United States
Environmental Protection
Agency

Region V
230 S. Dearborn
Chicago, Illinois 60604

June, 1979

Water Division

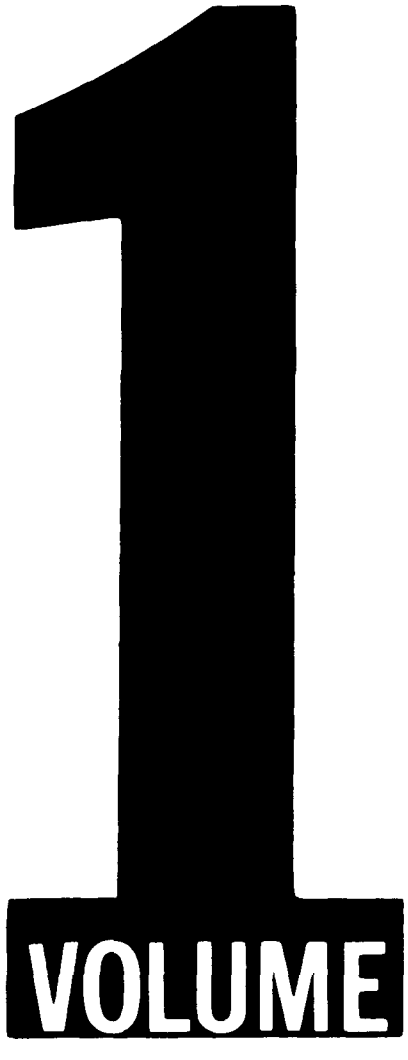
EPA

EIS790976F

Environmental Impact Statement

Final

Wastewater Treatment Facilities for the Metropolitan Area Columbus, Ohio



EPA-5-OH-FRANKLIN-COLUMBUS-WWTP&INT-79

FINAL ENVIRONMENTAL IMPACT STATEMENT
WASTEWATER TREATMENT FACILITIES
FOR THE METROPOLITAN AREA
COLUMBUS, OHIO

Prepared by the

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5

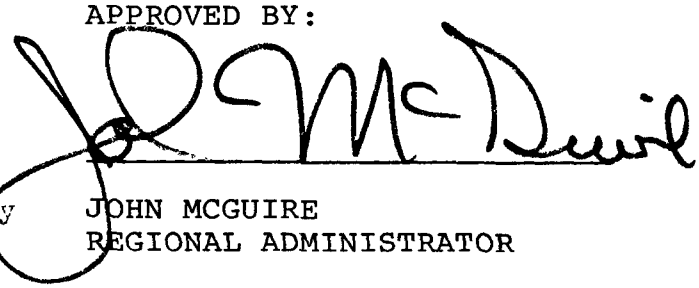
CHICAGO, ILLINOIS

And

BOOZ, ALLEN AND HAMILTON, INC. With HAVENS & EMERSON, INC.

BETHESDA, MARYLAND CLEVELAND, OHIO

APPROVED BY:



JOHN MCGUIRE
REGIONAL ADMINISTRATOR

JUNE 1979

VOLUME 1

Recommended Alternatives, Technical Analysis and Impacts

T A B L E O F C O N T E N T S

INDEX OF FIGURES

INDEX OF TABLES

PREFACE

The Final Environmental Impact Statement (EIS) for the Columbus, Ohio Wastewater Treatment Facilities consists of the three following volumes:

- Volume I: "Recommended Alternatives, Technical Analysis, and Impacts"
- Volume II: "Response to Comments and Final EIS Appendices"
- Volume III: "The Draft EIS (Edited)"

Volume I discusses the essence and substance of the final collection, treatment, and disposal recommendations, highlighting any recommendations that differ from the Draft EIS. The intent of Volume I is to provide a concise overview of the recommended system, emphasizing areas of significance (e.g., regionalization, pretreatment, sludge disposal). Detailed analyses supporting the conclusions can be found in the Appendices to Volume II and in Volume III.

Volume II contains the written record of public commentary and appropriate responses to the issues raised by this commentary. There are over 330 specific comments by Federal, state and local governments and private concerns for which detailed responses have been developed. Volume II also contains additional appendix material which was developed in response to the comments on the Draft EIS.

Volume III is the Draft EIS edited only for identified omissions and errors. Asterisks in the margins indicate those sections, lines, or words that have been changed, added, or deleted.

Summary Sheet for Environmental
Impact Statement

Columbus, Ohio Facilities Plan

EPA Project No. EPA-5-OH-FRANKLIN-
COLUMBUS-WWTP & INT-79

Draft ( )
Final (X)

Environmental Protection Agency
Region V

Chicago, Illinois

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

2. Brief Description of Proposed Action

The subject action of this Environmental Impact Statement is the Facilities Plan submitted by the City of Columbus to expand and upgrade wastewater collection, treatment, and disposal facilities within the Columbus metropolitan area. The proposed project includes three major actions.

- Selection of addition liquid & solids handling treatment facilities for sewage processing at the Southerly and Jackson Pike sewage treatment plants (STPs).
- Construction of two sludge incinerators and associated dewatering facilities for processing sludge from sewage treatment at Southerly STP .
- Construction of separate sanitary sewer interceptors within the Columbus planning area.

3. Summary of Major Environmental Impacts

The proposed action will have the following beneficial impacts:

(1) Alleviation of existing adverse conditions in the Scioto River caused by law quality wastewater discharges

(2) Improved treatment and disposal of wastewater sludges

(3) Upgraded and integrated treatment facilities to accommodate existing and future sources of wastewater

(4) Elimination of the need for onsite disposal systems and package plants where they are unsuitable.

The proposed action will have the following adverse impacts:

(1) Potential erosion of treatment plant sites and interceptor routes during construction

(2) Temporary noise and odor impacts during construction

(3) Increase traffic activity during construction

(4) Air emmissions from sludge incineration will be minized by offsets from existing incinerators and application of lowest achievable emission rate technology.

4. Summary of Alternatives Considered

Regional wastewater collection alternatives, including the no service alternative, were considered for eleven subareas within the Columbus planning area. Preliminary screening indicated that eight of these were suitable for possible inclusion into a regionalized system. A summary of the alternatives considered, in addition to the no-action alternative, for each of these eight subareas is given below:

Subarea	Number of Alternatives Considered	Alternative Types
West Scioto	2	Two new interceptors
Big Run	1	One new interceptor
Minerva Park	2	One new interceptor Upgrade existing plant
Big Walnut Creek Rocky Fork Blacklick Creek	5	Five new interceptor systems
Groveport	3	Upgrade existing plant Two new interceptors
Rickenbacker Air Force Base	3	Upgrade existing plant Two new interceptors

In addition, four pretreatment alternatives for a major Columbus-area brewery currently discharging to the Southerly Plant were considered. These alternatives ranged from no pretreatment to total on-site brewery waste treatment to Southerly NPDES effluent restrictions.

Treatment plant alternatives considered various ways of utilizing and upgrading the two existing Columbus wastewater treatment plants (Southerly and Jackson Pike). Alternatives for liquid treatment and disposal included: treatment and land application, treatment and reuse, and treatment and discharge.

Alternative disposal concepts considered for the solids produced by the two Columbus plants included: several codisposal opportunities, four resource recovery schemes, and a landfill disposal option. The EIS also examined the resource savings that might be available with the following alternative treatment technologies: phosphorous removal, intermediate sedimentation, oxygen production and dissolution, secondary solids thickening, conditioning and dewatering, recycle management, and pyrolysis. Finally, a variety of process optimization alternatives were analyzed for cost-effectiveness. These were: flow equalization,

reduction of electrical energy charges, the activated sludge system, effluent filtration, and waste solids processing.

5. Federal, State and Local Agencies and Officials Notified of this Action

Federal Agencies

Council on Environmental Quality
Environmental Protection Agency
U.S. Army Corps of Engineers, Huntington District
Department of the Air Force
Department of Health, Education and Welfare
Department of Housing and Urban Development
Department of the Interior
Department of Transportation
Water Resources Council

Members of Congress

Honorable John Glenn U.S. Senate
Honorable Howard G. Metzenbaum U.S. Senate
Congressman Samuel L. Devine U.S. House of Representatives
Congressman Chalmers P. Wylie U.S. House of Representatives
Congressman John M. Ashbrook U.S. House of Representatives
Congressman William H. Harsha U.S. House of Representatives
Congressman Clarence E. Miller U.S. House of Representatives

State

Honorable James A. Rhodes, Governor, State of Ohio
Ohio Environmental Protection Agency
Ohio Department of Natural Resources
Ohio Department of Health

Local

Honorable Tom Moody, Mayor, City of Columbus
Board of Franklin County Commissioners
City of Reynoldsburg
City of Westerville
Grove City
Village of Dublin
Village of Grove Port
Village of New Albany
Mid-Ohio Regional Planning Commission
Mid-Ohio Health Planning Federation
Delaware County Regional Planning Commission
Licking County Regional Planning Commission
Fairfield County Regional Planning Commission

6. Date made available to CEQ and the Public

The Final Statement was made available to CEQ and the public on June 15, 1979.

I. INTRODUCTION

I. INTRODUCTION

The City of Columbus, Ohio owns and operates two large conventional wastewater treatment plants: Jackson Pike built in 1937 and Southerly built in 1967. Combined, the plants serve an area with a population of over 800,000 people, yet discharge to the Scioto River less than ten miles from one another. In order to meet the river's stringent water quality standards both plants must be upgraded and/or expanded. Hence, the City applied for a Federal 201 Construction Grant to help meet these needs.

The project proposed by the City, beginning with formal initiation of facilities planning in October, 1974, included five major actions:

- Construction of additional liquid treatment facilities for sewage processing at the Southerly and Jackson Pike sewage treatment plants
- Design and construction of a pilot plant in order to evaluate the effectiveness of the recommended plan to solve the bulking activated sludge problem at Southerly
- Construction of three sludge incinerators and associated dewatering facilities for processing sludge from sewage treatment
- Construction of separate sanitary sewer interceptors within the Columbus planning area
- Selection of a cost-effective and environmentally acceptable system to minimize combined sewer overflows.

Due to the size of the undertaking, the expressed need to develop additional system alternatives, and the potential for resultant adverse economic and environmental impacts U.S. EPA published on March 15, 1976 a "Notice of Intent" to prepare an Environmental Impact Statement (EIS). More specifically the determination to prepare the EIS was based on the following concerns:

- The cost-effective liquid sewage treatment alternatives that would enable the attainment of water quality standards in the Scioto River

- The cost-effective wastewater system for facility receiving significant organic loads from a brewery

- The feasible methods for environmentally acceptable sludge treatment and disposal

- The environmental effects of the construction and operation of the proposed sewage treatment and collection facilities

- The induced growth and secondary environmental effects of building interceptors in and through sparsely developed rural and agricultural areas.

The Draft EIS was published in February, 1978 with a public hearing taking place in Columbus on March 31, 1978. Extensive comments on the Draft EIS were received at the public hearing and later in written submittals; so much so that the original deadline for receipt of review comments was extended by U.S. EPA from April 10, 1978 to April 26, 1978. The key issues raised in the comments focused on:

- Population projections

- Intercepting sewers including needs, sizes, location, impacts

- Design of wastewater treatment facilities including reliability, cost effectiveness, and environmental impacts

- Pre-treatment of brewery wastes

- Sludge handling and disposal methods

- The need for a large-scale pilot plant.

As can be seen by the chronology of events listed in Table I-1, U.S. EPA undertook considerable additional analysis in order to resolve the outstanding issues before publication of the Final EIS.

This Volume of the Final EIS is intended to provide a concise overview of the recommended system, empahsizing both areas of concern and changes between the final recommendations and those presented in the Draft EIS.

TABLE I-1
Final EIS Chronology

March 31, 1978	Draft EIS Public Hearing in Columbus, Ohio
April 10, 1978	Original deadline for receipt of review comments of Draft EIS.
April 26, 1978	Extended deadline for receipt of review comments of Draft EIS.
May 4, 1978	The City of Columbus transmits a copy of the April 1978 report regarding the elimination of Filamentous Blue-Green Algae at the Southerly WWTP prepared by Dr. Robert Sykes.
May 9, 1978	Meeting in Columbus between representatives from USEPA-Region-V EIS Preparation Section, OEPA, the City of Columbus, and the City of Reynoldsburg to inspect the Draft EIS sewer alternatives for Blacklick breek service area.
May 28, 1978	Meeting in Cincinnati between representatives from USEPA Region V and MERL to discuss the pretreatment alternative contained in the Draft EIS.
June 26, 1978	Revision of Columbus plan-of-study area Population Projections to 1,025,000 based on revised Bureau of the Census 1976 estimates and the final Bureau of Economic Analysis State projections for the year 2000.
June 28, 1978	USEPA-Region V contracts with John Stamberg of Energy and Environmental Analysis, Inc. to perform an independent analysis of the facilities treatment.
July 7, 1978	Submittal of Secondary Air Quality Impact Analysis by EIS consultants to EPA Region V.
July 21, 1978	Submittal of report by John Stamberg to USEPA-Region V.
July 25, 1978	Discussion in Region V offices with Stamberg regarding the findings and conclusions contained in the July 21, 1978 report.
August 3, 1978	Receipt by Region V of OEPA Air Modelling Study.
August 8, 1978	Meeting in Region V offices between Mayor Tom Moody, representatives of USEPA-Region V. The meeting discussed the Draft EIS recommendations for wastewater treatment facilities sizings.
August 23, 1978	Meeting in Columbus between representatives from USEPA-Region V EIS Preparation Section, the City of Columbus and the Development Committee to Greater Columbus to discuss the annual report prepared by the City of Columbus Department of Development on the growth potential of the Columbus Metropolitan Area.
August 25, 1978	The Columbus, Ohio sludge analysis was forwarded by USEPA-Beltsville Research Laboratory to USEPA-Region V.
August 25, 1978	USEPA-Region V requests additional information from the City of Columbus regarding the Blacklick Creek regionalization alternatives.
August 29, 1978	USEPA-Region V letter to Mayor Tom Moody identifies the USEPA policy regarding intercepting sewers and the alternatives evaluated in the Draft EIS.
September 8, 1978	Meeting in Bethesda, Md. between USEPA representatives and the EIS consultants to discuss the actions taken since the Draft EIS Public Hearing, and to discuss actions needed to be taken to finalize the EIS.
September 13, 1978	Meeting in Columbus, Ohio between representatvies of USEPA, OEPA, the City of Columbus and Anheuser-Busch, Inc. to discuss and review conclusions of John Stamberg's July 21, 1978 reports, the preliminary results of the OEPA Air Modelling Study, the Beltsville Lab analysis of Columbus sludge, the various alternatives available for sludge disposal, and the intercepting sewer sizings.
September 26, 1978	The City of Columbus transmits the additional information to USEPA-Region V requested in the August 25, 1978 letter regarding the Blacklick Creek regionalization alternatives.
October 3, 1978	The City of Columbus transmits additional information inadvertently omitted in the September 26, 1978 transmittal.
December 26, 1978	The OEPA transmits findings of an inspection of the proposed Blacklick Creek Intercepting Sewer route through Blacklick Woods Metro Park.
February 5, 1979	The Metropolitan Park District transmits an analysis of the economic and environmental impact of an intercepting sewer routed through the Blacklick Woods Metro Park.
March 5, 1979	The City of Columbus transmits a letter to the Regional Administrator, John McGuire, requesting a meeting to discuss the status and the conclusions of the EIS.
March 8, 1979	OEPA transmits a letter to John McGuire requesting a meeting to discuss the status and the conclusions of the EIS.
March 16, 1979	USEPA-Region V representative toured the Jackson Pike WWTP to review rehabilitation work included in the City of Columbus Facilities Plan, toured the City of Reynoldsburg WWTP, toured the route of the Blacklick Creek Intercepting Sewer through the Blacklick Woods Metro Park, and toured the Livingston Avenue route of a Reynoldsburg Force Main to the Big Walnut Interceptor.
March 16, 1979	The City of Columbus transmits a breakdown of work included in the Facilities Plan for rehabilitation of the Jackson Pike WWTP, as requested during the WWTP tour.
March 19, 1979	Meeting in Region V offices between representatives from USEPA-Region V, OEPA, and the City to discuss the status and the conclusions of the EIS.
March 28, 1979	Meeting in Cleveland between representatives from USEPA-Region V and the EIS consultants to complete the revision to the Draft EIS.
April 12, 1979	The City of Columbus delivers a request for a meeting to discuss the status and the conclusions of the EIS. A meeting between representatives of USEPA and the City of Columbus.
April 19, 1979	The Ohio Department of Natural Resources transmits a determination that an intercepting sewer routed through Blacklick Woods Metro Park would be considered a Section 6 (f) conflict of the Land and Water Conservation Fund Act.
May 11, 1979	Meeting in Columbus between representatives of USEPA-Region V, the EIS consultants, and OEPA to discuss the technical recommendations contained in the final EIS.
May 22, 1979	Meeting in Columbus between represenatives of USEPA-Region V, the EIS consultants, OEPA, and the City of Columbus to discuss the technical recommendations of the final EIS.

The analysis leading up to the final document has mostly substantiated the findings of the Draft EIS, including those concerning brewery pretreatment. In addition, three major modifications have been made which clarify concerns raised regarding the Draft EIS.

- The City of Columbus will be required to establish a Design Finalization Overview Team (DFOT), as a separate but integral part of the Value Engineering (VE) team, to review and recommend the final design parameters of both plants. The DFOT will be a grant eligible item.

- Based on air quality impact analysis, the Final EIS recommends that a total of two incinerators be operable at each plant, rather than the three recommended in the draft. Incineration is to be viewed as an interim sludge handling method with additional facilities planning to be conducted to examine the potential use of other more environmentally compatible alternatives, such as composting, land application or strip mine reclamation.

- Except for three instances of documented pollution (Reynoldsburg, New Albany, and Minerva Park) localized facilities planning will be required in unsewered areas to determine facilities needs where a population of 2.0 or more persons per acre is expected to occur during the planning period. Moreover, detailed facilities planning for Reynoldsburg (i.e., the Blacklick Sub-area) must address the Section 6(f) conflict with the Land and Water Conservation Fund Act.

The following three chapters on interceptors, wastewater treatment facilities, and environmental impacts expand on these and the other important conclusions of the Final EIS.

II. INTERCEPTORS

II. INTERCEPTORS

Cost-effective and environmentally sound regionalization of Columbus' sewer system has been of great concern throughout the preparation of the EIS. A total of eleven service areas were evaluated in either the Facilities Plan or the Draft EIS or both. Figure II-1 shows the Columbus overall planning area and these eleven subareas. All of Franklin County except the extreme southeast and southwest corners is included, along with areas to the northwest as far as Sunbury in Delaware County. Also included is a small area of Delaware County west of the O'Shaughnessy Reservoir and small portions of Licking, Fairfield, and Pickaway Counties.

This chapter will present the final recommendations for each of the eleven subareas after first discussing three key issues which impact the cost-effective selection among alternatives: population projections, sewer sizing, and infiltration rates. For a detailed review of the regionalization analysis see the revised Chapter III: Service Area and Sewer System Alternatives presented as Appendix CC in Volume II.

2.1 POPULATION PROJECTIONS

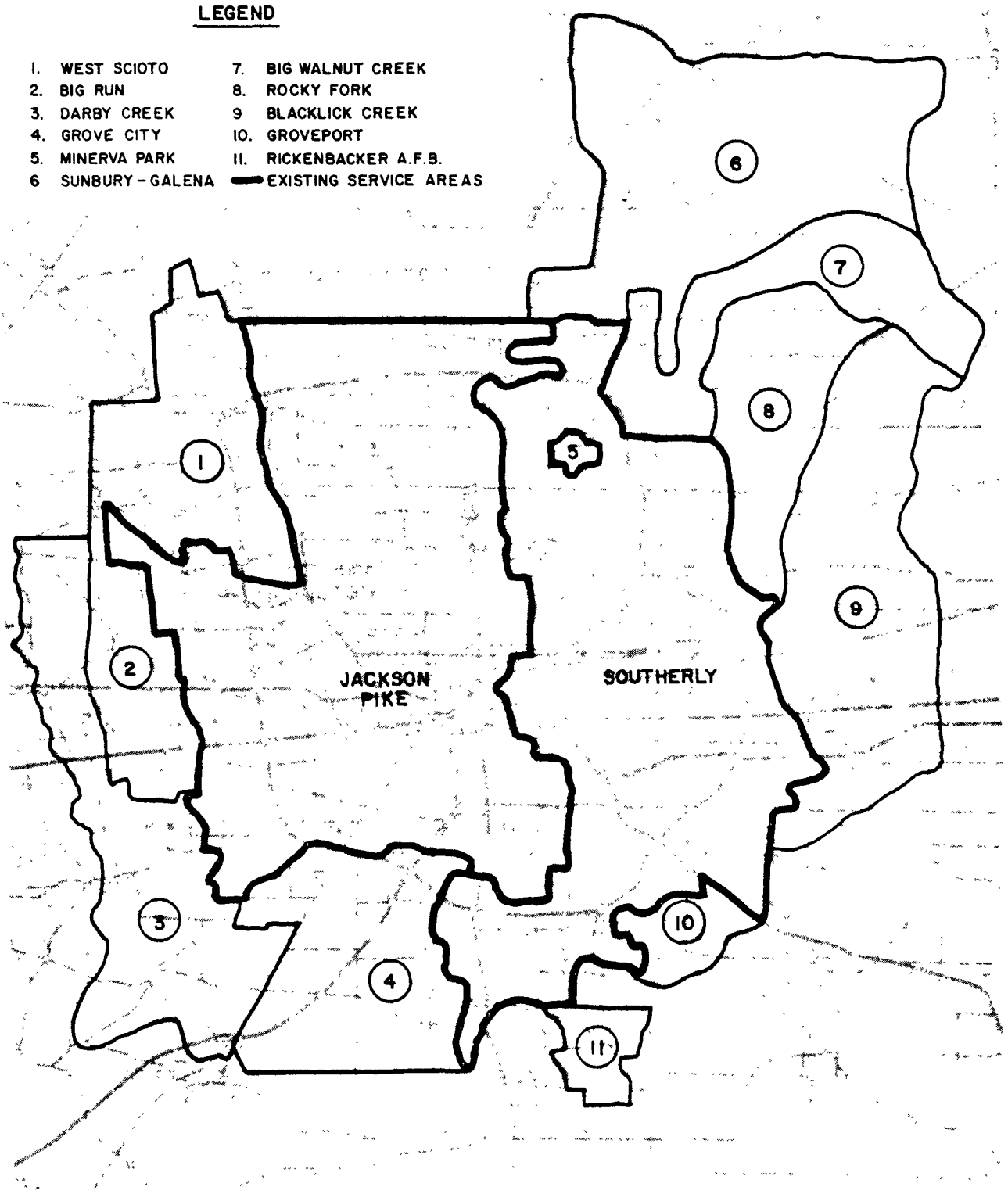
The amount of facilities expansion required over the next 20 years in Columbus depends to a great extent on the increase in population over that time period. Facilities' designs must be based on some reasonable estimate of growth for the planning area, during the 20-year planning period.

As stated in the Draft EIS, when work began on the draft, five sets of widely varying year-2000 population projections existed. There was no consensus among the region's planning agencies on any of these projections. In order to assess the reasonableness of existing projections and come to a conclusion on the projection to be used for the EIS, U.S. EPA developed four sets of independent projections using information from the Bureau of the Census and the Bureau of Economic Analysis (BEA).

The Census Bureau had two 1975 population estimates for Franklin County. Two sets of projections extrapolated the 1970 to 1975 growth rate to the year 2000 based on these estimates. The other two sets of projections calculated changes in percentage shares of the State population and extrapolated

Figure II-1

Planning Area For Metropolitan Columbus



these shares to the year 2000 to obtain Franklin County shares of the year 2000 BEA draft projection for the State. The highest of these four projections (1,110,000) was used as a "best estimate" in the Draft EIS in the interest of following a conservative approach with respect to wastewater treatment facility planning. Though considered to be optimistic, this projection was generally consistent with the five existing projections.

Subsequent to the incorporation of this projection in the EIS, new information became available. Population estimates for 1976 were published by the Bureau of the Census in 1977 and the final BEA State projection for the year 2000 was lowered. This new information led to downward revisions in three of the four sets of earlier projections, as shown on Table II-1, suggesting the Draft EIS estimate be modified.

Moreover, while the use of a high projection is conservative with respect to some aspects of environmental planning, it cannot be considered conservative in the absolute. Thus, a reasonable approach is the use of the modified average (i.e., 1,027,452) rather than an "optimistic" projection.

Two other recent developments also indicate a downward shift in the projection estimates for Franklin County. First, Federal regulations have been issued requiring the use of the BEA year 2000 State projections for water quality management planning purposes (208/201) and providing guidelines on the disaggregation process is not yet completed at this writing, there is sufficient information to indicate that the 1.11 million person projection may be grossly overoptimistic. Second, the most recent Mid-Ohio Regional Planning Commission (MORPC) projections (September 25, 1978) indicate a year 2000 estimate of 1,025,000. While not in itself the result of application of a projection methodology or technique, it is well within the range of other existing projections and represents a consensus of local planners.

It is recommended then, that the year 2000 population projection for Franklin County used in the EIS be changed to 1,025,000 and that this revision be incorporated conceptually[1]

---

(1) In fact, the revised projections have been used only in reevaluating alternatives in the Blacklick Creek Subarea. All other interceptor designs retain the more optimistic 1.11 million estimate.

TABLE II-1
Comparison of Draft EIS and
Final EIS Franklin County Population Projections

Method	Year 2000	
	Draft EIS (re: Table II-15)	Final EIS
1. P-25 Extrapolation	994,891	994,891
2. P-25 County Share	1,069,966	1,067,751[1]
3. P-26 Extrapolation	1,050,834	973,039[2]
4. P-26 County Share	1,110,251	1,074,128[1,2]
Average of Four Methods	1,056,486	1,027,452

(1) Affected by change in BEA projection.

(2) Affected by publication of new Census estimates (P-26).

into the design of wastewater treatment facilities for the following reasons:

- It is likely to be consistent (90%-110%) with Ohio EPA disaggregated projections based on the Bureau of Economic Analysis year 2000 projection for the State of Ohio.
- It is consistent with projections utilized in other planning efforts for mid-Ohio (specifically MORPC and the Columbus Metropolitan Area Growth Potential Report, see Volume II, Appendix EE).
- It is consistent with average projections based on an update of the data base for prior projections in EIS.

The recommendation of this projection for use as a tool in the Final EIS is not to be construed as a constraint on the water quality management planning projection process in the State of Ohio or the Mid-Ohio Regional Planning Commission area, but is clearly the best present guide for designing Columbus' wastewater system.

2.2 SEWER SIZING

Sewer designs in the Facilities Plan were based on an estimate of ultimate population yet, U.S. EPA's cost-effectiveness guidelines require comparing different design periods. An analysis was performed in the Draft EIS to show the size and cost differences between designs based on ultimate population, on interceptors flowing half full in the year 2000, and on interceptors flowing full in the year 2000. The cost difference between designs using half full by 2000 and full by 2000 varied from 3 percent to 24 percent, with the median variation 18 percent. This demonstrates that, on the average, an 18 percent increase in cost will permit twice as much intercepted flow at design conditions.

The comparison of ultimate density to the projected design density for the year 2000 showed that most of the areas are at or less than 25 percent of their ultimate density by the year 2000, making designs based on an ultimate population concept not cost-effective for the Columbus area. Thus, the Draft EIS recommended designing most gravity sewers using the half-full, year 2000 criterion. The Final EIS retains this criterion and, accordingly, finds that it is not cost-effective to construct the entire lengths of interceptors proposed in the Facilities Plan.

Should the City of Columbus desire to construct, on their own, additional sewer capacity beyond the cost-effective capacity, the following U.S. EPA policy for Federal grant assistance would apply:

- Additional facilities planning must establish the cost- effective wastewater treatment facilities
- The actual wastewater treatment facilities to be constructed must meet the requirements of the National Environmental Policy Act of 1969 (NEPA), with emphasis on primary and secondary environmental impact analysis
- The cost-effective portion of the actual wastewater treatment facilities will be the portion of the project receiving Federal funds
- All requirements identified in the cost-effectiveness analysis guidelines are to be met. These requirements regard the U.S. EPA approval of the actual wastewater treatment facilities plans and specifications as well as the development and implementation of user charge and industrial cost recovery systems.

2.3 INFILTRATION RATE

The allowable infiltration rate used in the Draft EIS for the design of intercepting sewers was based on 200 gal/inch-dia/mi/day. The final EIS retains this recommendation and Region V will consider this value as the grant eligible design criterion for allowable infiltration. Further, any capacity designed in a proposed sanitary sewer for infiltration beyond 200 gal/inch-dia/mi/day will not be eligible for grant participation and will be subject to an environmental assessment in accordance with NEPA.

2.4 SUBAREA ANALYSIS(1)

In general, the Draft EIS recommended providing intercepting sewers into presently unserviced areas that will have a population density of at least 2.0 people/acre during the planning period. This recommendation was based on the estimation of potential pollution problems arising from use of septic tanks at the 2.0 people/acre density given the soil characteristics in the City of Columbus plan-of-study area.

(1) This volume summarizes the findings in each of the eleven subareas. For a detailed discussion of specific proposed alternatives for each subarea see Volume II, Appendix CC.

However, the Draft EIS and the Facilities Plan provided actual documentation clearly establishing the existence of pollution problems in only three instances: the City of Reynoldsburg (Blacklick Creek), the Village of New Albany (Rocky Fork), and the Village of Minerva Park. Therefore, except for the three above mentioned municipalities, the Final EIS recommends that the City of Columbus, or another municipality designated by OEPA, conduct localized facilities planning in the unserviced areas expected to contain 2.0 people/acre or more during the planning period in order to determine specific wastewater treatment facilities needs prior to Federal grant assistance for any regionalization alternatives. (As discussed later, localized facilities planning in the Reynoldsburg area will also be needed because of the controversy surrounding Blacklick Woods Metro Park.) The localized facilities planning will have to meet the cost-effectiveness analysis and the environmental assessment requirements of facilities planning.

Discussed below are the specific recommendations for each of the eleven subareas. In all cases where the EIS recommends sewering, except for Rocky Fork and Minerva Park, additional localized facilities planning will be needed before system design and construction to document the need for constructing additional interceptors, providing package plants, or instituting septic tank maintenance programs.

2.4.1 West Scioto

This area is presently unsewered, except for the Dublin and Muirfield Village areas to the north. These two areas are connected to the interceptor constructed along the east side of the Scioto River.

The High Level Interceptor Alternative presented in the Draft EIS remains the interceptor alternative of choice because of the less serious nature of the associated primary impacts. The lower sections (below Manhole 3) of the interceptor may be needed due to high population densities and the need to protect Griggs Reservoir. When facilities planning is performed to determine a documented need for the West Scioto River, the option of serving the Scioto River area within Delaware County must be examined.

2.4.2 Big Run

The population density in the Big Run area illustrates that most of the interceptor sections evaluated should not be built during the planning period. The exceptions to this may be the lowest section of the proposed alternative which would tie-in to the existing Big

Run interceptor may be needed by 1995 and service in areas surrounding Interstate 70 close to the City of Columbus may be required by 1985.

2.4.3 Darby Creek

There are presently no sewers in the Darby Creek subarea. The projected population density is only slightly more than one-half person per acre. The combination of such a low density and the need for either pumping of sewage into the Columbus service area or construction of deeply laid sewers precludes further consideration of this subarea as a portion of a regional plan.

2.4.4 Grove City

In this subarea, relatively heavy development has taken place in and around Grove City and the Village of Urbancrest. Recently, wastewater flows from Grove City and Urbancrest have been diverted to the Southerly-Jackson Pike interconnecting sewer. The remaining areas of this subarea are very rural and are not suitable for regionalization.

2.4.5 Minerva Park

Regionalization is recommended in this subarea since the effluent from the existing Minerva Park WWTP contaminates Minerva Lake Creek. Because of costs and the impacts of operating a local plant, an interceptor alternative is more cost effective. The interceptor would be constructed from the Minerva Park WWTP in an easterly direction to a point on the 72-inch portion of the existing Alum Creek Interceptor. No additional facilities planning is needed in this case.

2.4.6 Sunbury-Galena

Homes in this subarea primarily use septic tanks and leachfields for sewage disposal. The exception to this is the Village of Sunbury, which is sewered and uses a treatment facility which discharges to a tributary of Big Walnut Creek. Proposals to study sewerage alternatives in a facilities plan for the area have been submitted. The lead entity in this endeavor is the Village of Sunbury, with the Village of Galena and Delaware County also participating.

The facilities plan will consider the possibility of regionalization into the Columbus system as one alternative for Sunbury-Galena. If regionalization is deemed best, flow from the area would be treated at the Columbus Southerly facility.

2.4.7 Big Walnut

Several interceptor alternatives were considered for this subarea. However, in all cases in this subarea, the projected population densities (apart from the section just below the Hoover Reservoir) are below the 2.0 person/acre criterion during the planning period. The one section below the Reservoir may require construction by 1985 if the population growth occurs as predicted.

One of the major concerns within the Big Walnut subarea is the protection of Hoover Reservoir, a potable water supply. The Facilities Plan recommended construction of an intercepting sewer for the elimination of potential surface water contamination from the sparcely developed area east of Hoover Reservoir. At present, there is no pollution source impacting Hoover Reservoir that requires a regional sewer system in the Big Walnut Sewer Service Sub Area. Provision of public utilities and highways have been shown to induce rapid development of desirable lands. If rapid development occurs east of the reservoir, surface water degradation may occur from overland non-point sources even with the interception of all sanitary wastewater. Therefore, the EIS recommends protecting the reservoir through strict zoning and development regulations.

The Sunbury-Galena-Hoover area will be considered again in depth within the Delaware County 201 Facilities Planning Study.

2.4.8 Rocky Fork

The Rocky Fork subarea is located in the northeastern portion of Franklin County and contains the Village of New Albany. At the present time, the surface waters in and around New Albany are heavily polluted during low flows. An analysis of all feasible interceptor alternatives for the entire subarea indicated that no interceptors should be constructed until 1995, with the far upstream sections of

each sewer probably not required at all during the planning period. This finding was based on an assessment of areawide population densities.

Since New Albany itself must be served, the optimal way of doing this was determined to be the construction of a combination east/west force main/gravity sewer. This system is designed to collect flows only from the New Albany area and transport them to the existing Big Walnut Creek Interceptor. Moreover, the provision of the force main delays the need for interceptor construction below New Albany until 1995.

2.4.9 Blacklick Creek

The Blacklick Creek subarea lies directly below the Rocky Fork subarea and includes the City of Reynoldsburg. Four major alternatives were considered for this subarea, three incorporating north/south interceptor concepts and one an east/west combination force main/gravity sewer.

The Draft EIS analysis indicated that the only portion of the Blacklick Creek subarea which must be served is in the vicinity of Reynoldsburg.

A force main to serve this area was recommended and would have followed a route along Main Street in the City of Reynoldsburg. Based on comments received, it was determined that this route was undesirable. Alternatives to this force main include a force main along Livingston Avenue, a gravity sewer route through Blacklick Woods Metro Parks (the Facilities Plan alternative), and routes avoiding the Metro Park. Present detail on these alternates is insufficient to select a cost-effective sewer route. The route of the interceptor through Blacklick Woods Metro Park, funded by the Land and Water Conservation Fund Act (LAWCON), involves additional considerations. Section 6(f) of this Act provides for the continuation of land use, uninterrupted by easements, construction and the like. On April 19, 1979, the Ohio Department of Natural Resources (ODNR), Office of Outdoor Recreation Services, decided that construction of an interceptor sewer through Black Woods Metropark would result in a Section 6(f) conflict of the Land and Water Conservation Fund Act.

Hence, the Final EIS recommendation is that routes avoiding the Park, including the Livingston Avenue Force Main must be evaluated in greater detail through additional facilities planning. (See Volume II, Appendix CC).

It should be noted that some costs incurred in resolving the Section 6(f) conflict, such as easement acquisition and land compensation are ineligible for Federal grant funds.

Also, any compensation made to the Metropolitan Park District for loss of revenue resulting from disruption of park activities is also ineligible for Federal grant funds.

2.4.10 Groveport

The projected population increase for this subarea located in southeastern Franklin County, coupled with the varying suitability of the local soils to septic tanks, necessitates some action. The only existing sanitary sewer system in this subarea serves the Village of Groveport itself. In the Draft EIS three regionalization alternatives were considered for this subarea: a plant alternative and two interceptor alternatives.

The perferred alternative is an interceptor alternative (A) which is higher in capital costs (than Alternative B) but lower in present worth due to phasing. This alternative should result in fewer adverse environmental impacts. The plant alternative is clearly more costly than either interceptor. However, additional facilities planning is required to document the need to construct additional sewers for this area.

2.3.11 Rickenbacker Air Force Base

The Air Force base is located in southernmost Franklin County and is served by an existing 1.25 mgd trickling filter plant. Since the Department of Defense is deactivating the base, regionalization recommendations will not be made although the analysis has been retained in the revised Chapter III in Volume II.

2.3.12 Summary

Although regionalization alternatives have been proposed for 11 subareas, only three (Blacklick, Minerva Park, and Rocky Fork have a documented need for sewer service. Other subareas where regional sewers may be needed during the planning period require additional facilities planning to establish the need and the timefram for implementing a cost-effective solution. The Blacklick subarea requires immediate additional facilities planning to identify the most cost-effective alternative.

III. WASTEWATER TREATMENT FACILITIES

III. WASTEWATER TREATMENT FACILITIES

There are three major actions proposed by the Facilities Plan for the City of Columbus that are concerned with the Jackson Pike and Southerly wastewater treatment plants:

- Construction of additional mainstream treatment facilities that involves both upgrading and partial expansion.
- Construction of additional dewatering and incineration facilities for processing sludge generated at the two plants.
- Construction and operation of a pilot plant to be used to evaluate the effectiveness of the recommended plan to solve the filamentous bulking problems being experienced at the Southerly activated sludge system.

As a result of U.S. EPA's and Ohio EPA's review of the Facilities Plan, several questions were raised regarding the proposals summarized above. These questions centered around the design capacity of the facilities in relation to the peaking factors for influent wastewater flows and loads, and the adequate consideration of the magnitude and impact of the Anheuser-Busch Brewery loads on the Southerly treatment plant, particularly with respect to filamentous organism problems at Southerly. In addition, U.S. EPA believed a more thorough consideration of alternative sludge disposal methods was needed with emphasis on the utilization of sewage treatment sludge as a resource.

The Draft EIS dealt with these issues in great detail, yet there remained considerable controversy even after its publication. Subsequent work focused on the following three areas:

- Basis of Design
- Mainstream Treatment Recommendations
- Sludge Heandling and Disposal Recommendations.

The findings in each of these areas are discussed below.

3.1 BASIS OF DESIGN

The Final EIS recommendations for the wastewater treatment facilities for the City of Columbus are based on the specified levels of treatment prescribed by the NPDES permits, the initial and future amounts and characteristics of the wastewater to be treated at the two plants, and an evaluation of the existing facilities.

3.1.1 Municipal Effluent Limitations

The effluent limitations for which the Facilities Plans were prepared to meet and on which the Draft EIS's Analysis of wastewater treatment alternatives were based are shown in Table III-1.

TABLE III-1
Proposed Effluent Requirements
Facilities Plan and Draft EIS

Parameters	30-Day Average Limitation
BOD_5	8 mg/l
Suspended Solids	8 mg/l
NH_4-N	
July—October	1.0 mg/l
November—June	2.5 mg/l
PO_4-P	1.0 mg/l
Dissolved Oxygen(1)	6.0 mg/l
Fecal Coliforms	200.0 counts/100 ml.
pH(2)	6 - 9

(1) Greater tnan or equal to at all times.

(2) At all times.

These limitations were developed by the Ohio EPA and are incorporated in the current National Pollutant Discharge Elimination System (NPDES) permits for the City of Columbus' Jackson Pike and Southerly wastewater treatment plants. Specifically, the BOD_5, suspended solids and ammonia-nitrogen limits were generated by Ohio EPA's water quality modelling of the Scioto River, the results of which are detailed in a Wasteload Allocation Report prepared by that agency.

Subsequent to the circulation of the Draft EIS and during the preparation of the Final EIS, the adequacy of limitations for BOD_5 (8 mg/l) and suspended solids (8 mg/l) with respect to the attainment of water quality standards for dissolved oxygen in the Scioto River became an issue of concern. In particular, the sensitivity of the water quality model to accurately identify effluent BOD_5 limitations to the nearest mg/l for each of the discharges was questioned. U.S.EPA review and additional water quality modelling of the Scioto River have confirmed the need for a high level of treatment, however, there is uncertainty about the accuracy and sensitivity of the model below 10 mg/l. Moreover, since U.S. EPA has officially recognized a treatment level which produces an effluent of 10 mg/l BOD_5 and 12 mg/l suspended solids as "Advanced Secondary Treatment (AST)", we have concluded that the water quality modelling efforts to date justify AST for the Columbus plants in lieu of the originally proposed BOD_5 solids limits of 8 mg/l each. Consequently, the Final EIS recommends effluent limitations of 10 mg/l BOD_5 and 12 mg/l suspended solids until further model verification is able to demonstrate the increased water quality benefits which would result from additional wastewater treatment at each plant. It is important to note that the treatment facilities design concept proposed in the Draft EIS is not changed due to this small change in effluent limitations.

For those Step 2 activities which may be initiated by the City of Columbus, the AST limits will be considered to be the cost-effective, environmentally compatible level for the progress toward the achievement of water quality standards. The NPDES permit for the City of Columbus shall include a schedule of studies to demonstrate whether the 10 mg/l limitation can meet water quality standards and a compliance schedule. The NPDES permit will contain a provision allowing for modification of these final limitations if justified by the required studies. The nature of these studies is specified by the U.S. EPA and Ohio EPA Memorandum of Understanding on Water Quality Standards and Wasteload Allocations.

3.1.2 Design Wastewater Characteristics

The engineering analysis of projected wastewater flows and loads for the Jackson Pike and Southerly treatment plant service areas resulted in some adjustments to the design values used in the Facilities Plans. Design average daily flows decreased for both plants, with a significant decrease in Southerly's design flows. Design raw wastewater concentrations of biochemical oxygen demand (five-day), suspended solids, total nitrogen, and phosphates also changed. Table III-2 summarizes the EIS wastewater characteristics projections and compares them with those of the Facilities Plan.

The EIS projects an increase in influent concentrations of BOD_5 and suspended solids from the existing situation to design conditions for the Jackson Pike facility. On the other hand, BOD_5 and suspended solids concentrations in Southerly's raw wastewater are expected to decrease over the design period. The Anheuser-Busch brewery, whose wastewater exerts a major influence on the influent characteristics at Southerly, is presently restricted to a maximum 30 day average BOD_5 of 60,000 pounds per day, with a maximum single day peak of 75,000 pounds per day. It is important to note that this requirement is independent of any further brewery pretreatment recommendation made in this EIS.

3.1.3 Evaluation of Existing Facilities

The existing facilities at both Jackson Pike and Southerly have experienced problems which result in intermittent periods of poor effluent quality. The primary source of poor effluent quality at Jackson Pike is the high operating solids concentrations in the activated sludge system. This condition has caused excessively high solids loads on the final clarifiers with the resultant loss in removal efficiency. The high operating solids in the activated sludge are due to the generally inadequate solids handling system at the plant. Poor effluent quality at Southerly is the result of the inability of the facilities to handle the high concentrations of soluble carbohydrate wastes in the raw wastewater from the brewery. This soluble carbohydrate waste induces a bulking activated sludge at Southerly. The growth of this filamentous organism

TABLE III-2
Average Day Design Wastewater Characteristics

	JACKSON PIKE		SOUTHERLY	
	FP[1]	EIS[2]	FP[1]	EIS[2]
Q, MGD	120	110	120	85
SS (mg/l)	270	240	220	230
% VOLATILE	60	70	70	80
BOD_5 (mg/l)	190	210	265	290
% VOLATILE	-	33	-	46
COD (mg/l)	-	430	-	570
% VOLATILE	-	35	-	46
TKN (mg/l)	20[3]	30.5	50[3]	29.5
% SOLUBLE	-	72	-	71
PO_4-P (mg/l)	10	8.5	9	8.7
% SOLUBLE	-	56	-	76
ALKALINITY (as mg/l $CaCo_3$)	-	250	-	200

(1) Facilities Plan Recommendations.

(2) EIS Recommendations.

(3) For average dry weather condition.

results in a condition where the solids flux to the final clarifiers is greater than the ability of the return sludge system to remove these solids in the clarifier underflow due to the poor settling characteristics of the filamentous activated sludge. Consequently, failure of the solids/liquid separation system occurs due to elevated soluble BOD_5 in the raw wastewater. It is not necessary to specifically identify the filamentous organism to correct the bulking problem; the control of the soluble carbohydrate waste input to the activated sludge system will eliminate the bulking condition.

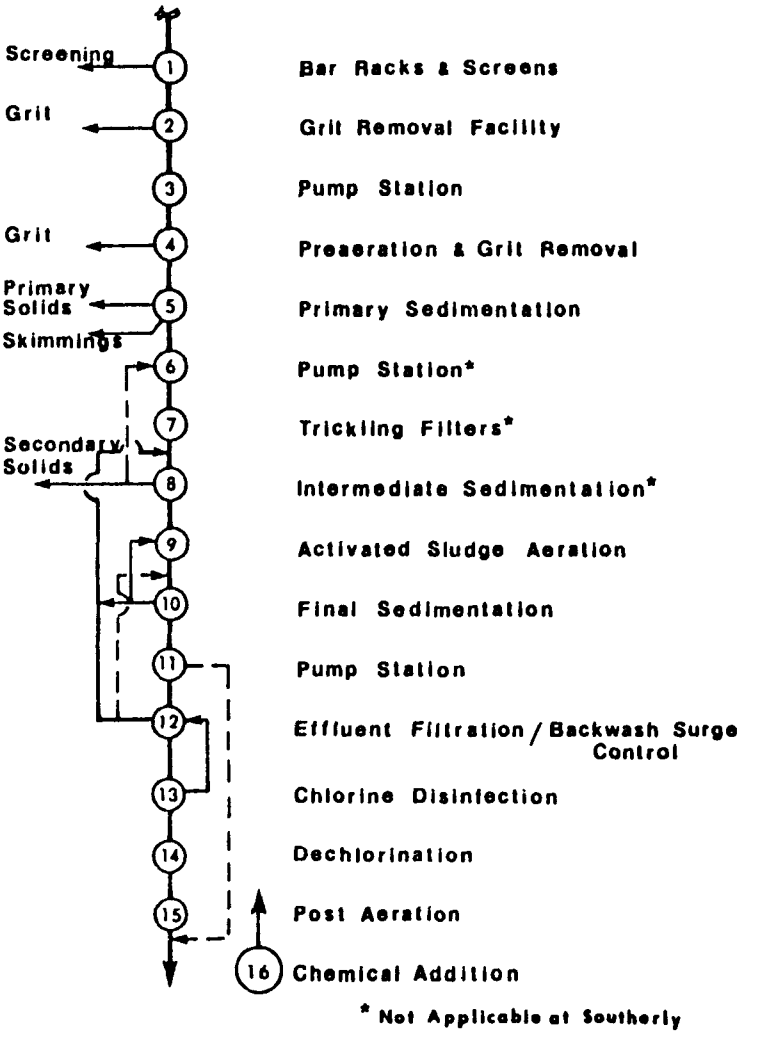
3.2 MAINSTREAM TREATMENT RECOMMENDATIONS

The Final EIS design concept recommendations for mainstream treatment at the Jackson Pike and Southerly facilities are identical to the recommendations of the Draft EIS. Moreover, the EIS recommended facilities are essentially the same basic concept as recommended in the Facilities Plan with one major exception: one-stage biological treatment with Brewery pretreatment is recommended at Southerly in lieu of the two-stage system proposed in the Facilities Plan. The EIS recommendations for both plants will provide more reliable treatment and design flexibility than those of the Facilities Plan, and at the same time, are less costly. The flow diagram of the recommended facilities is shown in Figure III-1. For detailed discussion of the facilities refer to Volume III of the EIS. The following is a brief summary of the key aspects of the recommended facilities.

3.2.1 Interplant Considerations

Given the average design flows projected for each facility Jackson Pike does not have adequate hydraulic capacity to handle the peak flow rates that can be expected. However, instead of expanding the Jackson Pike facilities, it is recommended that all flows to Jackson Pike that exceed the peak capacity of the plant be diverted to the Southerly plant through an existing 150 inch to 156 inch diameter interconnecting sewer. Southerly's excess hydraulic capacity, with expansion of the influent and effluent pumping stations (as discussed in a later section), will be such that an additional 40 to 60 mgd of capacity will be available to treat peak flows diverted form Jackson Pike. The connecting sewer affords the system flexibility for the total combined hydraulic capacity of both plants (430 mgd) to be adquate to treat the combined peak flows expected over the design period.

FIGURE III-1
EIS Recommended
Mainstream Treatment Concept
For Jackson Pike and Southerly WWTF's



3.2.2 Jackson Pike

The EIS recommends essentially the same two stage wastewater treatment concept as recommended in the Facilities Plan. The EIS engineering analysis developed Jackson Pike influent wastewater characteristics that are similar to the characteristics developed in the Facilities Plan. The EIS design concept considers optimization of the existing treatment processes in the alternatives evaluated. The results of the EIS engineering analysis determined that either a single stage treatment process or the removal of the intermediate sedimentation process necessitates expansion of the existing aeration and final sedimentation capacities along with a large increase in energy consumption. Since the existing aeration and sedimentation facilities are adequate after minor modifications, EIS engineering analysis determined that it is cost-effective to construct the first stage treatment facilities and modify the existing aeration and sedimentation facilities.

(1) Trickling Filter

A 50 percent reduction in the size of the first-stage, roughing trickling filter proposed in the Facilities Plan is recommended. Expected organic removal efficiencies will decrease 10 percent (from 75% removal to 65% removal), yet the design of of downstream activated sludge system is not significantly affected. Further size reduction or elimination of the trickling filter, however, would necessitate increasing the aeration capacity of the activated sludge system. The additional cost of construction and operation of aeration equipment and tankage and of additional final clarification does not justify the elimination of the trickling filter process.

(2) Intermediate Sedimentation

An expansion of the intermediate sedimentation area is recommended to afford the flexibility of handling waste activated sludge should the plant operator elect to recycle waste activated sludge to the trickling filters for improved operation.

(3) Second-Stage Activated Sludge System

The EIS recommendations for the activated sludge system are based on the concept of balanced design of aeration volume, clarification volume, and return sludge pumping capacity. The system is optimized by trading off increased aeration volume for decreased clarification area and depth due to the dependence of clarifier design on solids loading in addition to surface overflow rates. The results of applying the balanced design concept are that no expansion of the final clarifiers or sludge return pumps is necessary given the existing aeration and clarification volumes at the facility. Moreover, a step-feed areation pattern is recommended to provide more flexible

operation by maintaining reliable nitrification while, at the same time, reducing the solids load on the final clarifiers. Finally, the EIS recommends examination of alternative activated sludge oxygen dissolution systems to that proposed in the Facilities Plan during the design phase of the project.

(4) Chemical Addition

The addition of multiple-point mainstream metal salt coagulant addition capability is recommended for phosphorous removal flexibility. This includes addition at the influent to the intermediate and final clarifiers and to the raw sewage.

(5) Effluent Filtration

The size of the proposed effluent filters should be increased to 80 to 85 percent of the plant's hydraulic capacity in order to reliably meet the effluent limitations for BOD_5 and suspended solids.

(6) Chlorination-Post Aeration-Dechlorination

The EIS recommends a slight increase in the chlorine disinfection capability, as well as the addition of post aeration and dechlorination processes downstream. The addition of these two unit processes will eliminate the potential for chlorine toxicity to aquatic life in the Scioto River and allow the plant to meet effluent fecal coliform and dissolved oxygen concentration limits.

3.2.3 Southerly

The EIS recommends a single stage wastewater process in lieu of the two stage process recommended in the Facilities Plan. The EIS engineering analysis developed Southerly influent wastewater characteristics that are significantly different from the characteristics developed in the Facilities Plan. The EIS design concept considers optimumization of the existing treatment processes in the alternatives evaluated. The results of the EIS engineering analysis determined that minor modifications to the existing treatment processes and 5.2 million gallons of additional aeration capacity at Southerly will provide the necessary wastewater treatment facilities to meet the NPDES permit with soluble BOD_5 level reduction and flow equalization by the brewery.

(1) Load Reduction/Flow Equalization

The recommendation is based on a cost-effectiveness analysis of four brewery pretreatment scenarios ranging from no pretreatment with two-stage biological treatment at Southerly to total on-site brewery

Pretreatment with one-stage biological treatment at Southerly. The analysis considered the capital and operating and maintenance costs of both the brewery and Southerly treatment systems in each scenario. Scenario 2--load reduction and flow equalization of the brewery waste discharge is the recommended cost-effective system. TABLE III-3 summarizes the present worth costs for each of the four brewery pretreatment scenarios.

The Facilities Plan recommended a pilot plant to evaluate the effectiveness of the proposed two-stage trickling filter/activated sludge system at Southerly. With pretreatment of the brewery waste it is likely that the bulking problem will be eliminated. The EIS does not recommend that a pilot plant study be conducted to evaluate mainstream biological treatment.

The level of pretreatment that the brewery shall achieve in order to be consistent with Scenario 2 is 60 to 70 percent removal of the soluble oxygen demand associated with a total applied influent load to the brewery pretreatment system of 60,000 pounds of BOD_5 per day. This corresponds to a 30-day average soluble BOD_5 removal of approximately 35,000 pounds per day (see Table IV-1, Volume III). The EIS recommends flow equalization of the pretreated brewery discharge to provide less variation in diurnal loads at the Southerly plant. The type and design of the wastewater treatment facilities to be used for achieving this level of load reduction and flow equalization is at the discreation of the brewery and their design engineers.

The brewery may well decide to implement a pretreatment system with a higher level of removal, albeit the EIS recommendation is for a level equal to Scenario 2. Such a decision on the part of the brewery would be influenced by the City-imposed sewerage system user charges on various levels of pretreated brewery waste.

The City of Columbus has a U.S. EPA approved Industrial Cost Recovery (ICR) system. We would expect that the approved system will accomodate changes which may result from the EIS recommendation for brewery pretreatment.

TABLE III-3
Cost Analysis of Brewery Waste Treatment
Scenarios for the Southerly Treatment Facilities
(Million of Dollars, 1974/1975 Basis)

Pretreatment Scenario	Present Worth of Treatment Costs		
	Brewery[1]	Southerly WWTF	Total
1. No pretreatment[2]	0	119	119
2. Pretreatment of soluble BOD_5[3]	5	97	102
3. Pretreatment of soluble and particulate BOD_5[3]	12	96	108
4. Pretreatment to Southerly NPDES limits[3]	27	96	123

1 Assumes load of 60,000 lbs./day influent to brewery pretreatment facility.

2 Two-stage biological treatment at Southerly (trickling filter—activated sludge.

3 One-stage biological treatment at Southerly (i.e., trickling filter eliminated).

(2) Pumping Station Capacity

The capacity of the influent and effluent pumping stations at the Southerly facilities should be increased to the cited hydraulic capacity of the existing facilities (230 mgd) concurrent with utilization of the interconnecting sewer between the two plants.

(3) Trickling Filter and Intermediate Sedimentation

The roughing trickling filter and intermediate sedimentation unit processes proposed in the Facilities Plan are eliminated as a result of the EIS recommendation for brewery load reduction and flow equalization.

(4) Activated Sludge System

The concept of balanced design of aeration and sedimentation volumes also forms the basis for the EIS recommendations for the Southerly activated sludge system. The Facilities Plan proposed addition of 5.2 million gallons of aeration volume is necessary, albeit for a different purpose than cited in the Facilities Plan. This added aeration volume should be provided so as to be completely committed to return sludge aeration. This commitment insures successful attainment of a non-limiting mean cell residence time for process control during cold weather operation. As with Jackson Pike, the proposed expansion of the final clarifiers is not recommended given the expected aerator solids loadings. A revamping of the oxygen transfer capacity of the activated sludge system is recommended to correspond to the design oxygen demand loadings calculated in the Draft EIS (Volume III of this Final EIS). Investigation of alternative, efficient oxygen transfer systems is encouraged during the project's design phase.

(5) Chemical Addition

The capability to add metal salt coagulant to the raw wastewater and at the influent to the final clarifiers is recommended for phosphorous removal flexibility.

(6) Effluent Filtration

The size of the effluent filters should be increased and based on 80 to 85 percent of the 230 mgd hydraulic capacity of the plant.

(7) Chlorination-Post Aeration-Dechlorination

The addition of post aeration and dechlorination processes, and expansion of chlorine disinfection capacity is recommended to ameliorate the potential for chlorine toxicity of the discharge to river biota and to meet effluent limits for fecal coliform bacteria and dissolved oxygen.

3.2.4 Design Finalization Overview Team

The establishment of a Design Finalization Overview Team (DFOT) is recommended. The DFOT should be comprised of individuals with expertise on the treatment of wastewater characterized by a highly soluble organic component and on biological nitrification. The DFOT should be utilized by the City of Columbus during the Step II Design phase of the projects as a separate but integral part of the Value Engineering (VE) team to review and recommend the finalized design parameters for both treatment facilities. In recommending the design parameters for the facilities recommended in the EIS, the DFOT must incorporate the following:

- The results of the sewer system evaluation survey (SSES), a combined sewer overflow study, and the combined sewer separation program currently being completed by the City.

- Any revisions to the effluent limitations contained in the NPDES permit as discussed earlier.

- The mainstream treatment process impacts of the sludge handling recommendations.

The work of the DFOT is in addition to the work normally required of a VE team during the design of a project having an estimated construction cost equal to or greater than $10 million, exclusive of any sanitary sewer costs. As part of the Columbus VE team, the DFOT is grant eligible.

3.2.5 Independent Review Results

Region 5 had two independent technical reviews of the EIS mainstream treatment recommendations prepared. One was prepared by a private contractor, Energy and Environmental Analysis, Inc. The Municipal Environmental Research

Laboratory of U.S. EPA's Office of Research and Development prepared the other review. The following are summaries of the results of these reviews.

(1) Energy and Environmental Analysis, Inc.

This report assessed the suitability, reliability, and environmental issues associated with the EIS recommended facilities for Jackson Pike and Southerly, and evaluated the impact of these findings on the Cost-effectiveness Analysis. The report concluded that scenario 2,3 or 4 for Southerly should operate reliably to comply with the Draft EIS NPDES requirements, and that implementation of Scenario 1 could result in continued filamentous growth problems that jeopardize reliable operations and compliance with treatment requirements. Futher, Scenario 2 (the EIS recommendation) was found to be the most cost-effective and technically preferable of the brewery pretreatment scenarios at Southerly. The report also recommends regulation of the brewery waste discharge for flow and load equalization by limiting the capacity of discharge pumps from the equalization tanks at the brewery. A copy of the entire report is presented in Volume II of the EIS.

(2) U.S. EPA Municipal Environmental Research LABORATORY (MERL)

MERL reviewed the process design for the Southerly Treatment Plant in relation to the selected brewery pretreatment Scenario 2 and the treatment requirements for Southerly, and found the activated sludge aeration concept appropriate for the Southerly wastewater facilities. This configuration would provide operational flexibility to meet the intermittent nitrification requirement, provide energy savings during the non-nitrification season, assist in controlling solids flux to the clarifiers, and provide control of bulking sludges. MERL agreed with the EIS recommendations for final clarifier sizing in terms of the surface overflow rates and solids flux, and the EIS provision for reaeration of the return sludge not only to assist in maintaining a high mean cell residence time but to improve slude settleability, as well. Overall, the EIS recommendations result in improved treatment process flexibility.

The only reservation concerned the solids handling capability of the primary sedimentation facilities to handle the sloughed solids from the brewery pretreatment system in addition to the chemically precipitated and coagulated raw wastewater solids due to phosphorous control. MERL's analysis is found in Volume II, appendix BB.

3.2.6 Pilot Plant

The Facilities Plan recommended large scale pilot plant construction at Southerly and Jackson Pike to confirm the design criteria and establish process effectiveness. The Draft EIS recommended pilot studies for oxygen dissolution and solids thickening at the Jackson Pike plant. No large scale piloting was recommended. The final EIS retains the recommendations of the Draft EIS and is supported by both independent reviews.

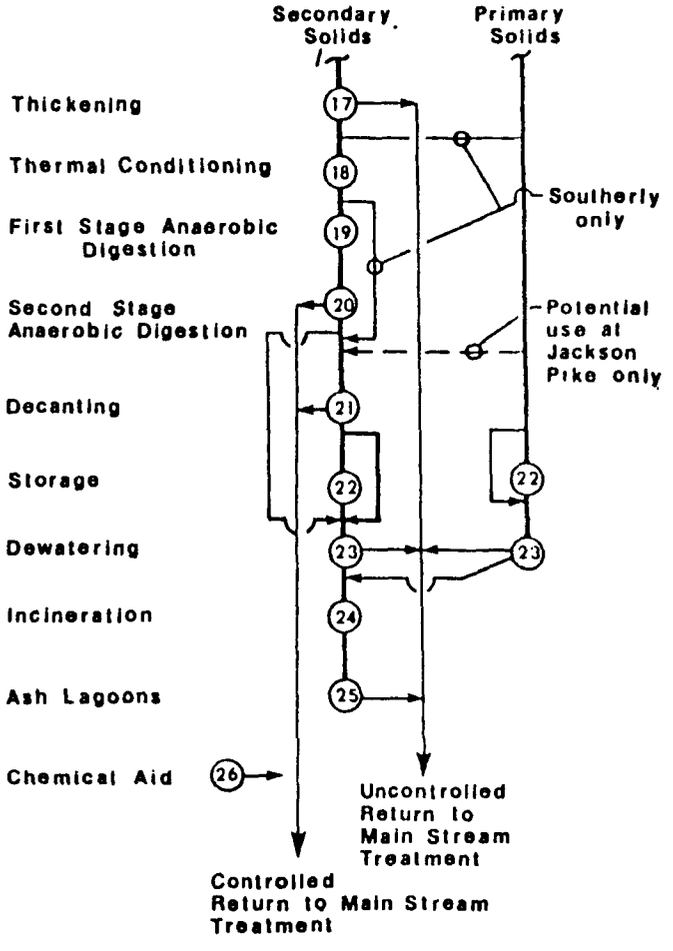
3.3 SLUDGE HANDLING AND DISPOSAL RECOMMENDATIONS

The Final EIS recommendations for sludge handling and disposal retain the basic concept proposed in the Facilities Plans with some reduction in capacity of the recommended units and one minor process change. Of particular note, however, is that the recommendations are of an interim nature and that further investigation of alternative long-term sludge disposal methods should be pursued at the same time the interim systems, sludge incineration at both Jackson Pike and Southerly, are being implemented. With the ultimate implementation of the selected alternative disposal methods preferably one which utilizes the resource value of sewage sludge, the interim incineration facilities would be relegated to standby, or back-up, status.

The basis for the EIS recommendation is a primary air impact analysis conducted by U.S. EPA with the support of the Ohio EPA. This analysis consisted of air quality modelling work completed by Ohio EPA, a U.S. EPA review of the modelling work, and a U.S. EPA assessment of the Clean Air Act requirements for non-attainment areas. Further discussion of the results of this analysis is presented later in this chapter.

The flow diagram for the recommended sludge handling and disposal facilities is shown in Figure III-2. The following is a brief summary of the key aspects of the EIS recommendations. Detailed discussions of the recommended sludge

FIGURE III-2
EIS Recommended
Sludge Handling and Disposal Concept
For Jackson Pike and Southerly WWTF's



handling and disposal facilities are presented in Volume III of this EIS.

3.3.1 Jackson Pike

The unit processes which comprise the recommended sludge handling and disposal concept for Jackson Pike are:

- Secondary solids thickening
- Thermal conditioning
- Anaerobic digestion, decanting, and storage
- Dewatering and incineration (interim).

It is recommended that waste solids from the intermediate and final clarifiers be thickened by 12 centrifuges, a 33 percent reduction from the 18 proposed in the Facilities Plan.

Future flexibility considerations and present dissatisfaction with the performance of the thermal conditioners point towards continued testing of a chemical conditioning--belt press system as a future alternative to thermal conditioning for the production of an autogenous sludge cake. Thermal conditioning could even be abandoned in favor of this new method sometime in the future depending on advances in belt press dewatering technology.

The EIS recommends against the design and construction of an isolated aerobic activated sludge system for the decanted liquors from the thermal conditioning process as proposed in the Facilities Plan. There is enough mainstream treatment capacity to handle the programed return of equalized, thermally conditioned sludge liquors.

Optimum utilization of the existing anaerobic digestion, decanting, and sludge storage facilities is recommended. Most of these facilities are currently being used only for storage; the EIS recommends that they be evaluated for rehabilitation and more effective use, such as anaerabic stabilization of the thermally conditioned sludge. Additionally, the EIS recommends

that the existing decanting tanks at Jackson Pike be used to thicken primary sludge prior to dewatering and incineration.

A total of nine dewatering centrifuges and two operable sludge incinerators is recommended at Jackson Pike, The two incinerators, either new or rehabilitated, in concert with an immediate landfill capability, can be used as the main method of sludge handling during the interim period. The recommended incineration facilities must obtain emission offsets and apply Lowest Achievable Emission Rate (LAER) technology (0.65 lbs. of particulates per ton of sludge burned). After implementation of the final selected alternative sludge treatment and disposal method, the incinerators can be used for standby sludge disposal. This recommendation differs from that of the Draft EIS which called for a total of three incinerators at Jackson Pike.

Ash from the sludge incinerators is recommended for landfill disposal. Also, the sludge lagoons presently being used for sludge disposal should be abandoned after implementation of the recommended sludge handling and disposal scheme.

3.3.2 Southerly

The unit processes which comprise the recommended sludge handling and disposal concept for Southerly are:

- Waste activated sludge thickening
- Thermal conditioning
- Anaerobic digestion, decanting, and storage
- Dewatering and incineration (interim).

The EIS recommends that the existing dissolved air flotation units be utilized for thickening of the waste activated sludge. These facilities are adequate and no additional thickening equipment is necessary.

Thickened waste activated sludge will be thermally conditioned by the existing units. These units are of sufficient capacity and there is no need for the additional thermal conditioning unit proposed in the Facilities Plan. As the EIS recommended for Jackson Pike, future abandonment of the thermal conditioners in lieu of new technology for autogenous sludge cake production is also an option at Southerly. Moreover, construction of an isolated aerobic activated sludge system for treatment of the thermally conditioned sludge liquors is not recommended. Adequate

mainstream capacity exists for treatment of the programmed return of these liquors.

The existing anaerobic digestion, decanting, and sludge storage facilities should be optimally utilized. For Southerly, this involves using the limited digester capacity to treat a portion of the thermally conditioned sludge and the decanting tanks to thicken and store thermally conditioned sludge not digested.

The EIS recommends installation of eight dewatering centrifuges and two operable sludge incinerators at Southerly. The eight recommended centrifuges are one less than the nine recommended in the Facilities Plan. They are intended to replace the existing vacuum filters. The constraints on the use of the incinerators for Southerly are the same as those described for Jackson Pike. Incineration is intended as an interim sludge disposal method which, upon implementation of an alternative disposal technique, will become a backup system. Emission offsets must be obtained to operate the incinerators and LAER technology must be used. Incinerator ash is recommended for landfill disposal.

3.3.4 Sludge Force Main

The EIS has determined that it is not cost-effective for the sludge to be made operational at this time.

3.3.5 Additional Studies

U.S. EPA encourages the City of Columbus to continue its attempts to investigate and implement alternative sludge disposal methods to incineration. These include continuation of a large scale land application demonstration project with the Franklin County Farm Bureau, and the contacting of strip mine owners who have expressed interest in mined land reclamation projects.

The EIS recommends that additional facilities planning be conducted to investigate alternative sludge handling and disposal methods to meet the City of Columbus long term needs. Alternatives to be evaluated include, but are not limited to, strip mine reclamation projects, composting, sludge application to agricultural land for use as a nutrient supplement and soil conditioner, and co-disposal with

refuse at the proposed coal-fired municipal power plant adjacent to Jackson Pike. The alternatives can consider the existing and interim sludge handling processes as a backup method of sludge disposal in the final program.

Concerns were raised that trace amounts of chlorinated benzenes may impact the disposal of the sludge on agricultural lands. Trace amounts of chlorinated organic substances are a potential environmental concern in any land-based sludge disposal scheme. An analysis of Columbus° sludge by U.S. EPA°s Plant Biology Laboratory in Beltsville, Maryland conducted in August, 1978 concluded that the chlorinated benzene compounds identified in the sludge did not adversely affect the germination and seedling development of corn and soybeans. The Columbus, Ohio sludges were found to contain an unidentified growth inhibiting agent which may be detrimental to the normal growth and development of corn and soybeans. There are some data showing that sludge can retard seed germination and early plant growth. However, most of these growth retardation cases have occurred at sludge application rates higher than those recommended here. The retardation is thought to be caused by a high concentration of soluble salts and/or high ammonia contents. These problems can be further reduced by applying the sludge 2 to 3 weeks before planting, by thorough mixing of the sludge in the tilled soil layer, or by a thorough irrigation prior to planting. In the humid regions of the U.S., the problem will also be potentially less severe than in the more arid non-irrigated regions. Further analysis of the sludge for growth inhibiting or toxic substances that could accumulate in or on crops by uptake mechanisms may be conducted as part of the additional sludge facilities planning to be performed by the City so that the potential public health consequences can be accurately identified.

3.4 SUMMARY OF COST ANALYSIS

Table III-4 compares the costs of the EIS recommendations and the original Facilities Plan proposed project. It is important to note that costs shown in 1974-1975 dollars and more accurately reflect the relative differences between the projects rather than actural costs. For a more detailed breakdown of costs refer to Tables V-5 and V-6 in Volume III of this EIS.

TABLE III-4

Project Cost Comparison Summary
(Millions of 1974-1975 Dollars)

	Facilities Plan	EIS Recommendations
Jackson Pike		
- Capital	92.6	70.2
- Operating	5.68	5.45
Southerly		
- Capital	66.4	36.0
- Operating	5.54	4.92
Combined Total		
- Capital	159.0	106.8
- Operating	11.22	10.37

IV. IMPACTS

IV. IMPACTS

The environmental impacts associated with the construction of the recommended regional interceptor sewers and wastewater treatment facilities' improvements were discussed in the Draft EIS which in Volume III of this Final EIS. The primary impacts of interceptor construction are presented in Chapter III of that Volume, primary impacts of the recommended wastewater treatment facilities in Chapter VI, and secondary impacts of the total system in Chapter VII of Volume III. Some additional issues have been identified since the preparation and circulation of the Draft EIS for which impacts had not been addressed in the Draft EIS. The purpose of this chapter is to identify and discuss these additional environmental impacts. They are:

- Impacts associated with brewery pretreatment
- Primary air quality impacts due to sludge incineration
- Secondary air quality impacts
- Impacts of alternative sludge disposal options
- Water quality impacts of the wastewater discharges on the Scioto River.

There has also been concern over the impacts of sewer construction through parks funded by the Land and Water Conservation Fund Act. This is discussed separately in Chapter II of this Volume.

4.1 ENVIRONMENTAL IMPACTS OF BREWERY PRETREATMENT

There are three environmental issues that arise as a result of brewery pretreatment of their high strength carbohydrate wastewaters:

- Potential odor at the proposed pretreatment site
- Potential odor and corrosion in the sewers carrying the pretreated waste
- Increased explosion risk resulting from proposed brewery pretreatment.

4.1.1 Potential Odor at the Pretreatment Site

Due to the high levels of BOD_5 in brewery wastes (4000 mg/l) excessive odors are likely where the pretreatment system has a limited oxygen transfer capability, such as a plastic media trickling filter. Odors result predominantly from microbially mediated production of hydrogen sulfide from sulfates in the water under anoxic conditions in the reactor. Odors can be mitigated by adjustment of wastewater pH to 8 or above, thereby shifting the reduced sulfur equilibrium to soluble HS^- and $S^=$ irons. Covering the trickling filter coupled with ozonation of the vented air, also serves to control odors.

4.1.2 Potential Odor and Corrosion in the Sewers

By conversion of soluble organic compounds into more complex bacterial and/or fungal solids, a biological pretreatment system at the brewery will actually serve to decrease potential odor and corrosion problems in the sewer carrying these wastewaters. At worst, odor and corrosion problems will be no more than present under current conditions, since the same amount of odor and corrosion producing sulfur compounds exist in the wastewater with or without brewery pretreatment.

4.1.3 Increased Explosion Risk

There should be no increase in the explosion risk over existing conditions in the sewers with implementation of brewery pretreatment. The pretreatment may even mitigate any explosion risk that may exist. Explosions are caused by the microbial production of methane gas from organic compounds. The production of methane from the soluble carbohydrate waste by the slow-growing methane bacteria would occur more readily than would methane production from the bacterial solids generated by pretreatment.

4.2 PRIMARY AIR QUALITY IMPACTS OF SLUDGE INCINERATION

In an area subject to requirements for non-attainment or prevention of significant deterioration Section 316 of the Clean Air Act, as amended, gives the U.S. Environmental Protection Agency the authority to withhold, condition, or restrict construction grants. There is

not an EPA-approved plan for dealing with air pollution that is reasonably anticipated to result either directly or indirectly from proposed new sewage treatment capacity [316(b)].

It is U.S. EPA's position that new wastewater treatment facilities must minimize emissions in nonattainment areas. If land application of sludge is feasible, then no new pollution from sewage sludge incinerators in a nonattainment area will be financed by U.S. EPA. where sludge incinerators are used, emission offsets must be obtained and Lowest Achievable Emission Rate (LAER) technology applies in nonattainment areas.

Columbus, Ohio is a nonattainment area for particulate matter and sulfur dioxide. Thus, with regard to operation of new and rehabilitated sludge incinerators at the Columbus, Ohio, Jackson Pike and Southerly sewage treatment plants, U.S. EPA finds that the LAER be set at 0.65 pounds of particulates per ton of dry solids processed. Moreover, given the emission levels that occur from sludge incinerators even with lowest available technology, U.S. EPA finds that using incineration as a primary sludge disposal method for large cities, in areas which are nonattainment for particulate matter, should be minimized, and where possible, phased out completely.

As far as possible, sludge management programs should focus on recycling options through land reclamation of strip mined lands, composting, and land application to farmland as a fertilizer supplement.

USEPA recognizes that Columbus has an immediate problem of sludge disposal and that recycling alternatives take some time to get underway. We will fund and permit a total of two sludge incinerators (new or rehabilitated) at Jackson Pike and Southerly with the provison that the City of Columbus maximize their efforts to develop acceptable reclamation, composting and land application programs in lieu of incinerating sludge. When the two rehabilitated or new incinerators at each STP are operational U.S.EPA will review the need for a third incinerator at each STP vs. other sludge options of land application, composting and land reclamation in conjunction with other environmental impacts.

If resource recovery schemes prove viable, the sludge incinerators shall be used as standby-back up facilities only.

4.3 SECONDARY AIR QUALITY IMPACTS

The secondary air quality impacts of the construction of community sewerage systems may be considered as two distinct issues. The first concerns the impacts resulting from the induced growth that the construction of sanitary sewer may cause. However, since the secondary impact analysis in the Draft EIS concluded that the population increase in Franklin County between 1975 and 2000 is likely to be similar with or without the construction of the proposed interceptor sewer, there are no added secondary air quality impacts that can be ascribed to the absolute growth aspects of the projects.

The second issue concerns the impacts due to the differences in the distribution of the population growth patterns that occur as a result of the construction of the EIS proposed sewer phasing program as compared to the original Facilities Plan construction program. For example, a more dispersed distribution may result in more vehicle miles traveled as people must travel further to utilize services; consequently more air pollutants are generated.

As discussed in the Draft EIS, the recommended interceptor construction program will result in an "infill" population distribution pattern, whereas the Facilities Plan proposal as well as the no-action alternative, result in an "urban sprawl" distribution pattern. An analysis of the air pollution emissions of total suspended particulates (TSP) and non-methane hydrocarbons (HC) corresponding to the two population growth patterns for the year 2000 concluded that on a County-wide basis (see Appendix FF):

- There is no significant difference in the HC emissions between the two growth patterns.
- The TSP emissions are not likely to vary significantly under the two growth patterns.
- The effect of one growth pattern relative to the other on the attainment of ambient air quality standards for photochemical oxidants and TSP's would not differ significantly.

4.4 IMPACTS OF ALTERNATIVE SLUDGE DISPOSAL OPTIONS

The sludge recycling programs, such as land reclamation, composting, and land application, recommended in this EIS for the City of Columbus as the preferred long-term sludge management schemes to incineration are not without potential adverse

environmental consequences; albeit the provision of environmental benefits are afforded by the resource utilization of the sludge. There are concerns associated with the introduction of pathogens, heavy metals, and organic chemicals into the environment and their potential intake by humans through direct contact and ingestion of contaminated water or food. The recycling of sludge back onto the land can present a public health threat because it introduces pathogens, metals, and organics directly into soils with the potential for contamination of both the human food chain and drinking water.

Inorganic and organic nitrogen in sludge disposed on reclaimed land may be leached into underlying groundwater which may serve as a drinking water source for nearby residents. Unsafe levels of nitrates could build up in these water supplies. Application of sludge to agricultural land introduces a wide variety of metals into the soil system. Cadmium is a metal of particular concern because it can be taken up by plants and enters the human food chain in concentrations that might pose a hazard to human health. Although sludge composting is an effective sludge disinfection process, there still remains a finite, if small, risk of disease transmission through the compost product. If contaminated compost is marketed to homeowners or used by nurserymen and greenhouse operators, a large number of people could be exposed to a potential public health threat.

Detailed consideration of the impacts associated with alternative sludge disposal methods should be addressed in the additional sludge handling and disposal facilities planning recommended in this EIS.

4.5 WATER QUALITY IMPACTS ON THE SCIOTO RIVER

The upgrading of the Jackson Pike and Southerly wastewater treatment plants to the effluent limits contained in the NPDES permits will improve the dissolved oxygen (D.O.) conditions in the Scioto immensely, as compared to existing conditions, even though violations of the 5.0 mg/l D.O. standard may still occur during certain critical summer and winter low flow conditions.

In addition to overall improvement in River dissolved oxygen conditions, the EIS treatment facilities' upgrading recommendations will result in the elimination of effluent residual chlorine discharges to the River. This, in turn, eliminates the potential for chlorine toxicity to aquatic life below the discharges.

Finally, the removal of phosphorous at each of the treatment plants to levels of 1.0 mg/l (PO_4 as P) in the discharge will substantially diminish the potential for development of nuisance growths of algae or other aquatic plants in the River and the undesireable effects they impart (unpleasant tastes and odors, contribution to eutrophication).