of low flow to prevent a salt wedge in the lower estuary from moving upstream to the Washington area. If this salt wedge moves upstream it would preclude the emergency use of the estuary for water supply in an extended period of drought.

* The federal government, the states and the local jurisdictions have agreed to the financing for the construction already underway. If the type of treatment was changed at this time it would be many more months before another financial agreement could be reached, and the degradation of the river would continue.

The question of possible air pollution from the sludge burning process which will be incorporated into the upgraded facility has also been raised. It is the opinion of Whitman, Requardt and Associates, Engineering Consultants, Baltimore, Md., that this would not be the case. A further study of the specific design configuration of the Blue Plains plant from the standpoint of the effect of the sludge burning on the ambient air quality of the metropolitan Washington area is now being conducted. The League of Women Voters would of course support any design modifications - if they are shown to be needed - for the plant to meet air quality standards.

Blue Plains will handle only a part of the total sewage load of the Washington metropolitan area. More facilities are needed in both Maryland and Virginia, and WSSC has agreed to begin immediate planning for an additional regional plant for the Maryland suburbs. Our committee feels that an examination of the alternatives for these future facilities would be more productive than proposing an alternative for one that is already under construction. The Potomac River can no longer afford to wait - it will become another Lake Erie if we continue to talk and do not act.

HESTER McNULTY,
Potomac Basin Inter-League Committee,
League of Women Voters

Falls Church

C O P Y

WASHINGTON ECOLOGY CENTER - December 1971

Blue Plains' Sewage Effluent Lands in Controversy

Advanced sewage treatment, a physical-chemical process which removes nutrients from sewage after conventional treatment, has long been billed as the answer to the pollution problem of nutrient loadings to streams and riverways. It promises to curb, at least, the eutrophication process, through which waterways are "killed" (like Lake Erie) through strangulation by growths of algae.

Advanced~~w~~ waste treatment facilities are now under construction at Washington's sewage treatment plant at Blue Plains, due to be finished in late 1974, and designed to remove up to 98 per cent of the pollutants from sewage. Anyone who has seen the summer algal growths in the Potomac Estuary holds out hope for this process.

With construction well under way at Blue Plains and benefits soundly promised, the Northern Virginia Conservation Council has questioned the entire theory of advanced sewage treatment, claiming we can put the effluent (treated waste) on the land, use it to enrich the land, and keep the mess out of the Potomac River. They would scuttle the advanced waste treatment process in favor of spray irrigation of the sewage effluent, and have taken their case to the U.S. Congress, presenting each Congressman with a case for land disposal with projections for Washington based~~on~~ on a much smaller system used in Muskegon County, Michigan.

The primary merit to be seen in the NVCC position is that it raises the question of what should be done with the hundreds of tons of sewage sludge produced each day. The burning of sludge, as now planned, will emit some 50 to 65 parts per million of nitrous oxides into the air - a fact which even D.C. officials admit.

But also to be considered is the ecological damage to the Potomac Estuary if we stop the flow of treated sewage effluent into the estuary

Blue Plains will discharge about 310 million gallons of treated waste water each day to the Potomac. If we spray irrigate this effluen the discharge will be lost. Bear in mind, 310 million gallons a day (mgd) is fairly close to the summer low flow of the river at Washington once as low as 388 mgd. Were we to have another drought year, theoretically we could have a sea of salt instead of the fresh-water Potoma Estuary.

Without the inflow of the waste waters from Blue Plains, the saline water, during low flows, could move upstream from the Route 301 bridge as far as the southern suburbs of Washington and eventually as far as Key Bridge.

All of this would, perhaps most importantly, preclude the future use of the Estuary as a water supply source. Once the people of the Washington area accept the concept of using recycled water, and ~~one-the~~ once the question of how to kill viruses is cleared up, the Potomac Estuary, now Washington's sewage effluent receptacle, could become a ~~vila~~ viable source of water. But not if we stop waste water discharges altogether.

All of this does not take into account the geological suitability of the Washington area and many outlying areas for spray irrigation of waste water. Some experts say the suitability is nonexistent. In addition, estimates are that it would take a land area the size of the District plus Arlington County.

The Northern Virginia Conservation Council did a good deal of research on the Muskegon County system, but that system was only designed for 35 mgd. Projections to Washington's 309 mgd are dangerous. They raise a good point in the problem of air pollution from incineration of sludge, but the benefits seem to weigh heavily in favor of continuing with advanced waste treatment at Blue Plains, despite it. If we stop construction of advanced treatment facilities now for a lengthy study of land disposal, Washingtonians may never see their environmental objective: a clean Potomac River.

CENTRAL ATLANTIC ENVIRONMENT NEWS - 30 Nov 71

...Finally, further confusing the situation, the Northern Virginia Conservation Council--in a statement given wide distribution on Capitol Hill--suggested in mid-November that the current Blue Plains expansion program be replaced by a new waste treatment system for the metropolitan area utilizing the spray-irrigation process. Basing its case in large part on spray-irrigation facilities now under construction (not yet operational) at Muskegon, Michigan, the Council claimed a similar system at Washington would be cheaper to operate and have less environmental impact than the present Blue Plains plan. (Our own preliminary inquiry--including contact with the Muskegon consulting firm--indicates that the Council's position paper contains material the validity of which is open to question.)

CENTRAL ATLANTIC ENVIRONMENT NEWS - 30 Dec 71

...Is there a better sewage treatment system for the Washington area?

A proposal promoted by Marion Agnew, President of the Northern Virginia Conservation Council, to phase out the Blue Plains sewage treatment system, which is described as a physical-chemical process, and replace it with a spray-irrigation land disposal process along the lines of one now being engineered for Muskegon, Michigan, has received much attention recently. There is appeal in the idea that nutrients should be used on the land where they can be recycled, rather than spilled into our waters where they pollute. Much research would need to be done, however, to adapt the Muskegon plan to the Washington metropolitan area, for the two areas are quite dissimilar in certain essential ways. Muskegon's system depends on many acres of very porous soils which are not available near the Washington area, and it is designed to handle relatively small quantities of effluent compared to the hundreds of mgd produced here.

The principal difficulty with the Muskegon system, however, if applied to the Washington area is that 309 mgd, more or less, of effluent would be lost to a river whose flow was recorded in 1966 at 388 mgd--in other words, the Potomac River cannot spare 309 mgd. Such loss could mean salt water intrusion into the upper estuary as a future source of water supply. Conceivably, some aspects of the Muskegon system could be redesigned and adapted for future disposal systems here-particularly if effluent could be treated in a land disposal system upstream, where it would drain back into the Potomac River. Unfortunately, the Delmarva peninsula is the only land area that appears suitable for application of this system at present, and the dollar costs of piping the effluent as well as the water lost prohibit such a scheme.

POTOMAC BASIN REPORTER - November-December 1971

Newsletter of the Interstate Commission on the Potomac River Basin

Editorial

The massive improvement program now underway at the D.C. Water Pollution Control Plant at Blue Plains promises to produce one of the finest waste treatment facilities in the nation, if not the world. It offers the first opportunity in many years for the people of the Washington metropolitan area to enjoy a comparatively clean Potomac River.

At this late date, with construction well under way and benefits soundly promised, the Northern Virginia Conservation Council has seen fit to question the entire theory of advanced sewage treatment, claiming that physical-chemical treatment will not solve the urban water pollution problem and may transfer it to the air. They would scuttle the advanced waste treatment process in favor of spray irrigation of waste water.

While the Interstate Commission on the Potomac River Basin has endorsed spray irrigation for use where it is feasible, the Washington area does not lend itself to such a process.

Many problems stand in its way:

1) 309 million gallons of water (the daily effluent discharge to the river) would be lost. This amounts to nearly the total flow of the river in the summertime.

2) Without this inflow, the saline wedge would move rapidly upstream.

3) Such a procedure would preclude the future use of the Potomac Estuary for water supply.

These three problems relate only to the actual effects of eliminating an effluent flow to the river after a spray irrigation or other land-contained process were instituted. There also are severe problems in the practical application of such a process in the Washington metropolitan area:

1) The geological suitability of the area to spray irrigation is in serious question.

2) The costs of transporting the sewage effluent or sludge to an area which is suitable for land disposal would be prohibitive and cannot be projected from the cost studies done of the Muskegon County, Mich., system, which involves a fraction of the load at Blue Plains.

3) It has been estimated that land disposal of sewage effluent from Blue Plains would require a land area the size of the District of Columbia plus Arlington County.

The Commission feels these are sufficient reasons to discredit spray irrigation in this type of setting.

We take the position that to halt construction at Blue Plains of advanced waste water treatment facilities would be sheer folly. While we concur, as do officials within the D.C. government, that burning of advanced waste treatment sludge may pose an air pollution problem, we believe that the benefits weigh heavily on the side of advanced waste water treatment.

Carl Johnson
Executive Director, ICPRB

7968 Bolling Drive
Alexandria, Va. 22308
March 5, 1972

Mr. Edward W. Furia, Jr.
Regional Administrator
Environmental Protection Agency
Curtis Building
6th & Walnut Sts.
Philadelphia, Pa. 19106

Dear Mr. Furia:

The enclosed material regarding the District of Columbia's Blue Plains sewage treatment plant is for your information.

I hope you will note in particular the Northern Virginia Conservation Council's Blue Plains resolution. The Board of Directors endorsed Advanced Waste Treatment upgrading and expansion of Blue Plains on January 12, 1972, the membership on January 26, 1972.

I can assure you that citizens of the metropolitan Washington area, with the exception of a <u>very few</u>, support AWT upgrading and expansion of Blue Plains.

Questions and criticisms regarding the incinerator could certainly be ironed out by open discussion of all concerned. It is not too late to change the design of the incinerator, if necessary.

Sincerely yours,

Elizabeth Hartwell

(Mrs.) Elizabeth Hartwell

Enclosures

MAR 3 1972
FWQA

Northern Virginia Conservation Council

Box 304, Annandale, Virginia 22003

February 23, 1972

DEAR MEMBER OF CONGRESS:

Enclosed is a new resolution adopted on January 26, 1972 by the NORTHERN VIRGINIA CONSERVATION COUNCIL Board of Directors and membership in regard to its position on the BLUE PLAINS SEWAGE DISPOSAL CONTROVERSY.

This resolution represents a change in the Council's earlier position.

Yours truly,

Caroline W. Peters

Caroline W. Peters
Secretary

M108

Northern Virginia Conservation Council

Box 304, Annandale, Virginia 22003

BLUE PLAINS RESOLUTION

Be it resolved by the Northern Virginia Conservation Council that:

1. As a general principle to follow in dealing with environmental problems, we favor the recycling of natural resources and the use of natural biological processes wherever feasible, in preference to elaborate, highly technological methods that may involve risks of harmful side effects, physical breakdown or human error;

2. Within the context of the above statement of principle, but also in recognition of the achievements of the Potomac River - Metropolitan Area Enforcement Conference, we should like to modify our position presented to the Conference on November 10, 1971, as follows:

a. We endorse the proposals of the Conference to expand the capacity of the District of Columbia's Blue Plains sewage treatment plant to 309 MGD by December, 1974, and upgrade it to advanced waste treatment (AWT), as partial steps toward solution of the area's waste water treatment problems;

b. To the extent that the requirements of Sec. 102 of the National Environmental Policy Act have not yet been complied with, with reference to the questions of effluent quality, sludge removal and incineration at Blue Plains, we request that additional statements be completed;

c. We urge all concerned agencies in the area to foster continuing studies between now and December, 1974, of the feasibility of alternative methods of sewage treatment, with particular attention to land-contained systems within the Potomac River Basin and methods of sludge disposal;

d. We urge that the results of such studies be applied where feasible in the area, so as to spread the treatment load more evenly, to avoid possible overloading of the Blue Plains plant, to avoid too heavy reliance on treatment methods that could cause unwarranted environmental hazards, and to conserve the Potomac River Basin's fresh water resources to the optimal degree.

3. We commend the Virginia State Water Control Board for its constructive role in working toward a solution to the area's waste water problems.

4. The secretary is instructed to supply copies of this resolution to all Conference participants and to all others who have been provided with the Council's previous position paper, urging their support of the concepts set forth in this resolution.

(Passed on January 26, 1972)

ENVIRONMENTAL DEFENSE FUND

1712
XXXX N STREET, N.W., WASHINGTON, D.C. 20036/202 833-1485

February 8, 1972

Edward Furia, Jr.
Regional Administrator
Environmental Protection Agency
Curtiss Building
6th & Walnut Streets
Philadelphia, Pennsylvania 19106

Dear Mr. Furia:

We want to thank you for the excellent meeting held in your office last week. Your willingness to take a fresh look at the Blue Plains project and your openness to the alternative land-contained sewage treatment system were very encouraging to us.

As you now know, the advanced waste treatment system and the sludge-incinerator planned for Blue Plains have been rushed through the administrative review process. They have been approved on the basis of scanty planning, inadequate information, and without the legally required environmental impact statement or the necessary public involvement. Consequently several very controversial questions about the process being installed and the potential alternatives remain to be answered. It is hard for us to understand why these were not brought to your attention sooner, as they should have been. However, now that you are fully aware of the situation, we are confident that your staff will investigate thoroughly the Blue Plains project and the available alternatives. Blue Plains has become such an emotional issue here in Washington that it is essential that someone from the outside like yourself undertake an objective assessment of the situation before proceeding any further.

Thus far, the flow of information has been from the public to the government. We hope, however, that as a result of our last meeting this flow can now begin to be reversed and the public begin to learn more precisely what EPA has invested its dollars in at Blue Plains and what will be the consequences. As stated in EDF's letter to you of January 24, 1972: "Our sole concern here is to insure that the decision on Blue Plains receives the careful analysis and public involvement required by the National Environmental Policy Act of 1969, before any irreversible commitments of resources are made."

We are therefore enclosing a list of questions which we hope will help to focus your investigation. This list is not complete but merely suggestive of the kinds of information needed before a rational decision can be made. It is our expectation that when we meet again this Friday we can begin to discuss the answers to some of these questions.

Sincerely,

Scott H. Lang
Washington Counsel

Marion Agnew
Chairman, Northern Virginia Conservation Council

Enclosure

QUESTIONS

The Incinerator

1. Is the engineering design for the incinerator completed?

2. Is the engineering design available to the public?

3. What is the design capacity of the incinerator?

4. What combustion process will be employed?

5. What pollutants will be emitted into the air?

6. What are the predicted stack emission levels for particulates, sulfur oxides, oxides of nitrogen, mercury, lead, and other pollutants? How many pounds of each?

7. Upon what data and what empirical studies are the predicted stack emissions predicated?

8. What control technology will be employed to control each of the above pollutants?

9. Is this control technology proven to be reliable? Based on what data and studies?

10. What impact will each of the above pollutants have on ambient air quality?

11. Are there data and studies available to show what impact the incinerator will have on ambient air quality?

12. What are the stack emission standards for each of the above pollutants?

13. Will all of these standards be complied with? Based on what information?

14. In particular, are these stack emission standards for oxides of nitrogen, and if not, how has it been determined what degree of pollution control is required?

15. Have the stack emission levels of all other point sources of oxides of nitrogen been considered, including other incinerators in the Washington air basin which are still in the planning stage?

16. In light of the Washington, D.C. air pollution implementation plan which requires a one-third reduction in automobile traffic entering the District in order to reduce oxides of nitrogen, what impact will operation of the Blue Plains incinerator and other point sources of nitrogen oxides including those planned but not yet constructed have on the Washington air pollution program?

17. What provisions have been made in the event the incinerator must be shut down because of malfunction or an emergency air pollution episode?

18. What will be done with the sludge processed at Blue Plains which cannot be burned during periods of incineration breakdown or shutdown?

19. How much fly ash will the incineration process produce each day?

20. What are the chemical and biological ingredients of the ash?

21. Where will this ash be disposed?

22. When is construction of the incinerator scheduled to begin? When is it scheduled to be completed?

23. Have any contracts been let for construction of the incinerator?

24. What is the total capital investment in the incinerator?

25. How much will it cost to operate the incinerator per year? Per day?

26. What are the alternatives to incinerating sludge?

27. How much will the alternatives cost? Capital investment? Operating expenses?

Dredging and Filling

1. What are the chemical contents of the sediments being dredged near Blue Plains and deposited in Dyke Marsh?

2. Has a study of the long-range toxic effect of the heavy metals in these sediments on the biota of the Potomac Estuary ever been undertaken? What are their redox potentials?

3. Has a study of the potential toxic effect on the biota of Dyke Marsh ever been undertaken?

4. What criteria does the Environmental Protection Agency use to determine whether dredged materials are safe for open water disposal?

5. Are these criteria being exceeded in disposing of the Blue Plains sediements in the open waters off Dyke Marsh?

6. Why is the channel being dredged at Blue Plains necessary?

7. Are there alternative methods of constructing the Blue Plains additions which would not require dredging, such as rail or truck hauling?

8. What are the economic factors which justify dredging as opposed to these other alternatives?

Advanced Waste Treatment

1. Is the engineering design for the Advanced Waste Treatment System (AWT) completed?

2. Are there any engineering designs available to the public?

3. Is there a detailed description available of the nature and quantity of the chemical and biological processes to be used at Blue Plains? For instance, do the plans call for chemical de-nitrification or biological de-nitrification?

5. What assurance is there that the AWT process is a reliable and workable system on the scale proposed at Blue Plains?

6. Is Blue Plains AWT modeled on the AWT plant at Lake Tahoe? What changes or variations have been made from the Lake Tahoe model?

7. Has the Lake Tahoe model proven reliable?

8. What percentage of the time, if any, has it been out of operation, and why?

9. Assuming that it takes about 18 hours for sewage to go through the AWT process, what provision has been made in case of excess capacity?

10. Is there a way for sewage to by-pass the AWT process, and if so what will happen to it?

11. Is there provision for on site storage of sewage in excess of the AWT capacity? Or will excess sewage have to be stored in the Washington sewers?

12. What are the average daily and yearly operating and maintenance costs of operating the AWT plant?

13. What are the fixed capital investment costs for constructing the AWT plant?

14. What quantities of chemicals will be used in the daily operation of the AWT process?

15. How much sludge will the AWT process produce daily? Yearly?

16. How will viruses and bacteria be controlled at Blue Plains?

17. Will chlorination be used to control viruses and bacteria? How much per day?

18. Where will chlorine be used in the water renovation process?

19. What impact will the chlorination have on the biota of the Potomac?

20. What consideration, if any, has been given to the report of Dr. Vinton Bacon published in the "Proceedings of the Potomac River Pollution Control Conference," May 21-22, 1970 at page 240E?

21. Upon what data did Dr. Bacon justify his position that the Blue Plains plant should be upgraded only to 240 MGD, primary, secondary and AWT, with no sludge incinerator?

22. Is the supportive data for Dr. Bacon's report available to the public?

Land-contained systems

1. What consideration has been given to a land-contained system for sewage from the Washington area?

2. How does the land-contained system compare with the AWT system in terms of:

   a) operating cost
   b) capital investment
   c) air pollution
   d) water pollution
   e) virus control
   f) reliability
   g) capacity
   h) construction time
   i) versatility, i.e., potential for an integrated total waste management system.

3. Is there sufficient suitable land available in the Washington area for a land-contained system.

4. What adverse environmental impacts, if any, will a land-contained system cause?

5. Will there be any danger of disease spreading from the spraying of treated sewage onto land?

6. Will there be an appreciable loss of water from the Potomac Basin if a land-contained system is implemented?

7. What is the potential for using treated sewage to reconstitute strip mines, gravel pits, other reclaimable lands?

8. What is the potential for using spray-irrigated lands to raise crops and livestock?

9. Is it economically and technologically feasible to adapt the Blue Plains facilities as well as other treatment plants in the area to a land-contained system?

10. How long will it be before a land-contained system capable of handling the Washington area sewage could be in operation?

11. Upon what basis are the answers to questions no. 9 and no. 10 above made?

12. What additional information is necessary to adequately answer questions no. 9 and no. 10?

13. What efforts are being made to obtain this information?

Plant Capacity

1. What is the projected design capacity for Blue Plains when all improvements are completed?

2. What is the projected UOD, P, and N loads for Blue Plains when all improvements are completed?

3. How will any overflow at Blue Plains be processed? Will they be bypassed? Stored?

4. Is storage and pre-treatment of storm water runoff from the combination sewers part of the present construction plan?

5. What are the future projected capacities of the following waste treatment plants when all improvements to these plants are made: Piscataway, Arlington, Alexandria, Lower Potomac (Pohick), Anacostia, Montgomery County, Upper Fairfax County?

6. What are the projected UOD, N, and P loads for the above plants when all projected improvements are completed?

Interim Treatment

1. What provisions have been made for interim treatment during the period Blue Plains is being constructed?

2. Where is the undigested sludge from the Interim Treatment Program being disposed?

3. If there is difficulty disposing of this sludge, what will be done with the sludge from Blue Plains? Can it all be incinerated?

4. What additional flows are allowed under the interim agreement? From which sewer lines? Where do these sewer lines now terminate?

BE IT FURTHER RESOLVED that the Loudoun County Board of Supervisors opposes at this time, the proposal that a spray-irrigation system of wastewater treatment be applied in this metropolitan area, as a replacement for Blue Plains.

BE IT FURTHER RESOLVED that the Executive Secretary is hereby authorized and directed to transmit certified copies of this resolution to the Virginia members of the U. S. Congress, the Interstate Commission on the Potomac River Basin, the Federal Water Quality Office, and the Metropolitan Washington Council of Governments, the Government of the District of Columbia, Eighth Planning District and the Governor of the State of Virginia.

* * * * * * * * *

Voting on the motion: Messrs. Walstad, Raflo, Brownell, Arnold, Costello, Stowers and Crossman--Yes.

A COPY TESTE:

Executive Secretary
Loudoun County Board of Supervisors
March 10, 1972

C O P Y

Commonwealth of Virginia

COUNTY OF LOUDOUN

Board of Supervisors
18 East Market Street
Leesburg, Virginia 22075

Telephone: 777-2660
Extension 20

At a meeting of the Board of Supervisors of Loudoun County, Virginia, held in the Meeting Room of the County Office Building, Leesburg, Virginia, on Tuesday, March 7, 1972 at 10:00 a.m.

PRESENT: William C. Crossman, Jr., Chairman
Paul J. Walstad
James F. Brownell
James E. Arnold
John A. Costello
Henry C. Stowers
Frank Raflo

EFP, DH WC

IN RE: BLUE PLAINS TREATMENT PLANT--UPGRADING AND EXPANSION

Upon motion of Mr. Walstad, seconded by Mr. Raflo, the following resolution was adopted:

R E S O L U T I O N

WHEREAS, the Government of the District of Columbia has taken the necessary steps to develop plans for the upgrading and expansion of its Blue Plains Waste Water Treatment Plant; and

WHEREAS, the construction for the said upgrading and expansion of the Blue Plains Treatment Plant has commenced and is well underway; and

WHEREAS, the said plans were developed in accordance with and approved by the Washington Metropolitan Area Enforcement Conference; and

WHEREAS, the proposed method of effluent disposal from the Blue Plains Waste Water Treatment Plant has been approved by the regulatory agencies having jurisdiction over such construction.

NOW, THEREFORE, BE IT RESOLVED that the Loudoun County Board of Supervisors goes on record as supporting the present schedule of the Potomac River - Washington Metropolitan Area Enforcement Conference for the expansion and upgrading of the District of Columbia's Blue Plains Sewage Treatment Plant to conventional advanced waste treatment capability, at a design capacity of 309 mgd, by December 1974.