EIS790976F2

United States
Environmental Protection
Agency

Region V
230 S. Dearborn
Chicago, Illinois 60604

June, 1979

Water Division

EPA

Environmental Impact Statement

Final

Wastewater Treatment Facilities for the Metropolitan Area Columbus, Ohio

2

VOLUME

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

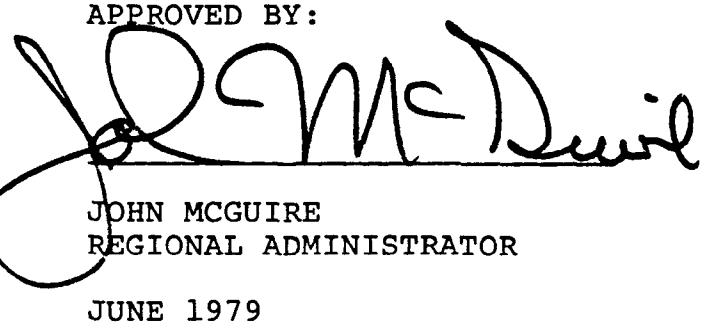
CHICAGO, ILLINOIS

And

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

BETHESDA, MARYLAND CLEVELAND, OHIO

APPROVED BY:



JOHN MCGUIRE
REGIONAL ADMINISTRATOR

JUNE 1979

U.S. Environmental Protection Agency
Region 5, Library (5PL-16)
230 S. Dearborn Street, Room 1670
Chicago, IL 60604

VOLUME II

Response to Comments

And

Final EIS Appendices

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.

Reference to pages in "the EIS" refer to pages in Volume 3; the edited Draft EIS.

All double-lettered Appendix references (e.g. AA,BB, etc.) are in Volume II; all single-lettered Appendix references (e.g. A, B, etc.) are in the edited Volume III.

TABLE OF CONTENTS

		Page Number
I.	INTRODUCTION	I-1
II.	COMMENTS FROM FEDERAL AGENCIES	II-1
2.1	Department of the Army (1)*	II-1
2.2	Department of Health, Education and Welfare (2)	II-4
2.3	Department of the Interior (4)	II-6
2.4	Department of Transportation (4)	II-13
III.	COMMENTS FROM STATE AGENCIES	III-1
3.1	Ohio Environmental Protection Agency (94)	III-1
3.2	Ohio Historic Preservation Office (3)	
IV.	COMMENTS FROM REGIONAL AND LOCAL PUBLIC AGENCIES	IV-1
4.1	City of Columbus (174)	IV-1
4.2	City of Columbus Division of Water (4)	IV-169
4.3	City of Reynoldsburg (3)	IV-179
4.4	Delaware County (6)	IV-183
4.5	Fairfield County (1)	IV-187
4.6	Genoa Township (1)	IV-194
4.7	Hamilton Township (1)	IV-197
4.8	Mid-Ohio Health Planning Division (11)	IV-199
V.	COMMENTS FROM PRIVATE CONCERNS AND INDIVIDUALS	V-1
5.1	Anheuser-Busch Inc. (16)	V-1
5.2	Columbus Industrial Association (4)	V-58
5.3	Development Committee for Greater Columbus (5)	V-61

*Number of comments received are in parentheses.

A P P E N D I C E S

AA EVALUATION OF THE WASTEWATER TREATMENT PROCESSES PROPOSED FOR COLUMBUS, OHIO IN THE DRAFT EIS — ENERGY AND ENVIRONMENTAL ANALYSIS, INC.

BB REVIEW OF COLUMBUS, OHIO DRAFT EIS BY THE MUNICIPAL ENVIRONMENTAL RESEARCH LABORATORY, CINCINNATI, OHIO

CC REVISED CHAPTER III: SERVICE AREA AND SEWER SYSTEM ALTERNATIVES

DD REVISED APPENDIX B: MATHEMATICAL CHARACTERIZATION OF THE SCIOTO RIVER BELOW COLUMBUS

EE COLUMBUS METROPOLITAN AREA GROWTH POTENTIAL 1977-1985

FF SECONDARY AIR IMPACT ANALYSIS

GG EFFECTS OF PARA-DICHLOROBENZINE AND ORTHO-DICHLOROBENZENE ON GERMINATION AND EARLY SEEDLING DEVELOPMENT OF CORN AND SOYBEANS, U.S. EPA PLANT BIOLOGY LABORATORY, BELTSVILLE, MARYLAND

HH EPA POLICY STATEMENT CONCERNING THE RELATIONSHIP AMONG EPA, ITS CONTRACTORS, SUBCONTRACTORS, GRANTEES, AND THE PUBLIC

II COLUMBUS EIS PROJECT PARTICIPANTS

JJ BIBLIOGRAPHY

I. INTRODUCTION

I. INTRODUCTION

Volume II of the Final Environmental Impact Statement (Final EIS) prepared for the proposed wastewater treatment facilities plan for the metropolitan area of Columbus, Ohio, contains the record of public commentary and appropriate response to issues raised during the period of public examination of the Draft Environmental Impact Statement (Draft EIS). This record of public commentary includes all written testimony received at the public hearing held in Columbus on March 30, 1978, and all additional written comments submitted to the U.S. EPA from public agencies, public and private organizations, and citizens.

All written comments which were received appear in this volume. The letters and written testimony in many instances raise questions or refer to issues which required additional analysis and consideration in order for a response to be formulated. The responses follow each written letter with a succinct statement of the issue or question raised. A numbering system is used to enable cross-referencing. Where analysis has led to a change in the text of the draft environmental impact statement, the location and change in Volume III or its appendices are referenced. Research data and analysis performed after the publication of the Draft EIS have been included as new appendices to Volume II with appropriate references within the texts of Volumes I and II.

This volume is organized with the written comments grouped alphabetically according to Federal agencies; State agencies; regional and local agencies; and private concerns and individuals. Where more than one letter was received from the same agency, the letters appear in order of date of receipt. An issue or question has only been answered once; therefore, all subsequent comments relating to the issue or question will be stated and referenced back to the original response.

The official transcript containing the verbal testimony given at the public hearing held March 30, 1978, is available for public review at the U.S. EPA office at 230 South Dearborn Street in Chicago, Illinois.

II. COMMENTS FROM FEDERAL AGENCIES

2.1 Department of the Army

2.1

DEPARTMENT OF THE ARMY
HUNTINGTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 2127
HUNTINGTON, WEST VIRGINIA 25721

REPLY TO
ATTENTION OF:
ORHPD-R

14 APR 1978

Mr. Valdas V. Adamkus
Deputy Regional Administrator
U.S. Environmental Protection Agency
Region V
230 South Dearborn Street
Chicago, Illinois 60604

Re: Draft Environmental Impact
Statement Wastewater
Treatment Facilities
EPA, Region V
Columbus, Ohio

Dear Mr. Adamkus:

Reference is made to your correspondence dated 24 February 1978, which transmitted to the Huntington District copies of the subject DEIS. Members of my staff have reviewed this document with respect to the specific interest and jurisdictions of the Corps of Engineers and have the following comments and recommendations.

On page IV-47. Possible runoff problems could result from the use of sludge waste and/or incinerator waste to reclaim strip mines and landfills. (2.1.1)

A Department of the Army Permit is required prior to the initiation of any construction, filling, dredging, or any other work in the Scioto River at or below the ordinary high water elevation. The placement of fill or dredged material in any waterway may require a Corps Permit. Close coordination of the FEIS should be conducted with the Permit Section. If you have questions concerning the permit process, please contact Mr. Michael D. Gheen at telephone number 304-529-5210.

original: OFA

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ADMINISTRATOR

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14 APR 1978

ORHPD-R
Mr. Valdas V. Adamkus

Considering the fact that the facilities involves the Scioto River drainage basin and its adjacent flood plain, sediment or erosion control techniques should be implemented to the fullest extent. Standard precautionary measures also should be taken to prevent and/or control any chemical, fuel, or lubricant spillage which may occur.

The opportunity to review the subject document is appreciated.

Sincerely yours,

GEORGE A. BICHER
Colonel, Corps of Engineers
District Engineer

2.1 Department of the Army

2.1.1 Comment: Possible runoff problems could result from the use of sludge waste and/or incinerator waste to reclaim strip mines and landfills.

Response: Current U.S. EPA Guidelines (40 CFR 241) on land disposal are modeled after sanitary landfill operational and design characteristics, with a strong emphasis on the minimization of environmental impacts during and after disposal operations. If these, or equivalent state guidelines are followed, potential runoff problems should be mitigated.

2.2 Department of Health, Education and Welfare

2.2

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

REGION V

[illegible] SOUTH DEARBORN STREET

CHICAGO, ILLINOIS 60604

April 7, 1978

Our Reference: Draft Environmental Impact Statement (EIS)
Wastewater Treatment Facilities
Metropolitan Area of
Columbus, Ohio

Mr. Valdas V. Adamkus
Deputy Regional Administrator
U. S. Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Adamkus:

We are unable to provide a response to the Environmental Impact Statement (EIS) for the wastewater treatment facilities for the metropolitan area of Columbus, Ohio.

The effects of the particulate matter from the incineration of sludge is not fully known, page VI-6. Until such time as the results of the assessment of the impact of the proposed incineration facilities are determined, this office must reserve its comments. (2.2.1)

Sincerely yours

Melvin H. Fisher, P.E.
Regional Engineer
Division of Regional Operations
for Facilities Engineering
and Construction

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OFFICE OF REGIONAL
ADMINISTRATOR

c ginal: Water

2.2 Department of Health, Education, and Welfare

2.2.1 Comment: The effects of the particulate matter from the incineration of sludge is not fully known.

Response: The Ohio EPA has conducted a study which assessed the impact of sludge incineration facilities upon air quality in the Columbus metropolitan area. The results of this study and U.S. EPA's corresponding policy on incineration are discussed in Volume I.

2.3 Department of the Interior

2.3

United States Department of the Interior

OFFICE OF THE SECRETARY
NORTH CENTRAL REGION
9310 DEMPSTER STREET
DES PLAINES, ILLINOIS 60016

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APR 19 1978

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ADMINISTRATOR

ER 78/194

April 19, 1978

Mr. George Alexander
Regional Administrator
U.S. Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Alexander:

This is in response to the request for the Department of the Interior's comments on the draft environmental statement for wastewater treatment facilities for the metropolitan area of Columbus, Ohio.

Fish and Wildlife Resources

Deficient sewage treatment facilities have adversely affected fishery resources for years in the Columbus metropolitan area. At times, under certain conditions, these adverse effects resulted in fish kills downstream from sewage effluents. Generally, such kills were due to organic overloading of the stream resulting in diminished levels of dissolved oxygen. For the most part, sublethal effects on the stream fishery remain unnoticed except that populations of sensitive fish species decreased. We are encouraged to see the implementation of plans to alleviate the poor water-quality conditions downstream from sewage treatment plant effluents.

Since many industries discharge their waste into the city's treatment facilities, heavy metal concentrations in receiving waters become a concern to us. Many heavy metals bioaccumulate, resulting in toxic effects to consumers of fish. We recommend that all toxic materials from treatment plant discharges be limited in accordance with recommendations made in U.S. Environmental Protection Agency's latest edition of "Quality Criteria for Water".

Placement of sewer lines could result in water-quality problems if erosion control measures are not used. Since siltation problems would be greater during the spring, we recommend that the construction of sewer lines be limited where possible to the dry season (August through November). We also recommend against the use of interceptors in stream beds. Excavation and movement of construction equipment in the stream often result in total disruption of benthic communities. Siltation problems are also greater with

original: EPA
cc: OFA

stream-bed construction. In cases where interceptor lines must follow stream beds, the affected reaches of the stream should be studied to determine species composition of the aquatic fauna. Such information could serve as baseline data for development of a mitigation plan to offset damages to the fishery resource. The same assessment should be made with stream bank and upland vegetation proposed for removal during construction.

Secondary impacts of the plan presented in the draft statement can be diverse and widespread. We recommend that institutional arrangements which would limit sprawl development be evaluated in more detail. Of special (2.3.1
concern to us is the possible conversion of high-quality wildlife habitat for housing or other developments. Are specific arrangements available and feasible for precluding the possible extension of sewer facilities into such areas? What actions can and will the project sponsor(s) take to zone wetlands and flood plains to preserve the existing resource? Executive Orders 11988 and 11990 concerning protection of wetlands and flood plain management should be cited and proposed compliance measures discussed.

Development must also be limited within the constraints of available water supply. Since the Columbus area receives most of its water from water-supply impoundments, we are concerned that excessive growth would result in additional impoundments on many of the remaining large streams in the area. Since these free-flowing streams provide excellent fish and wildlife resource habitat, we are opposed to any impoundments on these streams. Conservation measures for water should be implemented instead of new water-supply impoundments.

Cultural Resources

In the parts of the statement in which cultural resources are addressed (sec. 2.2.10 and 7.3.4), no clear indication is given that the presence or absence of such resources has influenced the selection of project locations or that the State Historic Preservation Officer (SHPO) has been consulted with respect to the 20 properties on the National Register of Historic Places located within the city and the 78 archeological sites in the area. The document should note whether any of the historic and/or archeological sites identified are within the proposed project boundaries (2.3.2)
and what effect, if any, the proposed projects will have on them.

The final statement should document consultation with the SHPO concerning the need for a professionally conducted cultural resources survey of the affected areas as contemplated by the National Historic Preservation Act of 1966. The Environmental Protection Agency in conjunction with the SHPO should apply the Advisory Council on Historic Preservation Criteria of Effect (36 CFR 800.8) to any known National Register property or any eligible property that may be discovered within any of the proposed project areas. Following this preliminary step, the procedures set forth in 36 CFR 800.4 should be followed and documented.

Recreational Resources

A public park (Hoover Dam Park) lies in Franklin County on the east side of Hoover Reservoir. The report is not clear as to whether Alternative A of the Big Walnut Creek service area would cross these parklands. These lands were acquired in part with monies from the Land and Water Conservation Fund.

About 100 acres of public parklands lie at the southwest corner of Havens Corner and Mann Roads. Land and Water Conservation Fund monies were used to acquire these parklands. Figures III-9 and III-10 are not complete enough to determine the precise relationship between either the proposed Alternative B or Alternative C and these parklands.

On page III-28, paragraph 4, line 13, mention is made that the proposed Rocky Fork interceptor would cross a public park. This park should be identified either by name or location.

On page III-30, paragraph 2, line 4, it is stated that the Blacklick Creek Interceptor would cross a portion of the Blacklick Woods Metropolitan Park, (2.3.3) possibly impacting the 55-acre natural area in this park. Land and Water Conservation Fund monies were also used in the development of these parklands. We would strongly oppose any sewer right-of-way alignment that would impact the natural area in any way. If an alignment can be worked out that will not adversely impact park development or future plans significantly, we would have no serious objection to the sewer interceptor crossing these parklands.

However, no portion of the Blacklick Woods Metropolitan Park or of any other park in which Land and Water Conservation Fund monies have been used for the acquisition and/or development of recreational facilities should be used for other purposes. Such a conversion is in violation of section 6(f) of the Land and Water Conservation Fund Act which states in part:

> No property acquired or developed with assistance under this section shall, without the approval of the Secretary (of the Interior), be converted to other than public outdoor recreation uses. The Secretary shall approve such conversion only if he finds it to be in accord with the then existing comprehensive statewide outdoor recreation plan and only upon such conditions as he deems necessary to assure the substitution of other recreation properties of at least equal fair market value and of reasonably equivalent usefulness and location.

We suggest that you contact the State of Ohio Liaison Officer for the Land and Water Conservation Fund Program, Mr. Robert Teater, Director, Department of Natural Resources, Fountain Square, Building D, Columbus, Ohio 43224, to coordinate and resolve these problems.

Water Resources

The draft statement mentions that large yields of ground water are obtained from limestone aquifers (p. II-11); it should at least in a general manner address the potential for contamination of these aquifers and natural or planned mitigation against effects of alternatives such as land application of effluents and quarry disposal of incinerator ash. (2.3.4) The nature of the quarry considered for incinerator ash disposal (p. IV-30, V-8) should be discussed (type of rock, fissures, or other hydrologically significant data); and possible impacts on ground water should be addressed. The statement should also indicate whether ground water will be monitored in the vicinity of landfill(s) used for sludge disposal (p. VI-1).

Sincerely yours,

David L. Jervis
Regional Environmental Officer

cc: Ohio Department of Natural Resources

2.3 Department of the Interior

2.3.1 Comment: What institutional arrangements are available to ensure the protection and conservation of critical natural resource areas from the impacts of sprawl development trends?

Response: Local governmental jurisdictions have all the authority necessary to plan for and direct overall development patterns through the process of local public decision making. The use and development of land is regulated by the city, county, and township governments. Land use and zoning regulations can be used to protect critical resource areas through the establishment of resource protection districts, ecological preserves, wildlife sanctuaries, and the like. However, these regulatory mechanisms comprise only part of the complex of decisions made by local governments which strongly influence development patterns. The policy decisions made which are related to the provision of public services and capital improvements generally have far greater impact upon new development than zoning or other land use regulations. The cost of servicing newly developing areas is increasingly beyond the fiscal capabilities of municipalities. While municipalities can and have availed themselves of Federal funds for major infrastructure/capital improvements projects (roads, sewage treatment systems, mass transit), the costs associated with maintenance, administration, and service to larger populations over a greater geographic area are frequently exceeding the municipal revenues generated by the growth of the new areas serviced. The dramatic rise in service costs can be attributed to a number of factors including rising fuel costs, increasing wage and salary levels, and increased government regulation at all levels.

Thus, more and more municipalities are recognizing the need to manage growth in terms of development patterns or trends which are consistent with the jurisdiction's fiscal resources and service capabilities. The managed growth concept must be implemented at the local level by the public officials within the decision making process and by the voting public at large. Federal Government policies which foster the protection and conservation of either fiscal or natural resources have only recently been directed to the administration of Federal grant programs such as construction grants. These policies are intended to assist local governments in the difficult effort to balance growing service needs with sound fiscal policy and

yet achieve pollution abatement goals. Thus, in the case of sewage treatment systems, EPA is responsible for ensuring that the expenditure of construction grants dollars will not result in the construction of an overdesigned system which induces sprawl development and imposes unnecessarily greater costs to municipalities over the life of the system.

2.3.2 Comment: The document should identify any likely effects the proposed project would have on any historic or archeological sites located within the project boundaries and indicate appropriate measures to be taken.

Response: See the response to comment 3.2.1 made by the Ohio Historic Preservation Office.

2.3.3 Comment: The public park which the proposed Rocky Fork interceptor would cross should be identified by name or location and whether Federal Land and Water Conservation Fund Act monies were used in acquiring or developing the park.

Response: The park issue has been analyzed in great deatil and the results are discussed in Volume I in the section on Interceptors.

2.3.4 Comment: The possible impacts from land application of effluent and quarry disposal of incinerator ash should be discussed.

Response: A discussion of these impacts has been included in Volume I.

2.4 Department of Transportation

2.4

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
REGION 5
18209 DIXIE HIGHWAY
HOMEWOOD, ILLINOIS 60430

March 28, 1978

IN REPLY REFER TO
HED-05

Mr. Gene Wojcik
Chief, EIS Preparation Section
Planning Branch
U.S. Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Wojcik:

The draft environmental statement for the wastewater treatment facilities for the Metropolitan Area, Columbus, Ohio, has been reviewed. Our review discloses that the document is weak or lacking in several areas of impact and mitigation discussions. Specific comments are as follow:

1. All alternates for sewer line locations involve highways extensively. The associated discussions indicate this is a minor to no impact. There is no discussion on how traffic will be maintained or what provisions will be made to provide safety. It has been our experience that sometimes sewer construction does not provide adequate protection for the traveling public. (2.4.1)

2. Page VII - 24, paragraph 3 discusses the impact on transportation facilities. This statement is not consistent with the information developed in the Mid-Ohio Transportation Plan. Many of the existing roads, particularly arterials, are operating at capacity loads. Any growth, whether fill in, increase in density, or new area growth, will increase the demand for transportation facilities. This discussion should be expanded and corrected. (2.4.2)

3. Various alternatives require the use of extensive lengths of highway rights-of-way. Some of this right-of-way has access control. No mention is made of this fact or the relationship of this important feature to the proposed facilities. (2.4.3)

   Also the report indicates the only effect on highways will be short term. This is not correct. The sewer facilities will require maintenance and possible replacement in case of failure. This could disrupt traffic at some future date. Also there may be an intent to place manholes within the highway facilities. These would have to be reconstructed to grade at later dates when the highway was resurfaced. These possibilities should be discussed.

4. Construction of the sewer lines will leave large areas of disturbed soil. There is no indication in the report of effective erosion control measures being employed to mitigate this problem. (2.4.4)

5. In general, we find a lack of documentation of early coordination with other Federal and State agencies.

Sincerely yours,

Donald E. Trull
Regional Administrator

W G Emrich

By:
W. G. Emrich, Director
Office of Environment and Design

2.4 Department of Transportation

2.4.1 Comment: There is no discussion on how traffic will be maintained or what provisions will be made to provide safety.

Response: The impacts of facilities construction, operation, and maintenance upon traffic maintenance and public safety have been incorporated in Chapter VI-6.1 and Chapter VIII-8.1.1 in Volume III of the EIS.

2.4.2 Comment: The discussion regarding existing road capacities should be expanded and corrected.

Response: The discussion is deemed adequate for an evaluation of sewage collection alternatives.

2.4.3 Comment: No mention is made of how rights-of-way with controlled access will be used for installation of sewers.

Response: Until design of interceptors are completed, details as to location with respect to the highway are not known. It is presumed, however, that the route of the interceptor will be located off the paved areas and beyond the ditch lines. Safety and traffic control are considered to be paramount, and the designer as well as the contractor should notify and abide by the decisions of local, state, and federal agencies involved in construction along highway rights-of-way.

2.4.4 Comment: There is no mention of effective erosion control measures being employed to mitigate erosion during construction.

Response: Appropriate measures should be taken to reduce adverse impacts during construction. Dust can be controlled during construction by water sprays from water trucks and from wheel wash hoses at the truck entrances and exits. Mud and grime on truck wheels can be removed at wheel washes at all truck exits to prevent the spread of these materials to the bordering streets. Construction vehicles should be discouraged from using residential neighborhood streets. Erosion from stormwater can be controlled on major construction sites by straw bales and planting of grass where necessary.

Erosion control plans and practices can be written into construction contract specifications so that little or no adverse impact from solids-laden storm runoff on the surrounding community occurs. Chemical contamination of storm runoff during construction can be reduced if:

- No chemical compound such as calcium chloride is used in controlling dust or in melting ice and snow; instead sand and gravel is used for ice and snow melting
- Chemicals and volatile fuels are stored in areas protected by vehicle barriers and safety devices to minimize chances for spillage.

III. COMMENTS FROM STATE AGENCIES

3.1 Ohio Environmental Protection Agency

3.1

Re: Draft EIS - Wastewater Treatment Facilities for the Metropolitan Area of Columbus Ohio - USEPA

April 24, 1978

Mr. Gene Wojcik
EIS Preparation Unit
Planning Section
USEPA Region V
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Wojcik:

The OEPA, acting as lead agency and review coordinator on Federal Environmental Impact Statements, has solicited comments on the adequacy of the above referenced Draft EIS. Comments were received from Offices in this Agency, the Ohio Department of Natural Resources, and the Ohio Department of Transportation.

General:

On the whole, the Draft EIS was found lacking in that many of the conclusions reached appeared to have little background in known fact, relying more on anticipated occurences. Because of these suppositions, much of the document created more questions than it answered. This, in connection with data errors, has produced a document which would appear to have little use in planning for the Columbus Metro area, except to provide a sounding board (as it no doubt will) for further controversy in the Columbus facilities planning activities.

Specific Comments

(3.1.1)

Executive Summary

Page 1. The statement is made that "The subject action of this Environmental Impact Statement is the approval of the Facilities Plans for the City of Columbus...". The EIS was required to analyze specific areas of concern, not to approve the facilities plan. Neither the facilities plan nor the EIS satisfactorily addresses the concerns of an April 20, 1977 letter to Mr. Robert C. Parkinson expressing what the USEPA and the OEPA saw as deficiencies in the facilities plan.

Page 3-II-A. The statement is made that "The proposed improvements will eliminate the discharge of untreated or inadequately treated sewage in most of Franklin County", However, the proposed improvements do not adequately address the eleven (plus) county operated plants, four (plus) public utility plants, and approximately 200 privately operated package plants.

Page 3-II-A-(1). The Ohio EPA disagrees with the first paragraph, which can be misleading as to the possible reasons for chlorination-dechlorination.

(3.1.2)

In subsequent chapters, reference is made to break-point chlorination to reduce ammonia to zero. If, in fact, ammonia is that critical, it has been the USEPA's position to require chlorination all year thus necessitating chlorination-dechlorination all year. Furthermore, even with the proposed improvements there will be a considerable amount of enrichment of the river caused by non-point and storm sewer discharges.

Page 4-Item II-A-(3). Refer to the statement, "The atmospheric modeling study performed by the OEPA to determine the impact on the ambient concentration of particulate matter from existing and proposed incinerators at Jackson Pike and Southerly is inconclusive".

Any problems with the OEPA study were due to the fact that USEPA requirements were not spelled out at the time OEPA was requested to do the report. The existing Southerly and Jackson Pike sources had an effective PTI prior to March 1, 1978 and should not be subject to P.S.D. requirements. No PTI application has been received for the proposed incinerators at Jackson Pike or Southerly and these would be subject to P.S.D. requirements. Regarding the Inter Office Memo of February 5, 1978 between Mr. Duprey and Mr. Sutfin, we can only state OEPA does not have the money nor manpower to do the complete work outlined. Please refer to Mr. Orlemann's letter of March 27, 1978 to Mr. Sutfin for further clarification. (3.1.4)

Page10-Item III-A. Service only to New Albany would affect the planning being done by New Albany since a local effort is being initiated to incorporate Plain Township into the New Albany planning activities.

Page 10-Item III-A. Suggested service to some portions of Delaware County contradicts the Delaware County EIS which stated that the remainder of the Scioto Basin in Delaware County would be determined through additional facilities planning by Delaware County, not through the Columbus EIS. (3.1.3)

Page 11-Item III-B. The analysis which supports the conclusion that the ultimate population concept is not cost effective for the Columbus area, is not complete. The EIS does not consider the environmental or economic impacts of parallel sewers, or building the recommended sewers 15, 20, or 25 years from now. (3.1.5)

Chapter I

Page I-2. The statement was made that the City and County were co-applicants is incorrect. Being one of the early grants, the City was the sole applicant for the facilities planning grant. (3.1.6)

Page I-6. The average daily flows indicated are not representative of the actual daily flows. Each plant is being flow controlled to maintain the integrity of the treatment process and to ensure that the NPDES permits are not violated. A more realistic average daily flow would be 87 MGD at Jackson Pike and 50 MGD at Southerly as opposed to the EIS flows of 72 MGD and 46 MGD respectively. (3.1.7)

Page I-7. The NPDES permits issued to the City of Columbus do not reflect the stringent levels required to meet Water Quality Standards. The OEPA recognizes that the permit levels will still result in water quality violations for 13 miles downstream of the outfalls. This information is available in the Scioto WLAR, Volume I June, 1974. (3.1.8)

Chapter II

Page II-11. Reference has been made to "several fish kills". The only two reported fish kills in the last four years occurred in the Olentangy River due to a factory explosion in the City of Delaware and in the Scioto River because Jackson Pike was by-passing during a union strike. From time to time there have been shad kills in the Big Walnut due to temperature changes and non-point runoff after rains. (3.1.9)

Page II-12-Item 1. There is a discussion of the condition of Blacklick Creek. The statement is made that "A variety of poorly or partially treated domestic wastewater releases above this sampling point is no doubt the major cause of the degraded conditions evidenced". *This statement is definitely true. Upstream is the City of* Reynoldsburg plant which is trying to stay in operation until it can be phased out. By-passing is occuring daily. Immediately upstream of the sample point (which has been discontinued) is the 1.0 mgd Blacklick Estates Sewage Treatment Plant. This is a public utility operation that produces a very poor effluent but the service proposal in the EIS does not include this pollution source. (3.1.10)

Page II-14-Item 4. There is a discussion of the condition of the Olentangy River at Goodale Street which needs clarification. At the time the sampling was done, the 24 inch "old main sewer" was completely blocked (plugged by grease) causing a continuous overflow to the river. The magnitude of the overflow was between 1 mgd and 5 mgd. The condition has since been relieved by the installation of a temporary pump station which intercepts flow and force mains it to the OSIS. (3.1.11)

Page II-42. There is a discussion of the inadequacy of the Columbus Water Supply. The City has the ability and the resources to develop adequate water supplies for Franklin and portions of adjoining counties. The OEPA, Office of Public Water Supply, is working closely with the City in developing adequate water supplies.

Page II-47. Under "Agricultural Land" there is a tendency to equate all vacant (non-residential) land as "prime and unique agricultural lands". The EIS should address how much land is active farm land and how much land is just vacant land. Also an attempt should be made to determine how much land is held by "farmers" as opposed to being held by holding companies, developers, etc. and only temporarily leased back to farmers. (3.1.12)

Page II-50-Item (2) "Scioto West". The EIS should explain that the Scioto West Interceptor would also relieve the flow constraints imposed on the Scioto East Interceptor. (3.1.13)

Page II-50-Item (2) "Big Walnut". The EIS should explain that the Big Walnut Interceptor would also relieve the existing pollution load into Hoover Reservoir. The EIS should note that the Sunbury-Galena Facilities Plan must address the possiblity of interconnection with the City of Columbus via this interceptor as opposed to building a treatment plant and discharging directly to Hoover Reservoir. (3.1.14)

Page II-54, first paragraph. The statement is made that excess sewer capacity exists within the City; however, when one considers the basis under which the sewers were designed, then the sewers have the capacity for the intended purpose. Until such time as the design (ultimate) population is realized, the sewers will (technically) have excess capacity.

Page II-54. Reference is made to the Nelson Road Water Plant. The EIS should indicate that this plant has been deactivated. (3.1.15)

Pages II-55 and II-56, Tables II-23. These do not reflect the current situation. The federally approved user charge for sewer rates was placed in effect January 2, 1978. Water surcharge rates remain in effect. The Urbancrest surcharge rates do not appear to be correct. It is our understanding that the Village of Urbancrest pays a surcharge to Grove City which in turn pays a surcharge to the City of Columbus .... in other words, Urbancrest pays a double surcharge. The EIS should be corrected. (3.1.16)

Figure II-6, inserted between Pages II-56 and II-57. This figure is not correct in the Dublin area and should be revised. USEPA should contact the City of Columbus for an updated map. (3.1.17)

Page II-57. Reference is made regarding the total availability of water. Since OEPA has monitoring jurisdiction over water supplies in the State, it has factual data as to the safe yield for the City of Columbus, the city's ability to construct additional capacity and the city's long term water needs. The innaccuracies in the EIS data should be corrected by contacting OEPA, Office of Public Water Supply for further information. (3.1.18)

Page II-57 Sewer Facilities. The statement is made that the City's sewers deliver an average of 155 mgd of sewerage which is not consistent with statements on Page I-6. In fact, the statement leads the reader to believe that the City is bypassing on a daily basis. A more valid average sewage delivery figure would be 136 mgd with the combined average capacity of the OSIS of 161 mgd. At times the system is surcharged due to insufficient capacity. (3.1.19)

Chapter III

Page III-1-Section 3.1.2. Neither the facilities plan nor the EIS provides adequate delineation of the individual service areas for the proposed sewer alternatives. In order to provide a coordinated planning effort for waste treatment improvements for Central Ohio, it is necessary that the selected plan identify the areas to be served by the projects for each area. (3.1.20)

Page III-1, Section 3.1.2. Reference is made to the force main crossing Griggs Reservoir at State Route 161. The force main actually crosses at Martin Road a considerable distance south of State Route 161. (3.1.21)

Page III-2. The EIS has incorrectly stated the number of combined overflow points. There are at least three major overflow points on the Southerly System and 30 major overflow points on the Jackson Pike System. There are some 80 to 90 additional overflow points on both systems. This information can be obtained from OEPA files. (3.1.22)

Page III-3-Item 3.1.3-(3) Darby Creek. Neither the EIS nor the facilities plan addresses the gross pollution problem that exists at the Village of Orient, or the fact that a large sewage treatment plant exists at Orient State Institute which is in the planning area. Federal funds have been with held from Orient awaiting determination of Orient's problem via the Columbus facilities plan and/or the Columbus EIS. (3.1.23)

Page III-6-Section 3.1.3-(9) Blacklick Creek. The EIS misrepresents the situation at the City of Reynoldsburg. The plant is overloaded and is bypassing daily. This plant was scheduled to be phased out by 1976. Consequently maintenance has been minimized, parts inventory depleted, and personnel phased out. If the proposed solution is to be implemented then immediate and extensive upgrading of the plant, staff and parts inventory must be undertaken to prevent a major health crisis. The EIS should address this potential investment and expenditure. Had the City of Columbus been allowed to build at least that portion of the Blacklick Interceptor to the Reynoldsburg Plant then this situation would not exist.

Consideration should be given to the fact that design drawings for the Blacklick Interceptor are complete. With modifications to the original alignment (as recommended in the comment concerning page III-30 below) the Reynoldsburg Plant could be phased out in the near future rather than in the 3-5 years that would be required to design and construct a pump station and force main.

This section should also address the possibilities of regionalization by eliminating package treatment plants and providing sewer service to subdivisions from the Fairfield County Area (representing 1.7 mgd). (3.1.24)

Page III-6-Section 3.1.3-(10) Groveport. The EIS misrepresents the situation. The Franklin County Commissioners bonded, built and operate the plant for the Village of Groveport. The plant and sewer system will be turned over to the Village when the bonds are retired in the near future. (3.1.25

Page III-8. The EIS does not present an accurate statement relative to the Scioto East Interceptor. The force main is not at State Route 161, but at Martin Road. The Village of Dublin's service contract with the City of Columbus limits flow to 29 cfs from the Dublin Area. Once this capacity is reached, development will be stymied until the Scioto West Interceptor is built. (see comment concerning Page III-1) (3.1.26)

Page III-9. The EIS does not utilize correct operation and maintenance costs, particularly as they relate to the treatment plants. The figures indicate only those costs necessary to keep the plants minimally operational and are therefore excessively low. This situation is due to civil service problems, union problems, and budget constraints. (3.1.27)

On this same page, why does EIS assume the life of the Columbus Plants at 35 years when in all other facilities plans the life of sewage treatment plants is 20 years?

On this same page, OEPA does not generally agree with the conclusion in the EIS that water pollution problems should be allowed to be created (as in the New Albany Area) before federal funds can be used to protect water quality. This does not reflect the best environmental concerns, nor does it seem to reflect the spirit of Public Law 92-500 or 95-217. (3.1.28)

Page III-14. The Columbus EIS information is inconsistent with regard to the Upper Scioto Basin and the Delaware County EIS. The Delaware County EIS indicates the remainder of the Scioto Basin (Excluding Dublin and Shawnee Hills) would be determined by additional facilities planning to be performed by Delaware County. Again, conflicting conclusions between the Columbus EIS and Delaware County EIS should be eliminated. (see comment concerning Page 10) (3.1.29)

Also, on this same page, the EIS proposes a pump station and force main alternate to that of extending the Scioto West Interceptor north from Manhole Number 3. The EIS does not include a cost effective analysis (only an economic analysis) or an environmental assessment of a permanent pump station and force main across Griggs Reservoir. Since the present pump station and force main is near Manhole Number 2, even the economic analysis is not valid. (3.1.30)

Page III-15-Section 3.2.3 Big Run. The EIS does not address the Lake Darby Estates Subdivision and its current 0.377 MGD plant which is proposed to go to 1.0 MGD in the immediate future. (3.1.31)

Page III-17-Section 3.2.4 Minerva Park. The Alum Creek Interceptor is east of the Minerva Park plant, not west. (3.1.32)

Page III-30-(3) Blacklick Creek. The EIS does not consider all the facts regarding the Blacklick Creek proposals. The Metropolitan Park District is aware of the sewer alignment. The Board would like to see this reach of Blacklick Creek cleaned up immediately. There have been some temporary plants approved pending the construction of the Blacklick Creek Interceptor with minimum requirements imposed since they were going to be phased out in the immediate future. Again the proposal does not consider the potential added benefits of regionalization by elminating seven Fairfield County Plants, nor the ongoing Canal Winchester facilities planning effort.

In the other alternatives explored it should be noted in the EIS that Blacklick Woods Metropolitan Park contains a fifty-five acre woodland which has been designated as a State Nature Preserve. Any routing of an interceptor which would adversely affect this natural area would be unacceptable to the Ohio Department of Natural Resources.

Furthermore, it should be noted that Blacklick Woods Metropolitan Park has been developed under two separate projects with assistance from the federal Land and Water Conservation Fund. Alignment of the interceptor through the park will result in a Section 6(f) conflict. According to that section of the Land and Water Conservation Fund Act: "Property acquired or developed with assistance from the Fund shall be retained and used for public outdoor recreation. Any property so acquired or developed shall not be partly or wholly converted to other than public outdoor recreation . . . "

The short term effects of interceptor construction are certainly outweighed by the improved water quality in Blacklick Creek which will result from the elimination of the Reynoldsburg sewage treatment plant and several smaller facilities. This stream, currently under stress from sewage discharges, is expected to recover and support a high quality fishery. It is important to know whether or not additional disruptions to parklands will result from the construction of future connecting sewer lines and this information should be included in the EIS.

The expected number of additional stream corssings and future easements across parklands or wildlife habitat along Blacklick Creek and the other affected streams to serve future service areas should be addressed in the EIS.

Alternative D has not been properly analyized. No cost effective analysis or environmental assessment has been done. Construction can not be completed in 21 months (1980). Surveying needs to be done, detail drawings prepared, and (most likely) easements obtained. U.S. 40 is the main street of Reynoldsburg and is totally commercialized. There is no room in the right of way for a force main, thus it would have to be laid in the street or the side walk. Since the entire community would be served by this one pump station, complete duplicate facilities would have to be installed along with standby power. This proposed solution is based on poor sanitary engineering practices.

USEPA would be advised that when investigating interceptor routes for the Blacklick Interceptor, adverse impacts on the Blacklick Woods State Nature Preserve should be avoided. All alternatives so far noted would significantly impact this area, and require extensive mitigation measures. (3.1.33)

Page III-32-Item (5). The summary is unacceptable to OEPA. The USEPA proposals for Big Walnut, Rocky Fork, and Blacklick Creek appear very inadequate. As stated earlier, no cost effective analyses or environmental assessments were done for the proposed alternatives. The previous comments regarding Hoover Reservoir, Reynoldsburg and Fairfield County were not considered. Growth in this area has been temporarily stymied by the lack of sewers and the reluctance of the County Commissioners and OEPA to approve package plants for developers who hold large tracts of land. Once it becomes obvious that sanitary sewers will not be forthcoming, then the developers will press for approval of package plants. (3.1.34)

Page III-36-Item 3.2.6 Groveport. The EIS is incorrect with regard to the Groveport situation. The "Village" of Groveport Plant does have an NPDES permit. The number is G916*AD. It is in the name of the County Commissioners for reasons stated earlier (see comment concerning Page III-6). An application for a grant to do SSES is in the Agency under review. The Village has requested the proposed interceptors based upon development pressures they are experiencing. (3.1.35)

Page III-39. As well as elsewhere in the EIS, the repetitious statement of "should be constructed by 1980" is ridiculous. It will be late 1978 before a portion of the EIS will be finalized. Assuming everyone capitulated to the EIS (which is unlikely) it would be early 1979 before grant application review could commence and late 1979 before USEPA could approve a grant for detail engineering to commence. Construction, at the earliest would be middle to late 1981 or early 1982. (This would be eight years from the commencement of facilities planning for City of Columbus). (3.1.36)

Also on this page, the operation and maintenance cost for the Groveport plant cannot be assigned a value based upon the City of Columbus operation and maintenance data. The same concern is true for any small entity and is not a valid sanitary engineering principle. (3.1.37)

Chapter IV

Page IV-3 Brewery Waste Pretreatment Alternatives. The EIS should present additional information on the potential environmental effects of the four brewery waste pretreatment alternatives. Besides the short term primary impacts and long term primary impacts of plant location, the secondary impacts of plant location and processes should be presented. A site at the brewery should be selected in order that these impacts can be given an appropriate technical relationship. (3.1.38)

Page IV-7-Item 4.1.4. The conclusions appear to be based upon erroneous data that appears in Table IV-2. The Table indicates under Scenario 1, that the treatment costs of both 100,000 lb/day, and 60,000 lb/day are equal. Either one is high or the other is low. The conclusions should be based upon Table IV-2 after it is corrected. A corrected table should then also be placed in the Executive Summary. (3.1.39)

Page IV-13-Item 4.2.2.-(1) Drinking Water Reuse. The EIS should compare future water demand and safe yield data presented against earlier statements on Page II-57. (3.1.40)

Page IV-19-Item 4.2.4 Conclusions. Here (as well as elsewhere in the EIS) it should be noted that the bond issue for the power plant has passed. (3.1.41)

Page IV-27-Item (2). The EIS should acknowledge that the Nelson Road Plant has been deactivated. (3.1.42)

Page IV-30. The EIS should acknowledge that future calcination is a possibility. (3.1.43)

Page IV-30, IV-35, IV-61 and probably elsewhere. The idea of disposing sewage sludge and/or codisposal of incinerator ash into a quarry is mentioned. Ohio Solid Waste Disposal Regulations prohibit the use of quarries and gravel pits for solid waste disposal. Sewage sludge and incinerator ash would definitely be classified solid waste by OEPA (also by RCRA definition). Without going into a lot of detail, the quarry is considered to be in direct contact with groundwater, and this Agency would not recommend approval of the use of a quarry for waste disposal purposes. (3.1.44)

Page IV-31. Mention is made of disposing incinerator ash at a site adjacent to the power plant, i.e., Jackson Pike landfill (which is closed). That site should not be given high consideration for any further solid waste disposal. OEPA has not approved any such concept and under present conditions, could not. (3.1.45)

Page IV-35-(4). The EIS again ignores the environmental concerns of putting incinerator ash in the quarry. The life of the quarry for water plant sludge is only 20 years, not 60 years as stated on Page IV-30. (3.1.46) (3.1.47)

Page IV-50-Table IV-15. We assume there is considerable amount of backup data available to support Table IV-15. A considerable number of questions must be asked.

1. How many trucks is a fleet?
2. What is the size and type of the trucks?
3. What is the travel time involved?
4. What union requirements were considered?
5. What wage scale, fringe benefits were considered?
6. What secondary roads would they be permitted to use?
7. Where would the trucks be kept?
8. Where would they be maintained?
9. Who would maintain them?
10. What energy considerations were made?
11. Was an Environmental Assessment done? (3.1.48)

Page IV-51. The beginning of the first paragraph is missing, making it impossible to evaluate the meaning of the first four lines. (3.1.49)

Page IV-52. USEPA obviously has not discussed land application with the local Farm Bureau. Had they done so, the statements under 4.3.5(2) would have been quite different. Farmers are more inclined to require the City to spread the sludge so they do not have to invest in equipment. They also believe they are doing a favor or providing a service to the City, consequently they (the farmer) should be paid to accept the sludge, not the other way around. (3.1.50)

Pages IV-54, IV-55, and IV-56. Landfill disposal of sludge is discussed. Landfilling sludge is not given high potential and OEPA would agree. Special sites, plans, and specialized operations are required, and it is a waste of an excellent resource and landfill space. The two landfills specifically mentioned, City of London, and Richwood, do not have approval to take sludge. The comment that they are "able" to take sludge is false. Plan approval and PTI processes would need be undertaken. (3.1.51)

Page IV-62. A program for reclamation of barren strip mines is outlined. No mention is made as to how or where the funding should be provided to start a program immediately. Can USEPA provide funding for such a demonstration program? (3.1.52)

Again, hauling sludge to individual farmland to be spread by the owner is full of problems. Who is responsible for the actions or inactions of the farmer? Who will be charged with monitoring the farmer's operation to assure that ground water and stream pollution do not occur? Does USEPA have the manpower or available funding for such a program?

Page IV-63-Item 4.4. This presents a very serious problem to the OEPA. USEPA appears to have used the EIS to expound or produce a "value engineering" document. Not only that, but it goes on to recommend "brand X". The statement is made "This mention is not to be construed as an endorsement of or a recommendation for a particular manufacturer's products;" however, when no "or equal" exists in the market place what else can one do except buy "brand X"? (3.1.53)

Page IV-65-Item 4.4.3 Oxygen Production and Dissolution. OEPA does not disagree with the fact that the present sock system at the Columbus plants severely effect plant operations, as well as being "maintenance-intensive"; however, a more in depth analysis must be performed. Opting for a quick solution that has not been properly field tested (with annual data) is not the answer. Unless of course USEPA is willing to pick up 100% of the costs. (3.1.54)

Page IV 73. The EIS discusses using the interconnector for storing excess flow and using the interconnector to dampen peak flows to Southerly. On paper this sounds feasible, but it introduces a number of maintenance problems. (3.1.55)

Page IV-74. The EIS discusses the brewery's discharge to be staged to conform to the reverse image of the normal domestic pattern of wastewater generation. This being the case, then 6 p.m. to 6 a.m. is not correct. Travel time from the brewery is 22 to 24 hours. (3.1.56)

Page IV-80. The EIS design loads to Jackson Pike and Southerly do not include recycle flows. There is also no mention of what happens to filter backwash. At the current time, the OEPA only permits one manufacturer to design at a maximum of 5 gpd/S.F. Requiring the City of Columbus to design to this figure is specifying a particular equipment manufacturer and eliminating competitive bidding. (3.1.57)

Chapter V

Page V-2-Item 5.2.3. The EIS states that "Immediate standby facilities for sludge disposal can be provided by landfilling". The EIS fails to take into account the City's inability to develop and/or utilize an acceptable landfill site. (3.1.58)

Page V-4, Table V-1. As an immediate short term goal, the EIS states, "Realize total hydraulic capacity of Jackson Pike and Southerly for wastewater treatment before expanding either facility or incorporating flow equalization concepts". The EIS fails to consider the internal constraints at Jackson Pike or Southerly as well as the original peaking factors used for both facilities. (3.1.59)

Page V-6. The EIS discusses the reclamation of strip mine land again, but does not propose a means for funding the project. If the City is to fund it, then it must be worked into the Capital Improvement Program/Budget. This would take at least a year or more. (3.1.60)

Page V-8. The EIS again discusses placing incinerator ash in the quarry. As stated earlier this is prohibited by Ohio Solid Waste Disposal Regulations.

Page V-13. The EIS recommends building a bypass around the trickling filter so that savings can result when complete nitrification is not a treatment requirement. Apparently the EIS author did not review this proposal with permit section staff. USEPA, Permit Section, has required that OEPA insist on year round nitrification at Columbus. If Appendix B of this EIS is to be followed, then again the bypass is a waste of money. (3.1.61)

Page V-14-(4)-Final Effluent Filtration. The EIS assumes the City will install the effluent filtration system of one particular manufacturer. (3.1.62)

Page V-26. The EIS "glosses over" the operation and maintenance staff at the two plants. This is a very serious and time consuming problem which appears to be getting worse not better. The realities of the employee situation should be considered at this point. (3.1.63)

Also on this page, the EIS should address what happens next, should the pretreatment of the brewery waste not solve the bulking or operational problems at Southerly. (3.1.64)

Also on this page, the OEPA feels a need for pilot testing the treatment process particularly if anything other than normal design standards are going to be insisted upon. (3.1.65)

On Page V-27. The EIS is again asking the City to consider equipment available from only one manufacturer. (3.1.66)

Chapter VII

Page VII-3. The EIS draws false conclusions with regard to the area's economy being held in check by inadequate water supplies as an independant control factor. (3.1.67)

Page VII-11, Table VII-1. This table does not represent the proper design flow used in Ohio or the current cost for treatment. The OEPA requires a flow value of 400 gallons per home. Day to day experience indicates that the costs are higher than the table indicates. The EIS should acknowledge that Ohio does not operate under South Carolina policies, guidelines, and procedures. (3.1.68)

Page VII-13. It is the opinion of the OEPA that sufficient development pressures exist in the Blacklick Creek and adjoining Fairfield County areas to require service either in the form of connection to Columbus or package treatment facilities. (3.1.69)

Page VII-15. The OEPA questions whether USEPA has supplied adequate information to support the conclusion that it is unlikely that the influx of business and and industry will be sufficient to fill currently vacant commercial space. As an example, 1977 and 1978 commercial space figures would be more appropriate in establishing "trend concepts". (3.1.70)

Page VII-17-(1) Manmade Environment. OEPA agrees that some demand may be placed on the City of Columbus where the already serviced, developable areas are located. However, a review of OEPA's files and those of Mid-Ohio Regional Planning Commission will show that an even greater demand exists where services are not located. (3.1.71)

Page VII-21-(4) Rocky Fork. The EIS neglects the effect of Plain Township being incorporated into New Albany. (see comment concerning Page 10) (3.1.72)

Page VII-21-(5) Blacklick. The EIS conclusion is unacceptable for reasons stated earlier. (see comments concerning Pages III-6, III-30, and III-32)

Page VII-22. The EIS fails to distinguish between farm land, vacant land, and prime developer land. Again an attempt should also be made to determine whether land is owned individually or being held by large corporations or holding companies for speculative development purposes. (see comment conerning Page II-47)

Page VII-29-(2) Surface Water Quality. The EIS should indicate that the City of Reynoldsburg plant is continuously bypassing and has an adverse effect on the Blacklick Creek. Chapter III does not offer the City of Reynoldsburg the immediate solution proposed in the facilities plan. (3.1.73)

Page VII-30 7.5 Secondary Impacts of the EIS Plan. The conclusions are not totally acceptable. Specifically, as part of the Southerly Service Area; the Blacklick, Rocky Fork and Big Walnut Creek sub-areas are unacceptable. In the Jackson Pike Service Area; the Delaware County area is premature. (3.1.74)

Chapter VIII

Pages VIII-1 and VIII-2. The discussion of mitigative measures for adverse primary impacts should address sewer construction as well as treatment plant construction. This becomes of major importance in the Blacklick/Reynoldsburg area if any of the alternatives are selected.

Included in this discussion should be the identification of the following issues raised by the Ohio Department of Transportation (ODOT).

1. There should be a discussion of traffic diversion during construction of the various interceptors.

2. On implementation of the various Wastewater Treatment Plans in the Draft by EIS, further coordination should be conducted with ODOT's District 6 office regarding the following:

West Scioto

Alternate No. 1
- a. FRA-(project) Hayden Run Road
- b. FRA-(project) 33-6.14

Alternate No. 2
- a. FRA-(project) Hayden Run Road
- b. FRA-(project) Fishinger Road (County Rd. 52)
- c. FRA-(project) 33-6.14

Big Run

Alternate No. 1
- a. FRA-(project) Broad Street Bikeway

Big Walnut Creek, et. al.

Alternate A-
- a. FRA-(project) County Road 20
- b. FRA-(project) 161-16.83
- c. FRA-(project) Township Road 195

Alternate B-
- a. FRA-(project) 161-16.83
- b. FRA-(project) Township 195

Alternate C-
- a. FRA-(project) County Road 20
- b. FRA-(project) 161-16.83
- c. FRA-(project) Township 195

Alternate D-
a. FRA-(project) 161-16.83
b. FRA-(project) 161-16.37

Alternate Sub B-
a. FRA-(project) TR195
b. FRA-(project) 161-16.37 (3.1.75)

Appendix A

Page A-3-Item A.1.3 Major Interceptors. The Southerly Plant receives flow via the interconnector. The flows originate from Grove City and Urbancrest and amounts to some 2.75 to 3.0 mgd. (3.1.76)

Page A-16-Item 16. The EIS states that "all thermally conditioned and filtered slude is landfilled". This is not true. Ohio EPA is not aware of, nor have they approved, the landfilling of thermally conditioned and filtered sludge. (3.1.77)

Page A-17-Item 17. The EIS implies that the Jackson Pike incinerators have scrubbers. This is not true. Scrubbers are currently under construction. (3.1.78)

Page A-18, A.3.2 Southerly. The EIS states that no further expansion of the solids handling and incineration system was thought to be necessary. This could not be further from the truth. Since at least 1974, the City has been attempting to expand the solids handling and incineration facilities. They have been repeatedly held up by USEPA. (3.1.79)

Page A-23-Item 16. The EIS should indicate that the Dewatering Complex is "maintenance intensive". It is rare that more than two units are ever working and are almost beyond repair. (3.1.80)

This same page Item 17. The EIS should explain that the incinerators break down due to the inability of the City to perform maintenance. The City cannot afford to take one off line without causing solids problems in-plant. The sludge which was lagooned at the plant site was not digested sludge. It was raw sludge limed to a pH of 12 before lagooning. The lagoons were subsequently flooded with water to suppress odors. Other methods were also tried to suppress odors. (3.1.81)

Page A-26, and A-29. The cost figures do not reflect proper operation and maintenance for the reasons stated earlier. (see comment concerning page III-9) (3.1.82)

Appendix B

Page B-11. The report incorrectly assumes the flows as measured by the Columbus gage on the Scioto River is indicative of flows upstream from the Jackson Pike Wastewater Treatment facility. While it is true the gage is located approximately 300 to 500 feet upstream of the discharge point of the Jackson Pike facilities, it is incorrect to assume the gage does not include the discharged flow. In fact under the remarks accompanying the U.S.G.S. gaged records you will find the following comments: (Page 290: Water Resource Data for Ohio - Water Year 1976 Vol. 1 Ohio River Basin) - "Records include the return flow of the Frank Road Sewage Treatment Plant". Thus the computed Q_7 - 10 flow of 127 cfs is made up of the

sewage flow plus the river flow upstream of the plant. If one estimated the minimum weekly sewage flow to be 65 mgd or 100 cfs the upstream flow would be approximately 22 cfs or close to the value of 18.2 used in the agency's 303 wasteload allocation report.

Further evidence of this fact may be seen from the following U.S.G.S. records.

YEARS IN WHICH THE MINIMUM WEEKLY FLOW AT COLUMBUS APPROACH 122 cfs AND RELATED FLOWS IN THE OLENTANGY RIVER

Year	Scioto River @ Columbus Q_7 CFS	Olentangy River @ Worthington Q_7	Difference
1970	126	13	113
1968	125	12	113
1967	133	14	119
1962	129	13	116
1959	131	12	119
1956	124	30	94
Mean	127.5	13	Mean 114.5 cfs

From the above it will be noted that the differences in flow between the two gauging stations has a mean of 114.5 cfs and is indicative of the minimum weekly sewage flow from the Jackson Pike Plant. In addition, the upstream flow of the Scioto River is only slightly greater than the mean of 13 cfs measured at the Worthington gauge on the Olentangy River.

During the drought period of 1953-55, the difference in monthly mean flows between the Circleville and Columbus gauges varied from 40 to 71 cfs with a mean of 53 cfs. Even if there was no runoff from the incremental drainage area of nearly 1600 square miles (which is highly unlikely) the difference in flow hardly accounts for the discharge from the Jackson Pike Plant. (3.1.83)

Page B-12. Comments similar to the above may be made concerning winter flows of 222 cfs used for modeling winter low stream flow conditions. (3.1.84)

This matter was the subject of an intensive study in 1961 by George Newell (now with City of Columbus) and Mr. George Garrett of Ohio EPA in cooperation with the U.S.G.S. It should be recognized that the assumed summer and winter low flows contain a serious error and thus weaken the presentation of the model's results.

Page B-18. The model runs illustrated in figures B-3 and B-4 and presented in tables B-2 and B-3 assume the river is a free flowing stream immediately downstream of the Jackson Pike facility. Although this is a common assumption it is inappropriate for this stretch of the river particularly with the completion of the chanelization program in the early 1960s. Immediately downstream of Jackson Pike facilities, the river narrows sharply and makes a sharp turn to the east on the first leg of an oxbow bend in the river. As a result of these extreme directional changes and other physical characteristics of the river, stream flows through the oxbow bend are restricted and the discharge from the Jackson Pike facilities is

forced across the stream where it in turn flows upstream along the eastern bank to the vicinity of Frank Road. This pool-like condition signficantly alters the time of travel calculations and thus the location of the oxygen sag point. This in turn modifies the impact of the Jackson Pike discharge on discharges from the Southerly Plant downward. (3.1.85)

Pages B-19 and B-21. The allocated loads presented in Table B-4 for the Jackson Pike facilities and in Table B-5 for the Southerly facilities represent treatment levels greater than that currently considered as "best available technology currently available". Furthermore, there is a serious question as to the reaction rates for effluents of this high a quality. In view of the foregoing, it appears that a policy decision must be made as to the maximum treatment that may be required of municipalities whose discharge make up a major share of the downstream flow for a significant portion of the summer low flow period. It should be noted that, as indicated at the top of page 20, the loads modeled for wasteload allocation purposes represent concentrations that closely approach background levels. In view of the significant impact of combined sewer overflows on the river as indicated in Appendix H there should be a point where the benefits from the control and treatment of such overflows provide a greater benefit than additional treatment of dry weather flows. (3.1.86)

Pages B-22. The finding that no measureable benefit would be obtained by shifting a portion of the load from Jackson Pike to the Southerly Plant is consistent with similar studies conducted by this Agency.

Page B-23. The finding that essentially only secondary treatment is necessary during wintertime stream flows to maintain water quality standards is consistent with model runs conducted by this Agency with the exception of extremely warm weather conditions during November such as that experienced during the first half of November 1975. (3.1.87)

Appendix C

Page C 1-4. The Water Quality Standards reported on these pages are those adopted by this agency in 1974, not the current Water Quality Standards adopted in February 1978. (3.1.88)

Page C 5-20: Tables C-2 C-17. The Water Quality data presented in these tables gives a fair and accurate portrayal of the water quality of Scioto River and its tributaries within the central Ohio area.

Appendix H

Pages H-2 and H-3. Not all the regulators are listed. Also, there is no mention that all the sluice gates are set half closed and what effect this might have on the system. There is also no discussion of the other 80 to 90 overflows. (see comment concerning Page III-2) (3.1.89)

Appendix I

Page I-27. The EIS states that the interconnector construction would permit tie-in of the Big Run and Frank Road Jackson Pike Service Area interceptors. This is not true. The only tie-in will be the Big Run Interceptor which recently had an estimated flow of 75 MGD. (3.1.90)

Appendix K

Page K-5. The EIS establishes overflow rates which are not consistent with Ten State Standards, Ohio EPA design criteria or good sanitary engineering design. They appear to be for the sole purpose of establishing dollar savings, not obtaining good treatment efficiencies. (3.1.91)

Pages K-8, K-9, K-11, and K-12. The EIS establishes design parameters which are not satisfactory for the reasons just cited. At the very least, full scale pilot testing would be necessary at both plants to establish credibility. Then some safety factor needs to be applied for day to day operation. (3.1.92)

Appendix L

The OEPA is not familiar with the publications used to develop Appendix L. It appears to be too general and lacking considerable information applicable to the land application of sewage sludge. We would recommend the authors of the EIS review "Ohio Guide for Land Application of Sewage Sludge, Bulletin 598". This bulletin was issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914 in cooperation with the U.S. Department of Agriculture, Roy M. Kottman, Director of the Cooperative Extension Service, the Ohio State University. (3.1.93)

Page L-1. It is stated that information such as sludge composition, the type of crops to be grown, and certain soil characteristics including pH, cation exchange capacity, and available phosphorus are needed prior to calculating the rate of sludge application. This is true although additional information is also necessary.

For example, before the actual application of sludge can take place, various on-site landscape features must also be considered to insure that no surface or groundwater pollution will occur as a result of leaching or runoff. Such site information as the amount of slope, the proximity to standing and flowing water bodies, the possibility of a flood hazard, the depth of the soil, the depth to the water table, and the amount of lateral seepage is required.

Equally important are the chemical and physical properties of the soil. Chemical characteristics not only encompass pH, cation exchange capacity, and phosphorus retention, they also include the amount of organic material present. The latter becomes important if the sludge contains heavy metals, since a high degree of organic matter increases the cation exchange capacity of the soil and also immobilizes some heavy metals due to chelation.

Physical soil properties, on the other hand, include texture, structure premeability, and erodibility. Texture is the most important physical property since it can determine the phosphate retention, CEC, permeability, drainage, erodibility, and buffer capacity of the soil. The type of soil structure determines the overall water movement which, in turn, influences the drainage and aeration.

Page L-2. It is stated that the criteria used in preventing injury to plants from application of sludge containing heavy metals is based upon the total amount of Pb, Cu, Zn, Ni, and Cd present. While Cu, Zn, Ni, and Cd are toxic to plants when they occur in soil in significant amounts, Pb can be toxic in acid soils that are low in phosphate. Pb in sludge seems to be non-toxic since the large amount of phosphate generally present ties up the lead prventing injury to plants.

Page L-5, Step 2, Part a. Reference is made to Table 3.5 when it should be made to Table 3.3. (3.1.94)

Summary

In general it appears that USEPA has misused the NEPA process in this instance. As USEPA has indicated in its regulations, the purpose of an EIS is to relate to the decisionmaker the environmental impacts of a proposed action in order that the decision maker can use that information in concert with economic factors to make a decision in a more comprehensive manner. This is a proper function, and one that the Council on Environmental Quality has reiterated in its draft revisions to the NEPA regulations.

However, in considering what the EIS is, consideration must also be given as to what it is not. It is not a document whereby new alternatives are developed outside the normal planning process, nor is it a platform for comparative analysis of various alternatives. Both of these actions are more appropriately carried out in the planning process (in this case 201 planning). Attempts at bringing forth new proposals in such a manner are doomed to failure because of the conflicting bases of project planning and EIS document production --- the former must be detailed and comprehensive while the latter should be general yet concise. Such conflict is very evident in this EIS document where (as the previous comments have shown) the planning bases were not detailed enough, (the repeated lack of cost effective analyses and environmental assessment) and where the environmental impacts of the proposed actions were not considered properly (interceptor route primary and secondary impacts).

While the above may be rightfully perceived as "lecturing" USEPA on its own procedures, it is being done because of a disturbing tendency, by USEPA to use the EIS as the "fix" for what is perceved to be inadequate planning. The proper vehicle for dealing with this situation is during plan review, not as a competition to existing proposals. The ludicrous situation that we now find ourselves in is one where Columbus now has two facilities plans; neither of which has been (or possibly can be) approved by OEPA. We are at a loss as to how to resolve this issue, and we fear that this may not be the last occurrences.

We can only state that it is our fervent hope that USEPA will, in the future, restrain themselves in calling for an EIS because of facility planning deficiencies, and will more appropriately attempt to resolve those deficiencies during plan review.

Then, possibly, EIS's will be produced only on proposed actions significantly affecting the environment, as they should be.

Sincerely,

Ned E. Williams, P.E.
Director

NEW/dmc
12013.0

3.1 Ohio Environmental Protection Agency

3.1.1 Comment: The Executive Summary contains several errors and statements with which OEPA takes exception.

Response: The Executive Summary in Volume III has been edited for errors. OEPA's other concerns are responded to below and in Volume I.

3.1.2 Comment: The explanation behind the recommendation of chlorination-dechlorination is misleading.

Response: The basic reason dechlorination was recommended when chlorination is practiced is for the protection of aquatic life from toxic chlorine concentrations. Further discussion of this point can be found in subsection 4.2.3 of Volume III. Statements in the EIS regarding breakpoint chlorination capabilities are made to point out the ease of achieving superior short-term effluent levels from the treatment facilities. This point is particularly critical in light of the commonly-held belief that facilities designed to NPDES effluent levels will not maintain quality standards in the Scioto River during a 7-10 flow regime.

3.1.3 Comment: Service to portions of Delaware County contradicts statements in the Delaware County EIS.

Response: The option of this service provision is being left open in the EIS so that the option will remain when the future planning referenced, is undertaken without delaying necessary construction in the Columbus facilities planning area.

3.1.4 Comment: The problems with the OEPA atmospheric modelling study which are inferred are not sufficiently explained.

Response: U.S. EPA has devised a draft policy with regard to the use of new and rehabilitated incinerators at the Columbus, Ohio, Jackson Pike and Southerly sewage treatment plants, which are located in a nonattainment area for particulates and SO_2. This draft policy has been incorporated into the statement.

3.1.5 Comment: The statement does not consider the construction of parallel sewers or phasing of sewer construction which might be cost-effective for the Columbus area.

Response: The Federal regulations for cost-effective analysis and 201 facilities planning do not allow the consideration of parallel sewer construction as an alternative plan. Phasing was considered in particular interceptors.

3.1.6 Comment: The City and County were not co-applicants for the 201 planning grant.

Response: The correct identification of the City as the sole applicant has been noted.

3.1.7 Comment: The average daily flows cited for the Jackson Pike and Southerly treatment plants are not realistic due to flow control measures.

Response: The OEPA's suggested average daily flow figures have been cited in Chapter I, subsection 1.5.2 of Volume III.

3.1.8 Comment: The NPDES permits issued to the City do not reflect the stringent levels required to meet water quality standards.

Response: The statement has been corrected.

3.1.9 Comment: The reference to several fish-kills is misleading.

Response: The reference in subsection 2.1.3(2) has been reworded to reflect OEPA's information.

3.1.10 Comment: The EIS service proposal has not addressed elimination of the Blacklick Estates Sewage Treatment Plant (a public utility).

Response: This comment will be addressed in later responses regarding the overall Blacklick Creek area (see Chapter IV, Section 4.3 of Volume II).

3.1.11 Comment: The discussion of the condition of the Olentangy River at Goodale Street needs clarification.

Response: The clarification has been noted in subsection 2.1.3(2)4 of Volume III.

3.1.12 Comment: The EIS should contain greater definition and discussion of prime and unique farmland as opposed to vacant land in the area.

Response: Reliable estimates of prime and unique farmland as well as ownership patterns within Franklin County are not available at this time. SCS has a survey underway; however, the data will not be processed nor available for some time due to limited manpower resources for the survey program.

3.1.13 Comment: The EIS should explain that the Scioto West Interceptor would also relieve the flow constraints imposed on the Scioto East Interceptor.

Response: No flow constraints are known to exist or to be projected for the Scioto East Interceptor, whose upper portions are estimated as capable of carrying over 50 mgd.

3.1.14 Comment: The EIS should note the relationship between the Columbus and Sunbury-Galena Facilities Plans for service alternatives around Hoover Reservoir.

Response: Analysis of the service needs and the possible interconnection of the Sunbury-Galena area with the City of Columbus system will be undertaken in the Sunbury-Galena 201 facilities planning process. This is discussed in subsection 3.1.3(6) of Volume III.

3.1.15 Comment: The EIS incorrectly identifies the Nelson Road Water Plant as still in operation.

Response: The reference has been deleted.

3.1.16 Comment: Table II-23 no longer reflects the water and sewer user charge system that U.S. EPA approved for the City of Columbus.

Response: The new user charge system instituted on January 2, 1978, has been referenced and Table II-23 deleted.

3.1.17 Comment: The maps showing water service areas are not correct for the Dublin area.

Response: More current maps are now available from the City of Columbus and have been noted for future reference.

3.1.18 Comment: The figures cited for safe yields of water for the City of Columbus are incorrect.

Response: The discussion regarding water supply needs, projections, and potential sources of water supply for the Columbus metropolitan area has been revised to reflect information provided by the City of Columbus, Division of Water.

3.1.19 Comment: The daily average sewer flow is inconsistent with figures cited on Page I-6.

Response: The statement has been reworded to reflect the range of daily sewage flow since average daily flow figures must be related to a specific time period to be meaningful.

3.1.20 Comment: More detailed description of the individual service areas and service alternatives should be provided in the statement.

Response: The descriptions provided are considered adequate for the purposes of the alternative concept planning and analysis. More detailed descriptions of the various service areas can be given at the step 2 level of planning.

3.1.21 Comment: Reference to the force main crossing Griggs Road at State Route 161 is inaccurate.

Response: The reference in subsection 3.1.2 has been corrected.

3.1.22 Comment: The EIS has incorrectly stated the number of combined overflow points.

Response: The references have been corrected.

3.1.23 Comment: Pollution problems in the Village of Orient have not been addressed in the Facilities Plan or in the EIS.

Response: Orient was considered for potential service in 1995 by the facilities plan. However, it was not cost effective to provide the service; consequently, the recommendation was not made. Orient is in Pickaway County and was not in the planning area designated by U.S. EPA for analysis in the statement.

3.1.24 Comment: The EIS misrepresents the situation at the City of Reynoldsburg.

Response: Please see the responses to comments by the City of Reynoldsburg in Chapter IV, Section 4.3 of this volume and Volume I.

3.1.25 Comment: The EIS misrepresents the situation in Groveport.

Response: Two sentences have been added to the discussion referenced, as follows: "The Franklin County Commissioners currently own and operate the treatment plant for the Village of Groveport. The plant and sewer system will be turned over to the Village when the bonds are retired in the near future."

3.1.26 Comment: The EIS does not present an accurate statement relative to the Scioto East Interceptor.

Response: The reference to location has been corrected. The limiting discharge of 29 cfs (18.7 mgd) from Dublin is over twice the peak flow estimated to come from both Dublin and the southwest portion of Delaware County (if this flow is collected by the City of Columbus), as pointed out in Table III-2 for the modified plan. Hence, growth is not likely to be "stymied."

3.1.27 Comment: The EIS does not use correct operation and maintenance costs or plant life figures.

Response: If treatment plant lives were shortened and/or related O & M costs increased, the cost-effective analysis involving the consideration of a treatment plant would not be changed, since all the treatment plant alternatives considered in the draft EIS were found not to be cost-effective.

3.1.28 Comment: Allowing water pollution problems to happen (as in New Albany) violates the spirit of PL 92-500 and PL 95-217.

Response: The New Albany situation was used in the EIS as an indication of when to expect pollution to be evidenced in an area, thus allowing a reasonable estimate to be made of when sewer construction should be phased so as not to create economic burden by premature facility construction.

3.1.29 Comment: The EIS information is inconsistent with regard to the Upper Scioto Basin and the Delaware County EIS.

Response: The EIS did not size the West Scioto Interceptor in an effort to instruct Columbus to serve southwestern Delaware County. The sizing was put forth so that the lower section could be constructed without further delay. If this section is constructed of the size mentioned in the EIS, it would not have to be paralleled in the event a future decision does call for the transport of sanitary flow from southwestern Delaware County.

3.1.30 Comment: The EIS does not include a cost-effective analysis or environmental assessment of the permanent pump station and force main across Griggs Reservoir, and the economic analysis is invalid.

Response: The main purpose for the consideration of the pump station and force main is to delay the construction of the interceptor between Manholes 2 and 3. It is not clear how the "economic analysis" is invalid.

The first paragraph on Page III-12 of the EIS under "Costs" states that a present worth basis was considered for a pump station versus an interceptor above Manhole 3. The detailed analysis was not presented in the report but is reproduced below:

West Scioto

	Interceptor	Pump Station
1980 Capital Cost		
(50 year life)	$1,421,000	$ 63,000
(20 year life)	0	350,000
1980 Present Worth of Salvage	-248,000	-11,000
1980-2000 O&M P.W. Interceptor and Force Mains	40,000[1]	2,000[1]
1980-2000 O&M P.W. Pumping Station	0	318,000[2]
	$1,213,000	$733,000

[1] 0.25% of construction cost.
[2] O&M varies from $20,200/yr. in 1980 to $33,600/year in 2000.

The P.W. of the interceptor is some 65 percent greater than the P.W. of the Pump Station.

3.1.31 Comment: The EIS does not address the Lake Darby Estates subdivision and its current 0.377 MGD plant which is proposed to go to 1.0 MGD in the immediate future.

Response: Lake Darby Estates subdivision is located near Galloway, Ohio, which is not in the Darby Creek subarea. This subarea was not reviewed in depth due to its elimination during preliminary screening through both its low projected population densities and the difficulty of providing regionalized service to the area.

3.1.32 Comment: The Alum Creek Interceptor is east of the Minerva Park Plant, not west.

Response: The reference has been corrected.

3.1.33 Comment: The EIS does not consider all the facts regarding the Blacklick Creek proposals.

Response: Please see the responses to comments for the City of Reynoldsburg in Volume I and Chapter IV, Section 4.3 of Volume II.

3.1.34 Comment: The summary and U.S. EPA proposals for Big Walnut, Rocky Fork, and Blacklick Creek appear to be inadequate. If sanitary sewers are not provided to these areas, there will be pressure by developers for the approval of package plants.

Response: U.S. EPA's policy is not to fund sewers for development, but rather to correct or abate existing and potential water pollution problems. In some cases, the use of package plants can be the most cost effective solution for sewage treatment provided the plants are properly sized, installed, and operated. Regulation of package plants should be upgraded as necessary to ensure environmental protection.

3.1.35 Comment: The Groveport treatment plant does have an NPDES permit; however, it is in the name of the Franklin County Commissioners.

Response: A telephone request was made of OEPA for NPDES permits for Reynoldsburg, Minerva Park, Rickenbacker AFB, and Groveport. On July 14, 1977, three NPDES permits were received with a note attached which stated that Groveport did not as yet have a permit. Apparently, this was not the case. It should be noted that this permit ultimately requires a tie-in to the collection system of the City of Columbus.

3.1.36 Comment: The repetitious statement of "should be constructed by 1980" is ridiculous and misleading.

Response: The statement "should be constructed by 1980" should be interpreted as needed as soon as possible. The year 1980 was stated since this is the beginning of the planning period.

3.1.37 Comment: Operation and maintenance (O&M) costs for Groveport, as well as other small entities, should not be assigned values based on City of Columbus O&M figures.

Response: The O & M for the Groveport WWTP and for other small facilities were not based upon the City of Columbus costs and in fact are approximately twice as high. However, if these O & M figures seem low, it should be noted that any increase would only correspondingly increase their associated present worth, thereby causing treatment plant alternatives to become even less desirable than shown in the EIS.

3.1.38 Comment: The EIS should present additional information on the potential environmental effects of the four brewery waste pretreatment alternatives.

Response: It would seem to be apparent that the primary impacts of no brewery pretreatment are presently being exerted on the Scioto River through the Southerly release. Short-term impacts of construction at the brewery site should be far less than those associated with either the original brewery construction or any future expansion of the brewery. Long-term primary impacts near the brewery of Scenario 2 should not exist, since the only final release on site will consist of deodorized air. Added impacts in Scenario 3 will be those associated with sludge disposal, a consideration which can either be addressed in conjunction with the City or through separate action by the brewery. Scenario 4 combines both the sludge impacts of 3 along with a release to a stream. Regardless of the projected actual severity of those impacts, they are obviously worse in a relative sense than those associated with Scenarios 2 and 3. This fact, coupled with the high present worth of Scenario 4, dictated its removal from further consideration. (See the response to comments regarding additional considerations for pretreatment of the brewery waste in Chapter IV, Section 4.1.)

It is difficult to believe that secondary impacts will occur as a result of the rather minor inoffensive construction proposed for treatment facilities which did not occur as a result of the original brewery construction.

The suggestion as to the need for site selection by the EIS would appear to be an attempt to open yet another avenue of criticism of the document. It was beyond the scope of services to go to this detail. The purpose of the analysis was to illustrate the cost savings that could be derived if the brewery practiced various levels of pretreatment.

On an overall basis, the primary and secondary impacts of a 3 mgd wastewater treatment plant at the brewery can only be effectively addressed in consideration of the primary and secondary impacts presently and historically associated with the brewery's operation at its present site.

3.1.39 Comment: The conclusions in subsection 4.1.4 appear to be based on erroneous data shown in Table IV-2. The table should be corrected.

Response: We do not believe the data presented in Table IV-2 to be erroneous. For further discussion, please see comments and responses contained in chapter V, Section 5.1 of Volume II.

3.1.40 Comment: The EIS should compare future water demand and safe yield data presented against earlier statements in 2.2.7(1).

Response: The discussions regarding water supply demands and sources have been revised to reflect information supplied by the City of Columbus, Division of Water.

3.1.41 Comment: It should be noted that the power plant bond issue was passed.

Response: The notation has been incorporated within the text.

3.1.42 Comment: The EIS should acknowledge that the Nelson Road plant has been deactivated.

Response: Reference to the Nelson Road plant has been deleted.

3.1.42 Comment: The EIS should acknowledge that future calcination is a possibility.

Response: The EIS notes that calcination is a possibility at the Parsons Avenue plant, and goes on to list the reasons for its present rejection elsewhere by the City.

3.1.44 Comment: Disposal of sewage sludge or codisposal of sludge with incinerator ash in a quarry is not a viable alternative under OEPA regulations and policy for solid waste disposal.

Response: The possibility of sewage sludge disposal in a quarry was never raised in the EIS. A discussion of incinerator ash and water sludge codisposal can be found in response to comments of the Columbus Division of Water in Chapter IV, Section 4.2 of Volume II. Rejection of a codisposal opportunity, which should mitigate against the environmental concerns associated with incinerator ash, is somewhat arbitrary unless the OEPA can show reasons other than the application of regulation which does not specifically address the waste residues anticipated in this situation.

3.1.45 Comment: OEPA is unlikely to approve any ash disposal concept utilizing the Jackson Pike Landfill.

Response: The EIS only mentioned the concept which was reported in a plan prepared by A.E. Stilson and Associates. A modifying statement has been added.

3.1.46 Comment: The EIS ignores the environmental concerns of putting incinerator ash in a quarry.

Response: See response to Comment 3.1.44.

3.1.47 Comment: The life of the quarry for water plant sludge is only 20 years, not 60 years.

Response: Please see response 4.2.4 contained in Chapter IV, Section 4.2 of Volume II.

3.1.48 Comment: Several questions arise from Table IV-15 regarding backup data or assumptions as follows:

1. How many trucks is a fleet?
2. What is the size and type of the trucks?
3. What is the travel time involved?
4. What union requirements were considered?
5. What wage scale, fringe benefits were considered?
6. What secondary roads would they be permitted to use?
7. Where would the trucks be kept?
8. Where would they be maintained?
9. Who would maintain them?
10. What energy considerations were made?
11. Was an Environmental Assessment done?

Response:

1. Six
2. 16 cubic yards
3. To Brush Creek and Perry County, about 2 hours
4, 5. Assumed same as Facilities Plan's values in the land application scheme.
6. Not considered
7. Southerly
8. Southerly or by contract
9. City of Columbus or by contract
10. Only fuel
11. No

3.1.49 Comments: The beginning of the first paragraph on page IV-51 is missing.

Response: The original text has been inserted and reads as follows:

Table IV-16 summarizes the results of a preliminary budgetary estimate for three land recovery schemes which assume application of 60 tons/day of dry Columbus secondary solids to the Perry County site. As can be seen, project costs are reduced with size, but the project costs

are never attractive from a cost standpoint. Indeed, the cost of operation would have to be subsidized by 85 percent for Columbus to break even (assuming local capital funding at 25 percent) under even the least cost alternative, which takes full credit for elimination of one new incinerator at Southerly and the elimination of one operating incinerator from both plants. Thus, from the standpoint of the City, any land recovery scheme is uneconomical; but, from the standpoint of society, a sterile, unattractive tract of land has been recovered for the beneficial use of subsequent generations. When viewed in this context, the value of the land and its relationship to the total environment is truly infinite, and the cost of reclamation is fully justified.

3.1.50 Comment: Discussion with the Farm Bureau would alter statements made in the EIS regarding land application of sludge.

Response: In the process of preparing the EIS, discussions were held on several occasions with the Farm Bureau regarding land disposal of sludges. The point of the comment may have some validity, however, the final EIS should indicate the desire on the part of the farmers to control application, whether or not they actually spread the sludge themselves. It is interesting though, that the Farm Bureau did not bring up this point during their presentation as a part of the Public Hearing on the Draft EIS.

3.1.51 Comment: The cities of London and Richwood do not have approval to take sludge at their landfill sites as mentioned in the EIS.

Response: Although the EIS does not recommend disposal in either of the sites mentioned, comments as to their "ability" to receive sludges are based on interviews with operating personnel.

3.1.52 Comment: Can U.S. EPA provide funding for a demonstration program involving the reclamation of barren strip mines with sludges?

Response: One possible funding source was indicated in the statement. Additional sources should be explored with U.S. EPA under section 105 of PL 95-217 and with the Department of the Interior under the various mining reclamation programs.

3.1.53 Comment: The inclusion of manufactured component trade names is a serious problem for OEPA.

Response: According to U.S. EPA guidelines, trade names can be mentioned when there are no current competitive components available in the market. If an equivalent component can be found in the future, it can be purchased as a substitute.

3.1.54 Comment: A more in-depth analysis should be performed on the sock diffusion system at both Columbus plants.

Response: The point of the EIS is merely the untenability of continuing to supply air needs in the present manner. To avert criticism of specific design parameters (such as transfer efficiencies) and to facilitate proper cost estimates, a particular dissolution system was chosen. The need for full-scale testing of this system is repeatedly noted, and it is the intent of the EIS to merely assure that any system ultimately installed in the Columbus facilities is at least as cost-effective as the system discussed. The EIS is not suggesting a quick solution but rather a re-examination of alternatives before an irretrievable expenditure of money is committed.

3.1.55 Comment: Utilization of the interconnective sewer for storing excess flow and to dampen peak flows to Southerly is conceptually feasible but introduces a number of maintenance problems.

Response: Unless specific maintenance problems are identified for consideration, the concept remains valid.

3.1.56 Comment: The EIS discusses the brewery's discharge to be staged to conform to the reverse image of the normal domestic pattern of wastewater generation. This being the case, then 6 p.m. to 6 a.m. is not correct. Travel time from the brewery is 22 to 24 hours.

Response: The statement referenced is one of concept, and does not intend to specify the exact period of time that two-thirds of the brewery load should be released. The actual travel time must be identified before any decisions can be made regarding the proper time of peak brewery load release. Our point here was only that with its small daily volume of high BOD_5, brewery waste presents an excellent opportunity to smooth out the daily total oxygen demanding load processed at the treatment plant. Conceptually, assuming the cooperation of the concerned parties, this would entail receipt of the brewery load in a reverse image of the other noncontrollable municipal sources. The use of the 6 p.m. to 6 a.m. time period was only for illustrative purposes, as it represents the commonly accepted norm for a plant's receipt of a low influent pollutant mass. Obviously, this time frame varies as the size of the plant's collection system and, since we are talking about smoothing out the air supply peaks, the detention time in the unit processes prior to the aeration system. Whether or not the aeration system operates in a plug flow, step feed, or complete mix mode is also of importance. The importance of the concept also varies as a function of the pretreatment level provided at the brewery and the type of unit processes provided at Southerly.

3.1.57 Comment: The EIS design loads to Jackson Pike and Southerly do not include recycle flows. There is also no mention of what happens to filter backwash.

Response: The design in the EIS does include recycle flows and provisions for filter backwash. These considerations are clearly presented on Pages IV-78, K-12, and K-13 of the EIS.

3.1.58 Comment: The EIS states that "immediate standby facilities for sludge disposal can be provided by landfilling"—the EIS fails to take into account the City's inability to develop and/or utilize an acceptable landfill site.

Response: The proposed project plan was for either four incinerators at each facility or three incinerators at Jackson Pike with as required force main conveyance of sludge to the four incinerators at Southerly. For more discussion on the landfill issue, see responses to comments made by the City of Columbus contained in Chapter IV, Section 4.1 of this volume.

3.1.59 Comment: The EIS fails to consider the internal constraints at Jackson Pike or Southerly as well as the original peaking factors of the facilities in regard to the suggested realization of total hydraulic capacity.

Response: The point of this comment or the specific response required are not clear. What are the internal constraints mentioned, and what specific complaints does the reviewer have with the EIS hydraulic capacities? The original peaking factors found with the Facilities Plan were considered less than standard convention (see Appendix I, Volume III of the EIS).

3.1.60 Comment: Mention of the use of sludge to reclaim strip mine land is not supported with adequate funding proposals.

Response: Please see the response to Comment 3.1.52. City funding should also be explored as there is generally considerable flexibility in local budgeting programs.

3.1.61 Comment: The EIS recommends building a bypass around the trickling filter so that savings can result when complete nitrification is not a treatment requirement. Apparently the EIS author did not review this proposal with permit section staff. USEPA, Permit Section, has required that OEPA insist on year round nitrification at Columbus. If Appendix B of this EIS is to be followed, then again the bypass is a waste of money.

Response: The permit limitations of both plants are known. However, it was felt proper to offer alternatives to those levels when they appeared justified. The by-pass option was preserved in case this option has future viability. In addition, the present permits are substantially before the end of the useful life of the proposed improvements, and that future permits may allow the use of the proposed first-stage bypass. A design that anticipates the above considerations, would allow the potential savings of significant operating power expenditures for aeration and pumping. At the same time, the design would have to still maintain the limiting condition of the secondary treatment equivalency or the water quality standards of the receiving stream as influenced by the discharges from the wastewater treatment plants.

3.1.62 Comment: The EIS assumes the City will install the effluent filtration system of one particular manufacturer.

Response: For the cost effective analysis, the EIS did assume a particular manufacturer. This is not intended to dictate the final choice of the City, but intended to ensure that consideration was given to this apparent cost-effective system. For more discussion, see responses to comments made by the City of Columbus contained in Chapter IV, Section 4.1 of this volume.

3.1.63 Comment: The EIS "glosses over" the operation and maintenance staff problems at the two plants. This is a very serious and time-consuming problem which appears to be getting worse not better. The realities of the employee situation should be considered at this point.

Response: Staff problems were apparent at the time of EIS preparation. We were told, however, that the difficulties are due to both union and civil service procedures and regulations, with, at one plant, the suggestion of intentional sabotage and the desire to avoid assignment in the thermal conditioning area. These observations have led to social questions concerning management difficulties associated with a labor force which, because of a few, can collectively respond in an inefficient, unproductive manner.

It is noted that the EIS has already been accused of venturing into areas of city policy (even where Federal funding is concerned), and it would seem that a discussion of these internal problems would have invited yet another flood of comments as to the "appropriateness" of this document. In fact, the one suggestion that was made in the EIS regarding plant staffing (Page V-26) was met with a negative comment by the City of Columbus.

3.1.64 Comment: The EIS should address what happens next, should pretreatment of brewery waste not solve the bulking or operational problems at Southerly.

Response: According to the cost analysis presented in Table IV-2 and its attendent rationale (assuming that the brewery has been responsible in the operation of its pretreatment facilities and that the City employees have performed their operational functions in a responsible manner), the next logical step is to require a higher level of pretreatment on the part of the brewery, e.g., Scenario 3.

3.1.65 Comment: If anything other than normal design standards are used, OEPA feels a need for pilot testing the treatment process.

Response: Several questions regarding pilot programs are responded to in Chapter IV, Section 4.1 (comments by the City of Columbus).

3.1.66 Comment: The EIS repeatedly asks the City to consider equipment available from only one manufacturer.

Response: See previous responses regarding manufacturer "specification." Further, it should be noted that the OEPA comment is incorrect concerning single source procurement of this system, as the Aerocleve Submerged Aeration System of the Clevepak Corporation appears to offer direct competition.

3.1.67 Comment: The EIS draws false conclusions with regard to the area's economy being held in check by inadequate water supplies as an independent control factor.

Response: Growth can occur in areas not served by sewer through the use of on-site disposal systems. However, growth cannot occur in areas where reliable water supply or service is not available. Water supply deficiencies thus provide potentially greater constraints to the expansion of the economic base than wastewater treatment problems.

3.1.68 Comment: Table VII-1 does not represent proper design flow used in Ohio or the current cost for treatment. The EIS should acknowledge that the South Carolina information is not relevant to Ohio.

Response: Repeated attempts to obtain definitive capital and O&M cost data for package plants in the Columbus metropolitan area were unsuccessful during the preparation of the EIS. Therefore, the decision was made to modify the South Carolina data as indicative of the "order of magnitude" difference in costs associated with package plants. The references and application of the data presented have been clarified so as not to be misleading.

3.1.69 Comment: It is the opinion of the OEPA that sufficient development pressures exist in the Blacklick Creek and adjoining Fairfield County areas to require service either in the form of connection to Columbus or package treatment facilities.

Response: Fairfield County is outside of the planning area and was not considered in the analysis of growth patterns and market demand. The Blacklick Creek area has been reevaluated using new growth projections. See the responses to the City of Reynoldsburg.

3.1.70 Comment: The conclusion that existing vacant commercial and industrial space is more than sufficient to satisfy demand is questionable. Commercial space figures for 1977 and 1978 would be more appropriate in establishing trend concepts.

Response: Most of the research regarding market trends in the commercial office and industrial sectors was done in early 1977. Thus, 1977 and 1978 space figures were not available at the time.

3.1.71 Comment: A review of OEPA's files and those of MORPC will show that an ever greater demand exists where services are not located.

Response: The demand for public services can be characterized broadly as to areas where no services exist and areas where the services provided are insufficient to meet demand. The point made in the EIS is that it may be cost-effective to upgrade and support existing investments in public services as opposed to establishing new service programs and facilities in areas where they have not been provided heretofore. The determination of which type of demand is "greater" requires a value judgement.

3.1.72 Comment: The EIS neglects the effect of Plain Township being incorporated into New Albany.

Response: The main concern of the EIS was to abate existing and potential water pollution problems by the construction of some means for sewage treatment for transportation to an existing treatment plant, not the individual collection system of New Albany. In any case, this effect may not be of great significance, as indicated in the following quote from the second annual growth statement for the City of Columbus prepared by the City of Columbus, Department of Development, October, 1978 and included in this Volume as Appendix EE.

"The most interesting and significant development relative to annexations occurred in the northeastern portion of the city and county, an area previously defined as an active growth area. The annexation activity in the northeast, which included two relatively large annexations in the vicinity of 500 acres each, does not reflect a sudden development potential in Columbus; rather they are reactions to an attempt to contain urban expansion in this area.

Residents of Plain Township initiated a referendum, which appeared on the June ballot, that would permit the City of New Albany to pursue the annexation of the remaining unincorporated area within Plain Township. The referendum was narrowly defeated. This effort and its near success indicate a desire by many residents in the vicinity of New Albany not to take on an urban character. Therefore, the probability of the entire sewer contract area of New Albany experiencing urban development through the year 2000, as previously thought, is somewhat remote. Figure 6, defining active growth areas, has been revised to reflect that annexation potential through 1985, and development potential through the year 2000 will be limited to west of New Albany Road."

3.1.73 Comment: The EIS should indicate that the City of Reynoldsburg plant is continuously by-passing and has an adverse effect on the Blacklick Creek. Chapter III does not offer the City of Reynoldsburg the immediate solution proposed in the Facilities Plan.

Response: The condition of the Reynoldsburg plant is referenced in subsection 7.4.3(2). The recommended solutions contained in Chapter III do address the existing pollution problems. The "immediacy" of those solutions is not significantly different than that proposed in the Facilities Plan.

3.1.74 Comment: The conclusions regarding the secondary impacts on the Blacklick, Rocky Fork, and Big Walnut Creek subareas are unacceptable.

Response: Without further specificity, no response can be formulated.

3.1.75 Comment: The discussion of mitigative measures for adverse primary impacts should address sewer construction as well as treatment plant construction. Included in this discussion should be the identification of the following issues raised by Ohio D.O.T.:

1. There should be a discussion of traffic diversion during construction of the various interceptors.

2. On implementation of whichever wastewater treatment plan selected, further coordination should be conducted with ODOT's District 6 office regarding the following:

West Scioto

Alternate No. 1
- a. FRA-(project) Hayden Run Road
- b. FRA-(project) 33-6.14

Alternate No. 2
- a. FRA-(project) Hayden Run Road
- b. FRA-(project) Fishinger Road (County Rd. 52)
- c. FRA-(project) 33-6.14

Big Run

Alternate No. 1
- a. FRA-(project) Broad Street Bikeway

Big Walnut Creek, et. al.

Alternate A-
- a. FRA-(project) County Road 20
- b. FRA-(project) 161-16.83
- c. FRA-(project) Township Road 195

Alternate B-
- a. FRA-(project) 161-16.83
- b. FRA-(project) Township 195

Alternate C-
- a. FRA-(project) County Road 20
- b. FRA-(project) 161-16.83
- c. FRA-(project) Township 195

Alternate D-
- a. FRA-(project) 161-16.83
- b. FRA-(project) 161-16.37

Alternate Sub B-
- a. FRA-(project) TR195
- b. FRA-(project) 161-16.37

Response: Discussion regarding mitigative measures to be taken during sewer construction has been incorporated into subsection 8.1.1. The need for coordination with ODOT has also been noted.

3.1.76 Comment: The Southerly Plant receives flow via the interconnector. The flows originate from Grove City and Urbancrest and amounts to some 2.75 to 3.0 mdg.

Response: The information has been included in Section A.1.3 of Appendix A.

3.1.77 Comment: The EIS states that "all thermally conditioned and filtered sludge is landfilled." This is not true. Ohio EPA is not aware of, nor have they approved, the landfilling of thermally conditioned and filtered sludge.

Response: In an unfortunate attempt to understate the case, the EIS referred to the City's practice of dumping the sludges referenced in a field adjacent to the Jackson Pike plant as "landfilling." Whether or not OEPA is aware of or has approved this practice, is beside the point; the EIS is merely reporting the practice at the time of interviews with the Jackson Pike personnel. This issue has been more clearly delineated in the EIS.

3.1.78 Comment: The EIS implies that the Jackson Pike incinerators have scrubbers. This is not true. Scrubbers are currently under construction.

Response: The term "scrubber water" was incorrectly used and has been deleted.

3.1.79 Comment: The EIS states that no further expansion of the solids handling and incineration system was thought to be necessary. This could not be further from the truth. Since at least 1974, the City has been attempting to expand the solids handling and incineration facilities. They have been repeatedly held up by U.S. EPA.

Response: The statement referenced is not critical to any of the analysis contained in the EIS and has been deleted. It was not the intent of the EIS to misrepresent any condition.

3.1.80 Comment: The EIS should indicate that the dewatering complex is "maintenance intensive." It is rare that more than two units are ever working and are almost beyond repair.

Response: While the first statement is true, we would like to point out that all solids handling equipment is maintenance intensive. During the plant tour we did not note nor was it brought to our attention that this system was "almost beyond repair," and that the Unit Operations Report (Malcolm Pirnie, 1975) also fails to note that the vacuum filters are "almost beyond repair." It is possible that it is rare to see more than two vacuum filters in operation due to the fact that it is also rare to have both incinerators available for operation at one time, and that there is little reason to operate more than two vacuum filters when limited incineration capacity is available.

3.1.81 Comment: The EIS should explain that the incinerators break down due to the inability of the City to perform maintenance. The City cannot afford to take one off line without causing solids problems in-plant. Various measures were tried to suppress odor problems.

Response: The need for increased incinerator capacity is recognized as evidenced by earlier responses.

The EIS reflects an understanding of the nature of the sludge solids placed in the lagoon based upon interviews with the plant staff. Superficially, although the sludge may have been odorous, we cannot see any reason why the plant staff would intentionally route raw primary sludge to a lagoon if other sludge sources were available.

3.1.82 Comment: The cost figures do not reflect proper operation and maintenance for the reasons stated earlier (III-9).

Response: The costs stated in the EIS are taken directly from the "Annual Summary of Operations for Sewage Treatment" for Jackson Pike and Southerly which are included in the 1976 Annual Report of the Division of Sewerage and Drainage of the City of Columbus.

3.1.83 Comment: The report incorrectly assumes the flows as measured by the Columbus gage on the Scioto River is indicative of flows upstream from the Jackson Pike Wastewater Treatment facility. While it is true the gage is located

approximately 300 to 500 feet upstream of the discharge point of the Jackson Pike facilities, it is incorrect to assume the gage does not include the discharged flow. In fact under the remarks accompanying the U.S.G.S. gaged records you will find the following comments: (Page 290: Water Resource Data for Ohio - Water Year 1976 Vol. 1 Ohio River Basin) - "Records include the return flow of the Frank Road Sewage Treatment Plant." Thus the computed Q_7 - 10 flow of 127 cfs is made up of the sewage flow plus the river flow upstream of the plant. If one estimated the minimum weekly sewage flow to be 65 mdg or 100 cfs, the upstream flow would be approximately 22 cfs or close to the value of 18.2 used in the agency's 303 wasteload allocation report.

Further evidence of this fact may be seen from the following U.S.G.S. records.

YEARS IN WHICH THE MINIMUM WEEKLY FLOW AT COLUMBUS APPROACH 122 cfs AND RELATED FLOWS IN THE OLENTANGY RIVER

	Scioto River @ Columbus	Olentangy River @ Worthington		Difference
Year	Q_7 CFS	Q_7		
1970	126	13		113
1968	125	12		113
1967	133	14		119
1962	129	13		116
1959	131	12		119
1956	124	30		94
Mean	127.5	13	Mean	114.5 cfs

From the above it will be noted that the differences in flow between the two gauging stations has a mean of 114.5 cfs and is indicative of the minimum weekly sewage flow from the Jackson Pike plant. In addition, the upstream flow of the Scioto River is only slightly greater than the mean of 13 cfs measured at the Worthington gauge on the Olentangy River.

During the drought period of 1953-55, the difference in monthly mean flows between the Circleville and Columbus gauges varied from 40 to 71 cfs with a mean of

53 cfs. Even if there was no runoff from the incremental drainage area of nearly 1600 square miles (which is highly unlikely) the difference in flow hardly accounts for the discharge from the Jackson Pike plant.

Response: The comments in this submittal and those made orally at the public hearing imply that the authors of the EIS were unaware of the remark as to sewage return flow in the Scioto River at Columbus station description. Nothing could be further from the truth. The gage was visited by personnel and repeated inquiries were made to the USGS in regard to the proper 7-10 flow value. We were assured that the return flow noted for the station was merely the overflow from the Jackson Pike ash lagoons, which enters the Scioto River almost exactly at the gage site. This situation was also discussed with several OEPA stream modelers. The originally submitted Appendix B included runs made at the upstream flow of 18.2 cfs preferred by OEPA. The shapes of the resultant DO profiles were identical to those obtained using the 122 cfs upstream flow, with lower actual DO levels evidenced throughout. Upon review, we were requested to drop the runs related to upstream flow sensitivity and to replace them with the temperature-sensitive runs which now appear in the EIS.

Following the public hearing, USGS was again contacted in regards to this flow problem. An oral assurance was again provided that the gage was not impacted by Jackson Pike, and a summary letter was sent to confirm this. The return from USGS indicated that communications had been confused, and stated that the gage control point was indeed below the Jackson Pike release. Appendix B has, therefore, been changed and inserted as a new Appendix in this Volume to include the modeling runs at an upstream flow of 18.2 cfs.

3.1.84 Comment: Comments similar to the above may be made concerning winter flows of 222 cfs used for modeling winter low stream flow conditions.

This matter was the subject of an intensive study in 1961 by George Newell (now with City of Columbus) and Mr. George Garrett of Ohio EPA in cooperation with the U.S.G.S. It should be recognized that the assumed summer and winter low flows contain a serious error and thus weaken the presentation of the model's results.

Repsonse: The background flow assumptions used in the draft EIS are significantly different than those proferred by OEPA. However, it is worthy to note that comparable modeling predictions remained reasonably close at both flow regimes, showing the relative overall insensitivity of the results to the background flow assumption.

Mr. Garrett supplied us with the State data which is reproduced in the EIS. It is unfortunate that the referenced study was not mentioned or made available to us at that time.

3.1.85 Comment: The model runs illustrated in Figure B-3 and B-4 and presented in Tables B-2 and B-3 assume the river is a free flowing stream immediately downstream of the Jackson Pike facility. Although this is a common assumption it is inappropriate for this stretch of the river particularly with the completion of the channelization program in the early 1960s. Immediately downstream of Jackson Pike facilities, the river narrows sharply and makes a sharp turn to the east on the first leg of an oxbow bend in the river. As a result of these extreme directional changes and other physical characteristics of the river, stream flows through the oxbow bend are restricted and the discharge from the Jackson Pike facilities is forced across the stream where it in turn flows upstream along the eastern bank to the vicinity of Frank Road. This pool-like condition significantly alters the time of travel calculations and thus the location of the oxygen sag point. This in turn modifies the impact of the Jackson Pike discharge on discharges from the Southerly Plant downward.

Response: The OEPA did not inform us of this situation. In reviewing their 303e work on the Scioto we noted that they considered the stream to be free flowing and that their river miles seemed to be incorrect, we assumed that this was in error and used values which we thought may more correctly define stream stations. With this review comment, it may have been that they were attempting to compensate for the sinuous pattern of the river at their low flows. Regardless, the predicted sag points, dissolved oxygen profiles, and load carryover to Southerly by OEPA and the EIS appear to be essentially in agreement. The only output disagreement with the OEPA would appear to be in the predicted absolute dissolved oxygen values in the modeled stretch of Scioto; a point which would have been critical only if the EIS and OEPA modeling efforts would have disagreed as to standards convention.

It should be noted that other "experts" have offered testimony as to the EIS predicting a sag point far too soon after the Jackson Pike release, while the OEPA comment implies that the sag should exert itself even sooner with perhaps more load assimilated than shown in the EIS.

3.1.86 Comment: The allocated loads presented in Table B-4 for the Jackson Pike facilities and in Table B-5 for the Southerly facilities represent treatment levels greater than that currently considered as "best available technology currently available." Furthermore, there is a serious question as to the reaction rates for effluents of this high a quality. In view of the foregoing, it appears that a policy decision must be made as to the maximum treatment that may be required of municipalities whose discharge make up a major share of the downstream flow for a significant portion of the summer low flow period. It should be noted that, as indicated at the top of page 20, the loads modeled for waste-load allocation purposes represent concentrations that closely approach background levels. In view of the significant impact of combined sewer overflows on the river as indicated in Appendix H there should be a point where the benefits from the control and treatment of such overflows provide a greater benefit than additional treatment of dry weather flows.

Response: We agree fully with this comment and have attempted in several places of the EIS to indicate that treatment further than BATEA should not be required at the present time. (See Pages IV-18 through IV-20, V-2, and V-5 of the EIS.)

3.1.87 Comment: The finding that essentially only secondary treatment is necessary during wintertime stream flows to maintain water quality standards is consistent with model runs conducted by this Agency with the exception of extremely warm weather conditions during November such as that experienced during the first half of November 1975.

Response: If the OEPA agrees with this result an option would be to establish seasonal, flow-dependent NPDES effluent restrictions and allow the municipality to save in its operational power consumption. This would have to be agreed to by OEPA and U.S. EPA.

3.1.88 Comment: The Water Quality Standards reported on these pages are those adopted by this agency in 1974, not the current Water Quality Standards adopted in February 1978.

Response: The February 1978 standards had not been adopted at the time of preparation of the EIS. The new standards have been footnoted.

3.1.89 Comment: Not all the regulators are listed in Appendix H. Also, there is no mention that all the sluice gates are set half closed and what effect this might have on the system. There is also no discussion of the other 80 to 90 overflows.

Response: The regulators listed in Table H-1 were provided by Malcolm Pirnie, Inc., in response to our request for such a listing in the combined sewer areas of Columbus. The remaining 80 to 90 overflows were not considered to be in the scope of work set forth by USEPA. Refer to the Report on Combined Sewer Overflow Monitoring by Malcolm Pirnie, Inc. (Feb. 1979) for additional information on overflow regulation.

3.1.90 Comment: The EIS states that the interconnector construction would permit tie-in of the Big Run and Frank Road Jackson Pike Service Area interceptors. This is not true. The only tie-in will be the Big Run Interceptor which recently had an estimated flow of 75 MGD.

Response: Refer to Page III-2 of the EIS, which specifically states that City Auditor's Engineer Contract Reference Number 2032 does call for the connection of both the Big Run and Frank Road Interceptors with the interconnecting sewer. This statement was confirmed in a telephone call to the City of Columbus' Department of Sewerage and Drainage on May 1, 1978.

3.1.91 Comment: The EIS establishes overflow rates which are not consistent with Ten State Standards, Ohio EPA design criteria or good sanitary engineering design. They appear to be for the sole purpose of establishing dollar savings, not obtaining good treatment efficiencies.

Response: A surface overflow rate of 500 gpd/sf provides no assurance of success if operating MLSS and return sludge needs are ignored, and deviation from this parameter in no way violates good (or intelligent) sanitary engineering design principles. Arbitrary use of the 10 State Standards or OEPA design criteria appears to us to be cookbook design with a lack of fundamental understanding of how these parameters were developed, their applicability, and their limitations. See responses to comments made by

the City of Columbus in Chapter IV, Section 4.1, Volume II for more discussion.

3.1.92 Comment: The EIS establishes design parameters which are not satisfactory for the reasons just cited. At the very least, full scale pilot testing would be necessary at both plants to establish credibility. Then some safety factor needs to be applied for day to day operation.

Response: Two independent reviews of the draft EIS have substantiated the design parameters proposed in the document.

3.1.93 Comment: The OEPA is not familiar with the publications used to develop Appendix L. It appears to be too general and lacking considerable information applicable to the land application of sewage sludge. We would recommend the authors of the EIS review "Ohio Guide for Land Application of Sewage Sludge, Bulletin 598." This bulletin was issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914 in cooperation with the U.S. Department of Agriculture, Roy M. Kottman, Director of the Cooperative Extension Service, the Ohio State University.

Response: Appendix L was used in part to support analysis performed on land disposal of sludge alternatives. Other source materials were relied on as well.

3.1.94 Comment: Reference is made to Table 3.5 when it should be made to Table 3.3.

Response: The correction has been noted.

3.2 Ohio Historic Preservation Office

3.2

RECEIVED

APR 03 1978

EPA REGION 5
OFFICE OF REGIONAL
ADMINISTRATOR

March 30, 1978

U. S. Environmental Protection Agency
Region V
230 South Dearborn Street
Chicago, Illinois 60604
Attn: Planning Branch - EIS Preparation Section

Re: Draft Environmental Impact Statement
Wastewater Treatment Facilities for the
Metropolitan Area Columbus, Ohio

Dear Mr. Adamkus:

As requested, the staff of the Ohio Historic Preservation Office has reviewed the subject statement and offers the following comments relating to cultural resources.

In Section 2.2.10 mention is made of the 20 National Register sites and the 78 archaeological sites recorded for the study area. However there is no indication that this knowledge was used as a planning tool in project site location. No breakdown is given of which resources are located in which service areas. (3.2.1)

The D.E.I.S's assessment of the facilities effect on historical and archaeological sites (Section 7.3.4) is inadequate to meet the requirements of Section 106 of the National Historic Preservation Act, Sections 1(3) and of 2(b) Executive Order 11593, and Section 102 of the National Environmental Policy Act. There is no documentation provided to support the statement that "there is not likely to be any significant secondary impacts on historical or archaeological sites." The question of effects on cultural resources due to facilities construction is not addressed in the statement (Section 6.2.1) (3.2.2)

Plans to conduct cultural resources surveys should be included in the E.I.S or documentary evidence indicating that cultural resources will not be affected. A determination of effect on properties listed on, nominated to, or eligible for the National Register of Historic Places that are located within the proposed project areas will be necessary. This may be coordinated with the O.H.P.O. (3.2.3)

Thank you for the opportunity to review and comment on the subject statement.

Sincerely,

Thomas H. Smith
State Historic Preservation Officer
Director, Ohio Historical Society

original: Water

THS:FR:cw

Ohio Historic Preservation Office
Ohio Historical Center I-71 & 17th Avenue Columbus, Ohio 43211 (614) 466-8727

3.2 Ohio Historic Preservation Office

3.2.1 Comment: The EIS does not indicate specific site locations of the 20 National Register sites and 78 archaeological sites recorded in the study area with respect to construction effects from the planned sewer routes and facilities.

Response: The historic inventory for Franklin County has only recently been completed with over 2,600 listings. Determinations on which of the buildings are eligible for designation in the National Register of Historic Places have not yet been made. Discussion with the Preservation Officer for the Columbus Landmarks Foundation suggests that a field inspection and inventory would be appropriate during Step 2 of the 201 planning process.

3.2.2 Comment: The question of effects on cultural resources due to facilities construction is not addressed in the statement (Section 6.2.1).

Response: The primary effects upon cultural resources from the construction of interceptors and other treatment facilities are generally those categorized as public annoyances such as noise, night glare, vibration, and traffic congestion. (See discussion in 6.1.1). These effects are short-term in their duration whether experienced during the initial construction phase or later on during periods of repair and maintenance procedures. The determination of potentially serious or damaging effects to particular buildings or places cannot be resolved and mitigation measures adopted until Step 2 when final construction planning and management operations ensue.

3.2.3 Comment: There is no documentation provided to support the statement that "there is not likely to be any significant secondary impacts on historical or archaeological sites."

Response: Secondary effects are those impacts created by virtue of population growth induced by the proposed action over and above the growth projected under the no action alternative. The EIS indicates that the regional population projections will remain ultimately the same and differ only according to distribution patterns in particular subareas. Consequently there are no significant

secondary effects that can be determined at this time on cultural resources. Please see 7.3.4 of Volume III for revised language.

IV. COMMENTS FROM REGIONAL AND LOCAL PUBLIC AGENCIES

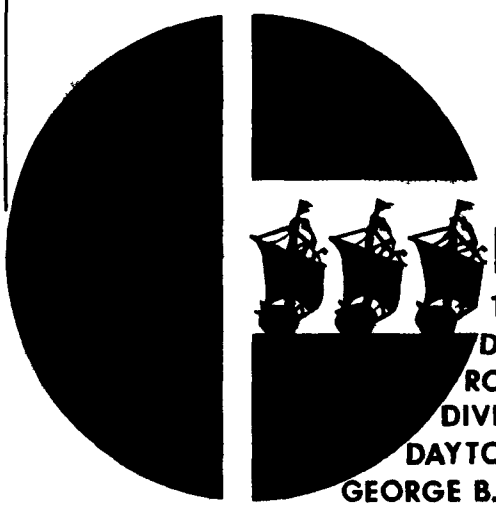
4.1 City of Columbus

REVIEW OF

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION V • DRAFT

ENVIRONMENTAL IMPACT STATEMENT

Wastewater Treatment Facilities for the Metropolitan Area Columbus, Ohio



by Columbus, Ohio

TOM MOODY • Mayor

DEPARTMENT OF PUBLIC SERVICE

ROBERT C. PARKINSON • Director

DIVISION OF SEWERAGE & DRAINAGE

DAYTON D. ROBBINS • Superintendent

GEORGE B. WALKENSHAW • Ass't. Superintendent

REVIEW SUMMARY
ON THE
USEPA DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR THE
COLUMBUS METROPOLITAN AREA

The Federal Water Pollution Control Act Amendments of 1972, commonly referred to as Public Law 92-500, contained provisions intended to achieve the national objective to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. In order to achieve this objective, PL 92-500 declared two major national goals:

(1) That the discharge of pollutants into the navigable waters be eliminated by 1985; and

(2) that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983.

PL 92-500 also contained several important national policy statements, two of which were as follows:

(1) Public participation in the development, revision, and enforcement of any regulation, standard, effluent limitation, plan, or program established by the Administrator or any State under this Act shall be provided for, encouraged, and assisted by the Administrator and the States. The Administrator, in cooperation with the States, shall develop and publish regulations specifying minimum guidelines for public participation in such processes.

(2) That to the maximum extent possible, the procedures utilized for implementing this Act shall encourage the drastic minimization of paperwork and interagency decision procedures, and the best use of available manpower and funds, so as to prevent needless duplication and unnecessary delays at all levels of government. Please note the law's concern and commitment regarding minimization of paperwork, prevention of needless duplication, and avoidance of unnecessary delays. (Emphasis Added)

As the first step in obtaining Federal assistance for construction of sewers and wastewater treatment facilities, an applicant for such funds is required, by law, to

prepare what is known as a Facility Plan. Facility planning, as provided under Federal regulations, is a planning process to be used in establishing a cost effective and environmentally sound wastewater treatment works. The law stipulates that one municipality or other local political entity must be designated as the agency responsible for completion of the Facility Plan.

As such, the City of Columbus formally initiated the required facility planning process for the Columbus Metropolitan Area on October 3, 1974, and completed same on October 15, 1976 at an approximate cost of one million dollars. The citizens of Columbus have agreed to this program to solve the water pollution problems in the Columbus Metropolitan area. They have demonstrated this commitment by voting a 90 million dollar bond issue to pay the local share of the capital costs of this program.

On March 15, 1976, during the last stages of the Facility Plan preparation, the United States Environmental Protection Agency decided to prepare a separate document called an Environmental Impact Statement, or EIS, for the Columbus planning area. The stated purpose of the EIS was to address several issues raised by USEPA in regard to the environmental impacts of construction projects proposed in the City's Facility Plan.

The City of Columbus immediately appealed the EIS decision on the grounds that the Facility Plan had already resolved the environmental issues, and on the grounds that preparation of the EIS would be a needless duplication of effort and cause unnecessary lengthy delays resulting in increased costs and uncontested degradation of the area's water resources. Such duplication, delays, increased costs, and degradation of waters are in direct conflict with the aforementioned national goals and policies of PL 92-500. The City was promised by USEPA that the final EIS would be completed by May, 1977, thereby over-optimistically assuring that the EIS imposed delays would be somewhat minimal.

Now, after a two year delay and an inflationary expense to the taxpayers of about 30 million dollars in construction costs, a draft "so-called EIS" has finally been issued by USEPA. Several comments, recommendations and conclusions in the "draft" document indicate that the "final" EIS may not, in fact, be "final" for quite some time, thus resulting in additional costs and inflationary spirals at the taxpayers' expense. Actual cost to the taxpayers for preparation of the EIS is likely to exceed one-half million dollars when including governmental salaries and expenses and the local effort that must be expended in reviewing and assessing the Federal proposals and conclusions contained therein.

In addition to duplicating many of the City's facility planning efforts, the Federal EIS has not adequately or correctly addressed or resolved the stated issues originally used by USEPA to justify its preparation. Therefore, the EIS document is believed to be both environmentally incomplete and unacceptable, and technically inappropriate and inaccurate.

Specifically, on the environmental issues, the EIS would appear to be unresponsive to several major local concerns and problems as follows:

1. The EIS does not include any specific environmental assessment whatsoever of its decision to construct a Sewage Treatment Plant on Anheuser-Busch property in close proximity to the highly developed residential and commercial districts of Worthington, Westerville, Sharon Woods, and other North Columbus areas. USEPA's neglect of such concerns as air quality, potential odors, property values, implementability and legality is in direct violation of Federal regulations which require that an EIS present a detailed assessment of the environmental impacts for public evaluation and information. This omission alone is grounds for elimination of this EIS proposal and all other EIS decisions related to the Southerly Plant. The City's Facility Plan recommended continued treatment of the brewery waste at its existing remote Southerly site.

2. The EIS interceptor alternatives are based on a 20 year design period, flowing half full. The EIS has not justified this interceptor planning period or design basis with any cost effective analysis, nor does it present any environmental assessment addressing the impacts of construction of parallel sewers in 20 years which will be necessitated by the smaller sewers proposed.

3. The EIS proposes delayed construction of the Big Walnut Interceptor Sewer in the developing Hoover Reservoir area. This decision seriously endangers the City's present and future drinking water supply by increasing the probability of contamination by untreated sewage. This proposal is in direct conflict with the City's efforts to protect this valuable and irretrievable

natural resource. Furthermore, the EIS proposes to locate the future sewer in an environmentally critical area. The City's Facility Plan made note of said area and recommended an alternate route as well as immediate construction to protect the public health.

4. The EIS proposes construction of sewage pumping stations and force mains in lieu of gravity sewers for the Blacklick Interceptor, the Rocky Fork Interceptor, and a section of the Scioto West Interceptor. With the present and future threats of electrical power interruptions for extended periods of time, the City finds these alternatives to be less reliable than the gravity sewers recommended in its Facility Plan. Unnecessary pumping of sewage when gravity sewer alternatives are readily available is contrary to today's energy conservation needs, and poses a greater threat of sewage backups, of odor nuisances and hazards to the public health. In summary, these EIS decisions neglect to consider the energy intensiveness and reliability of pumping stations and force mains versus gravity sewers. Furthermore, no environmental assessment was included in the EIS on the impacts of future construction of gravity sewers to replace these force mains.

   Specifically, and in regard to the Blacklick area, the USEPA force main is located along U.S. Route 40 and extends through the middle of commercial and residential areas in the City of Reynoldsburg. The EIS has underestimated the impacts of construction through such highly developed areas.

5. The EIS also calls for delayed construction of several other proposed interceptor sewers. The City views this decision as environmentally unsound, as it promotes continued use of private treatment units in areas where both the City and OEPA have recognized or identified limitations of the soil to continually assimilate such poorly treated sewage.

6. The USEPA EIS has proposed expansions to the City's two existing wastewater treatment plants on the Scioto River which are believed inadequate to meet community needs, and could result in significant adverse environmental impacts in Franklin and adjacent counties. Review of the EIS indicates that many of its proposed facilities utilize unproven technology, are based on questionable assumptions, and are designed using parameters which deviate from normal engineering standards and practice. New environmental impact or consequences are presented, discussed or analyzed in the EIS regarding these speculations.

From a technical standpoint, a large portion of the EIS is devoted to the presentation and development of design criteria and unit process sizing. An intensive review of this document by the City and three consulting engineering firms concludes it is not an Environmental Impact Statement. Since two thirds of the document address redesign of facilities, it should properly be termed a "Re-design Report" or a "Value Engineering Report". The City of Columbus recommends that Region V, U.S.E.P.A. withdraw these sections of this document that deal with design considerations. Such

detailed presentation and development is felt to be beyond the authority of an Environmental Impact Statement.

However, since the EIS has inappropriately included these tasks, we feel obligated to point out some major inconsistencies, inaccuracies, and areas of total disagreement.

1. Construction of a new, separate Sewage Treatment Facilities at the Anheuser-Busch Brewery with discharge to the Southerly Plant in lieu of total treatment at the Southerly site was deemed cost effective in the EIS based on a highly questionable cost analysis. Real savings of such a treatment scenario are believed to be significantly overstated. The EIS states that construction of the brewery Sewage Treatment Plant will cost 2.9 million dollars. Anheuser-Busch's engineers estimate construction cost at about 2½ times this EIS estimate. The EIS also states that about 30% of the solids handling and disposal facilities and all of the first stage liquid treatment facilities proposed in the Facility Plan for the Southerly Plant can be eliminated by prior treatment at the brewery. The EIS fails to account for the fact that the same amount of solids must be handled by the Southerly Plant in either case, and that further treatment of the brewery waste and full treatment of all other industrial and domestic wastes must still be accomplished at Southerly.

   The net effectiveness of separate brewery treatment is also subject to serious question since the solids generated at the remote location may be physically degraded and/or biologically changed during the long 23 hour residence time in the sewer system prior to reaching the Southerly Plant. The EIS should have conducted detailed studies on net treatment effectiveness prior to making such a proposal or decision.

   Legally, there are no existing Federal or local laws requiring the pretreatment of compatible brewery wastes. Therefore, the legality and implementability of this EIS proposal are highly questionable. The City feels that neither it or USEPA has any legal authority to implement this EIS mandate. However, the City has already imposed a limitation on the brewery discharges under authority of its existing ordinances. In addition, a two year research study, conducted by Ohio State University under contract with the City, on bulking problems at the Southerly Plant has not shown brewery waste to be the direct cause.

2. Design criteria used in the Federal EIS for expansion of the City's two existing treatment plants are consistently inadequate, based on unproven technology, not in conformance with recognized engineering practice, and, in many cases, are contrary to USEPA's own published criteria and not approvable by Ohio EPA. The City's consulting engineers are not willing to use these EIS parameters because of the probable damage to their professional reputations. Utilization of such criteria results in the EIS development of misleading and unrealistic cost savings in comparison to Facility Plan proposals. Does USEPA really expect anyone to believe that a cost savings can be realized by not providing adequate facilities?

Here again, optimization of facilities should be a function of the Step 2 design and value engineering processes, not of the Environmental Impact Statement. Deviation from normal engineering practice can only be recommended after detailed and extensive pilot testing and in-plant analysis. It is highly improbable that a large treatment plant designed on such a basis could regularly meet the strict discharge permit limitations imposed on the Columbus plants. Using these inadequate criteria, excessive violations of U.S.E.P.A.'s own effluent limits will occur. Is the goal of U.S.E.P.A. to restore water quality in the Scioto River? If so, it is difficult to relate inadequate facilities with this goal.

3. The City of Columbus presently has inadequate incineration capacity at both treatment plants. For the past four years, the City has repeatedly requested USEPA to fund additional units. Our present situation is indeed desperate. The two incinerators at Southerly Wastewater Treatment Plant are worn out and have been for four years. To completely rebuild these units requires some two years. Without backup units, the City cannot shut down any of its existing facilities for rebuilding. Under the present conditions, incinerators cannot be out of service other than for the time necessary to make emergency repairs. The Jackson Pike Wastewater Treatment Plant is currently rebuilding both incinerators, and likewise, without backup facilities, must divert sludge to an existing lagoon.

   Region V USEPA assured the City in the summer of 1976 that the incineration issue would be resolved first in the EIS. Now after two years and a draft, "so called EIS", the incineration question is <u>still not resolved</u>.

4. The EIS's negative assumptions on the growth rate and the short sightedness of the planning area is of major concern to the City of Columbus. Many factors affect growth of a community or a metropolitan area Some of these are:

   - area attractiveness
   - strategic location
   - geographic location
   - natural resources
   - human resources
   - business and industry
   - economy
   - local government policies
   - state government policies
   - federal government policies
   - "in" migration or "out" migration
   - birth and death rates

- transportation system and

- utility services provided such as

    electricity
    telephone
    water
    sewer and
    solid wastes

All of these factors, and more, decide the population and area growth. While the importance of each factor listed may be debated by planners and nonplanners, the order listed above is thought to be indicative of the priority placed upon the many factors by the majority of people and industry.

The area's attractiveness, strategic and geographic location, natural resources and human resources must be at, or near the top, of any priority list. The exact order, or which should be number one or number five, would be debatable by many. Government policy at the various levels affects growth in that it either encourages or discourages the rate of growth. As with the other factors in the mid range of the above list they tend to affect the rate of growth but are not in the upper third in controlling factors. The remaining lower third of the list would be debated by many. In fact, some of these may be in the middle or upper one-third.

The main point of this discussion is that, while the exact position of utility service may be debated, utility services, especially water and sewer, are not major controlling factors. Frequently, the adequacy of these facilities affect decision, but they are not controlling.

Frequently in a metropolitan area transportation is of primary importance. If the transportation is available and the area is attractive (which is used here to cover many intangibles), then people will obtain water and sewer facilities by whatever means is necessary. There is a good reason for this. Typically the cost of water and sewer services, by even the most expensive means, represents only about one percent of a family, business or industry budget, in all but the most unusual cases. People are concerned and want these services at the lowest reasonable costs, but generally these costs do not represent a significant portion or deciding factor of the family, business or industry location. A cost range of one-half of one percent to perhaps a maximum of five percent of a family or industry budget would cover all cases. In some instances, the availability and adequacy of water or sewer service may be a prime consideration. However, these instances are thought to be very few.

The cost difference between providing properly planned and adequate sewer service facilities concurrent with or slightly before development is minor when comparing these same facilities after growth has occurred and pollution problems develop.

Historically, sewers and wastewater treatment facilities have followed planned growth and development, not preceeded it. The very reason that water pollution control legislation was passed is that this condition was allowed to progress to such a point that gross pollution problems resulted.

The responsibility for implementing the water pollution abatement program in the Columbus Metropolitan Area rests with the City of Columbus. More specifically, with the Department of Public Service, Division of Sewerage and Drainage. It is for this reason that the Division has been primarily responsible for preparation of the Columbus Metropolitan Area Facilities Report and for the in depth review and comments on the Draft Environmental Impact Statement prepared by the U.S.E.P.A.

The review by the Division and its consultants has been thorough and are presented in this attached document. The comments are lengthy and for the most part are somewhat technical and therefore not necessarily understood by all of those who read them. But water pollution abatement, wastewater treatment, and sewer design are technical subjects and can only be discussed intelligently in these terms.

Even though this response by the Division is lengthy, we find it necessary because it has been one of the few forums in which the City has been afforded the opportunity to participate in the tragedy of the Columbus Environmental Impact Statement planning process.

We speak of it as a tragedy because of the valuable time, money, and effort that has been expended to produce a document that is technically inaccurate, environmentally incomplete and that makes recommendations for upgrading the City's wastewater treatment plants based on unproven technology. The City has an obligation to the taxpayers of the Columbus area to use sound judgement and competent engineering in developing an effective water pollution abatement program. Utilizing unproven technology to build a 200 million dollar expansion not only violates ones own sense of responsibility but it would also violate the trust the people of Columbus place in their local government. Maybe the U.S. government can afford this kind of blundering, but we cannot.

The two years it has taken to produce the so-called "Draft EIS", and we repeat this is only a draft document (and it is unknown when the final version will be completed) has increased the cost of the program by about 30 million dollars. This money, of course, will have to be made up by increasing both local and federal long term debt. The real tragedy of this loss is that the repayment burden will not rest with those that caused it, but will fall upon our children and grandchildren. Cannot we be more responsible?

An Environmental Impact Statement is supposed to bring together all of the various inputs of information, data, skills and opinions on a particular proposed action. And after weighing each input carefully, sifting the evidence, and with wisdom and experienced judgement, formulate a recommended plan that will accomplish the goals and objectives of the program. How can this be done without direct interaction with the people that are directly responsible for implementing the program, the City of Columbus? The answer is that it can't. Few times during the preparation of the "Draft EIS" was anyone in the Department of Public Service contacted to discuss findings or recommendations. The contents of the statement reflect this omission.

The water pollution abatement program envisioned by the City as its part of the national goal to restore the integrity of the Nation's waters is expected to be very expensive in terms of dollars and resources. The City has no other choice but to rely on the 75% funding that is available under the U.S.E.P.A. Construction Grant Program. Since that funding is contingent upon the completion of the Columbus EIS, the City has no choice but to do its very best to see to it that the EIS actually reflects the needs of the Columbus community.

For these reasons, the Division has taken the time to prepare this lengthy review. To addressing every calculation, statement and recommendation in the "Draft EIS." To make sure that every comment is factual and represent sound judgement and not just an assumed or unproven guess. The "Draft EIS" is wrong! It is hoped the comments in this review will set it straight.

DETAILED REVIEW

REVIEW OF CHAPTER I. INTRODUCTION, BACKGROUND, AND ISSUES

Page I-2 The EIS states that the City of Columbus and the Board of County Commissioners co-applied for a Federal grant to expand and upgrade the City's treatment facilities. The City of Columbus was the sole applicant. (4.1.1)

Page I-4 Separate brewery wastewater treatment was not an issue in the U.S.E.P.A. "Notice of Intent" to do the EIS. (4.1.2)

Page I-6 EIS states it will use the same planning area as delineated in the Facilities Plan. However, the alternatives considered for interceptors use a different planning area. (4.1.3)

The EIS did not use the same flow data available at the time the Facility Plan was prepared. Planning of alternatives and drawing conclusions is difficult, at best, if different data is utilized in the planning process. (4.1.4)

Page I-8 The EIS states that realistic schedules extend the construction of facilities 5 to 7 years. The City agrees that it may even be longer with the delays that have been incurred by the EIS process.

REVIEW OF

CHAPTER II. ENVIRONMENTAL SETTING

General Comments

Detailed comparisons between the EIS and the Facility Plan resulted in no notable differences in findings or conclusions. Even in the case where data available after the preparation of the Environmental Assessment was reviewed, i.e., air and surface water quality data, conclusions were identical. Several discrepancies were noted in this chapter as follows:

The Man-Made Environment portion of this chapter was developed in a format completely different than that of the Environmental Assessment. A critical inconsistency, that of population projections, is discussed later due to its effect on interceptor sizing. Other inconsistencies are the lack of discussion on the socio-economic profile and solid waste disposal and an extraneous discussion on current and projected economic characteristics.

The City believes that the population projections as contained in the original Facilities Plan have not been shown to be significantly different than any other reasonable projections. Given the nature of projecting future populations, a significant difference should be proven to justify any change from the Facilities Plan. Minor variations in projections (10-15%) have to be ignored since wastewater collection and treatment facilities have to be designed and constructed to handle peak flows and provide adequate treatment during dry weather low stream flows.

Probably the biggest issue addressed from a planning standpoint in the EIS is the issue of induced growth. The paragraph at the bottom of page II-25 seems to offer a better cause for induced growth than found elsewhere in the EIS, and it is only partially correct. The interstate highways have convincingly made it easier for people to move about in the urban area and their basic purpose, notwithstanding, had its foundation in a healthy economy and a growing population. This is true because the outerbelt serves two functions -- to provide a bypass for through traffic and to relieve traffic volume pressure in the center of the urban area. The latter fact is of far greater importance to inducing suburban growth than is interceptor sewers.

Further in this chapter, the point is made that most existing economic expansion trends are likely to continue, i.e., expansion of that portion of Franklin County outside the City of Columbus. However, that is qualified by the statement that "plans to revitalize the downtown area may reduce the decentralization trend of the 1960's and 1970's." First, downtown to most people would be defined as the area within the innerbelt highway. To say that growth in this area would be responsible for measurably reducing the decentralization trend is almost incomprehensible. Even if the EIS does not intend such a confined area as this, it will take several decades to offset a trend that is far more historical than just the 1960's and 1970's. One of the principal reasons for decentralization has been to avoid congestion, and we have not seen

any noticeable trends to indicate any change. It is particularly evidenced in Columbus by the low density of development compared with other areas. We know of nowhere in any U.S. metropolitan area where density does not decrease as the distance from the downtown or center increases. (4.1.5)

Another major issue concerns the statement on page II-53 that "the total of 48,281 acres available for residential development will support a growth of 977,204." Without taking exception to the assumption that this land would be developed at the same density as the present average density of the city (which is at least arguable), nothing is offered to describe the location of this "available" land. Nothing is mentioned regarding other elements of the infrastructure which may or may not exist, or such other factors as zoning, social setting, accessibility, community facilities such as schools, parks, health facilities, etc. Available and suitable are not always synonomous terms where developable land is concerned. In addition, there seems to be an inference that some of this land has been or will be bypassed. We are forced to ask the question "Why has this land not been developed?"

Page II-54 references a Mid Ohio Regional Planning Commission (MORPC) study indicating excess sewer capacity in the city. This can probably be said of most cities, and therefore is hardly an unusual situation. However, we view this inference as being misleading because, while this under-capacity is found in "most areas except....," we contend that most areas are probably already developed, and it is

highly unlikely they will be candidates for redevelopment at higher densities within the planning area. Also, the EIS mentions ultimate population, and if these areas of excess capacity are not completely developed, the sewer capacity is bound to be excessive until the area is completely developed.

The EIS states that "the availability, adequacy and accessibility of community services will influence the community's development patterns." Community services historically follow, not precede, development, and they don't seem to have had much of an influence on development in the northern part of Franklin County or in the southern part of Delaware County where there are few such services.

Finally, the EIS does not generate any new environmental impacts on any of the alternates proposed in the Facilities Plan and should therefore, come to the same conclusions.

Specific Comments

Page II-8 Rocky Fork has been deleted as a tributary of Big Walnut Creek. Also, no discussions of Little Walnut Creek are included. (4.1.6)

Page II-11 282 mgd is the total safe yield from surface water sources instead of the 182 mgd reported in the EIS. (4.1.7)

Page II-11 Surface Water Quality information in the EIS contain:

1. No significant discussion of nonpoint sources. (4.1.8)
2. A report of "several fish kills" on the Olentangy River which are unsupported by documentation. (4.1.9)

3. No discussion of fecal coliforms, and (4.1.10)

4. Hypothetical statements concerning dissolved oxygen concentrations in the Olentangy River. (4.1.11)

Page II-16 The EIS incorrectly states that the northwestern quarter of Franklin County was not covered by Climax beech forests. (4.1.12)

Page II-32 Why did the EIS generate new population projections when this was already done in the Facilities Plan. Why did the EIS generate new projections when five local agencies already had generated projections? Local agencies would certainly have a better concept of population characteristics in Columbus than U.S.E.P.A. in Chicago. It is noted that the EIS used a planning period population of 1.11 million as compared to 1.18 million in the original Facilities Plan. This shows the EIS effort for population projections resulted in insignificant differences. (4.1.13)

Page II-35 Why did the EIS generate new population projections for the Interceptor Service Areas when this data was generated earlier for the Facilities Plan. (4.1.13)

Page II-42 The City of Columbus does not suffer from an inadequate water supply, nor do they anticipate any shortage throughout the planning period. (4.1.14)

Page II-47 There is a tendency to equate all vacant land as active farm land. The EIS should address how much vacant land is active farm land. The U.S. Government is currently planning to pay farmers to take a minimum of 10% of all active farm land out of production.

The conclusion has to be that we have too much active farm land. (4.1.15)

Page II-50 The EIS should explain that the Scioto West Interceptor would also relieve the contraints imposed now on flow to the Scioto East. (4.1.16)

Page II-54 The EIS is misleading the readers by stating that excess sewer capacity exists. When one considers the basis under which the sewers were designed, then the sewers have capacity for the intended purpose. Until such time as the ultimate population is reached, the sewers will always technically have excess capacity.

Table II-23 does not reflect sewer charges currently in effect. A new rate structure was developed which charges proportionate rates to all users of the Columbus Sewerage System. The new rate structure satisfies the requirements of PL 92-500 and has received formal approval by U.S.E.P.A. (4.1.17)

Page II-57 Safe yield of water appears to be incorrect according to City of Columbus figures. (4.1.18)

REVIEW OF
CHAPTER III. SERVICE AREA AND SEWER SYSTEM ALTERNATIVES

General Comments

Service Area Population Estimates

The EIS projections are, in three service areas, lower than those used in the Facilities Plan (FP) and the EIS projections for two service areas are higher than those used in the Facilities Plan. The total difference is less than 2.7 per cent.

Who can estimate population any closer than this?

The City believes the Facilities Plan is better than the EIS.

Environmental Impacts

The EIS has duplicated material from the Facilities Plan for the interceptor alternates.

Design Criteria

Planning period - the EIS uses 20 year population projections with interceptors flowing at half full. The implication is that the sewers will convey, at full capacity, the flow from the forty year population. However, projections for the Facilities Plan show the population in the service areas will increase 3-4 times from the year 2000 to 2025. On this basis, it is estimated that the EIS proposed interceptors will only convey flow for a 25-30 year planning period, at full capacity. Therefore, additional interceptors will need to be constructed parallel to the EIS proposed sewers. The EIS does not consider the environmental or economic impacts of parallel sewers. The City will not design or operate sewers with capacity less than their own criteria. (4.1.19)

Previously Approved Projects

EPA has approved the following interceptors using the City of Columbus ultimate criteria.

1) Scioto West and Scioto East
2) Brookside Estates
3) Alum Creek Interceptor
4) Big Walnut Interceptor
5) Sewers in Westerville and Dublin
6) Blacklick Creek

For further back-up information, see Attachment 1.

Cost Estimates

EIS used 0.25 percent of the construction cost as annual O & M for the interceptors. A properly designed gravity sewer larger than 15-inches in diameter would not require O & M except in rare instances. This distorts cost estimates in the EIS. (4.1.20)

Salvage values were not straight lined, but appear to have followed a decreasing rate trend. This approach has no justification for interceptors and tends to show a higher present worth cost of interceptor alternatives. (4.1.21)

By using a 20 year planning period, the EIS does not consider construction of interceptors for the period from 2000 to 2025. Therefore, the present worth of EIS alternates is lower when compared to alternates scheduled for construction prior to 2000. (4.1.22)

EIS states that it used costs for interceptors based on recent bids in the Columbus area. Where is the documentation? Also, these costs are likely to be less accurate to those in the Facilities Plan since the Facilities Plan costs were site specific. (4.1.23)

The increase in costs to construct the ultimate size gravity sewers as compared to the EIS proposed sewer works is approximately 1.5% when compared to the total costs of all the proposed construction.

Pump Stations

The EIS considers use of pump stations and force mains in the analysis of several alternates. These alternatives have not been evaluated fairly, and thus the EIS has arrived at erroneous conclusions. The City will not assume responsibility for design or operation of force main and pumping station facilities as recommended by the EIS.

Sensitivity Analysis

The EIS performs what is called a sensitivity analysis that compares the costs of three methods of sizing interceptors; full at year 2000, half full at year 2000 and full at ultimate population. The EIS justifies half full at year 2000 on the basis that it costs 15 percent less than ultimate.

First of all, full at year 2000 is not worthy of being considered as an alternate. Second, this analysis should have been a cost effective analysis that included environmental concerns related to each type of design criteria. For example, the full at year 2000 and half full at year 2000 alternates will require parallel interceptor construction at a future date. The environmental impacts of such a proposal are much greater as compared to the full at ultimate population alternate in which only one interceptor would be constructed at a time prior to full development. Even though EPA does not recognize the effects of inflation in economic analyses, we feel this factor cannot be ignored.

The EIS states that the full at ultimate population alternate is not cost effective because most of the areas would only be at or less than 25 percent of their ultimate population. The EIS fails to recognize that these same areas are expected to triple or quadruple in population during the years

from 2000 to 2025, which is within the 50 year planning period that should have been analyzed for the interceptor alternates.

Finally, it is noted that the EIS does not do a cost effective analysis to justify its basis for design. (4.1.24)

West Scioto Interceptor

General

After the EIS shows that the High Level Alternate is more cost effective than the Low Level Alternate, it then proceeds to extend and enlarge the interceptor to convey flow from South Western Delaware County. However, no Cost Effectiveness Analysis (CEA) is performed that compared the pump station and force main alternate to that of extending the West Scioto Interceptor north from M.H. No. 3. (4.1.25)

Alternatives

EIS arrives at same conclusion as was presented in the Facilities Plan with the exception of the pump station and force main. The EIS does not include a Cost Effectiveness Analysis of the pump station, but only an economic analysis. No environmental issues are discussed with regards to the pump station and force main over Griggs Reservoir. Factors that should have been included are reliability, energy intensivenesss, etc.

Legality - Columbus cannot serve South Western Delaware County without a sewer contract.

Big Run Interceptor

General

The EIS considered the same alternate as was presented in the Facilities Plan.

Phasing

The EIS suggests that the section between M.H. 4 and 5 may be needed by 1995, but the rest of the interceptor should not be built during the planning period. The EIS overlooked the fact that the section between M.H. 4 and 5 could not be constructed unless the section from M.H. 5 to 6 was constructed. (4.1.26)

Alternatives

The EIS proposes construction of two interceptors along Fedder Road and Renner Road. However, no CEA is performed to determine if other alternatives to serving this area are attractive. No calculation was made to determine if the existing interceptor system has the capacity to serve the Fedder and Renner Roads areas. Finally, the interceptors proposed by the EIS are incapable of being extended in the future. (4.1.27)

Minerva Park

General

The EIS duplicated the alternates as used in the FP. The only difference is that the EIS proposes smaller pipe sizes due to their sewer design criteria. It is noted that the EIS states ".... an interceptor would be constructed from the Minerva Park WWTP in westerly direction to....the existing Alum Creek Interceptor." The EIS is in error, since the Alum Creek Interceptor is located east of Minerva Park. (4.1.28)

Big Walnut Creek, Blacklick Creek, and Rocky Fork

Big Walnut Creek

General

The EIS proposes delayed construction of alternate A, which the FP stated was in an environmentally critical area. Also, the delayed

construction of this interceptor will increase the threat of contamination to Hoover Reservoir. (4.1.29)

Alternatives

The EIS considers three alternatives for the Big Walnut area, identical to those previously analyzed by the Facilities Plan.

Phasing

The EIS recommends that construction of the portion south of Hoover Reservoir may be needed by 1985. However, the remaining section would not be constructed during the planning period. According to the EIS recommendations, Alternate A would eventually be implemented, although not immediately. This conclusion was not based on a Cost Effectiveness Analysis but rather, on an economic analysis alone. The FP discussed the environmental assessment of each alternate for Big Walnut Creek, and Alternate A was located in an environmentally critical area. Implementability was also noted to be a significant factor in the FP as well as the environmental impacts to Hoover Reservoir.

Rocky Fork Creek

General

The EIS proposes construction of a pump station and force main to serve New Albany. The issue for the EIS to address is whether or not collection facilities are necessary.

Alternatives

Basically, the EIS contains the same alternatives as presented in the FP with the addition of a pumping station alternative, which it recommends. No considerations are given to reliability, energy intensiveness, or environmental impacts related to delayed construction of interceptors. Unnecessary pumping of sewage when gravity sewer alternatives are readily available is contrary to today's energy conservation needs, and poses a greater threat of sewage backup, odor nuisances and public health hazards.

Phasing

The EIS delays construction of all interceptor alternates until 1995. It proposes a pump station and force main be constructed immediately to serve New Albany. The pump station and force main sizes would be affected by annexation plans presently being contemplated by New Albany.

Blacklick Creek Area

General

The EIS recommends serving only the immediate area of Reynoldsburg with a pump station and force main.

Alternatives

The EIS considers the same three alternatives as previously analyzed in the FP with the addition of the pump station and force main alternate, which it recommends be constructed to serve Reynoldsburg for the period from 1980-2000 The EIS overlooks the fact that the adjacent 201 Facility Plan for Canal Winchester considers, as one alternative, conveyance of its sewage to the Blacklick Interceptor.

Also, as stated in other alternates, the EIS neglects to consider environmental impacts and makes recommendations on an economic basis only. This is quite evident in the Blacklick Creek force main alternate which would be constructed through highly developed areas of Reynoldsburg. The EIS grossly underestimates the environmental effects by stating that the route is *along residential* and open grassy areas. This is totally incorrect.

Finally, the EIS does not consider reliability, energy intensiveness or environmental impacts related to delayed construction of interceptors. Unnecessary pumping of sewage when gravity alternates are readily available is contrary to today's energy conservation needs, and poses a greater threat of sewage backup, odor nuisances and public health hazards.

Population Estimates

The EIS is inconsistent throughout its analysis of the Blacklick Creek alternates with respect to the population to be served.

Cost Estimates

The costs presented in Table III-7 for the Big Walnut Creek, Rocky Fork and Blacklick Creek Sub-Areas are misleading. They would appear to have been manipulated to allow the pump station alternate to look economically favorable. (4.1.30)

Groveport

General

The EIS recommends Alternate A which is identical to the recommendation in the Facilities Plan. This is another duplication of effort.

Rickenbacker AFB

General

The EIS considered regionalization of Rickenbacker AFB. This area was not considered in the Facility Plan because the City of Columbus did not have a sewer contract with RAFB. Alternatives for serving the AFB should be performed in a Facility Plan Update and not in an EIS.

Specific Comments

Page III-1 The force main under Section 3.1.2 crosses the Scioto River at Martin Road, not at S.R. 161. (4.1.31)

Page III-2 EIS states a detailed analysis of the combined sewered areas is inappropriate at this time. This was one of the major issues listed in the Notice of Intent to do the EIS.

EIS states a model of the combined sewer areas was done. The reliability of such a model is questionable since it was based entirely on theoretical concepts and was not verified by actual field measurements. (4.1.32)

Page III-5 Outletting the Sunbury/Galena/Delaware County Facilities Planning area into the Columbus system is not dealt with in the Big Walnut or Rocky Fork EIS alternatives. (4.1.33)

Page III-8 The EIS states "Sewers for the areas to be regionalized were designed in the Facilities Plan based on ultimate population. Guidelines proposed since the preparation of the Facilities Plan have recommended the use of year 2000 populations for sewer design."

(1) Why do we have to start over with new designs every-time a new guideline comes out.

(2) The above EIS statement says that the year 2000 is recommended for sewer design, but does not say that the year 2000 is required.

The EIS states that the quantity of dry weather flow used for sewer design in the EIS is 90 gallons per capita per day without

Page III-8 (cont'd.) any backup calculations or any comment about the Facilities Plan design. (4.1.34)

The EIS allowance for infiltration is 10 gallon per capita per day. This is not nearly enough and should be estimated on an acreage basis and not tied to population. The fallacy is that, for a given population, the area in which this population lives will require different lengths of sewer lines depending on development patterns and the area in which the population resides. (4.1.35)

Basing the infiltration on a per capita basis (instead of lineal feet of sewer based on an inch/day/mile standard or per acre assumption based on an average length/inch/day/mile criteria) is irrelevant, as per capita per acre densities are too variable to relate to physical feet of sewer subject to infiltration.

The EIS infiltration allowance makes no consideration for house services, illegal connections, abuse or even deterioration. This is unreal! In general, the EIS design criteria for sewer design is unreasonable and not good engineering practice.

The EIS does not truthfully represent the facts relative to the Scioto East Interceptor. Dublin is currently limited to discharging 29 cfs. Once this capacity is reached development will be stymied until the Scioto West Interceptor is built. (4.1.36)

Page III-9 EIS used costs for interceptors based on recent bids in the Columbus area. However, it is inappropriate to use these costs in different areas of the City because each interceptor site has its own construction problem. The Facilities Plan used cost which were developed for each specific site.

The EIS shows the interceptor alternates to include Operation and Maintenance costs (O&M). O&M costs are much lower in interceptors than stated.

EIS assumes the life of wastewater treatment plants to be 35 years. This assumption is completely unrealistic. (4.1.37)

Page III-9 The use of the 1/2 full criteria provides for capacity beyond the planning period, but no analysis was done to relate the 20-50 years population flow demands to the sewer which has a stated service life of 50 years to determine whether the sewer will serve the area throughout its stated life. (4.1.38)

EIS indicates that water pollution problems should be allowed to be created (New Albany area) before anything is done about them. This is ridiculous and does not reflect proper environmental concerns and definitely does not reflect the intent of Public Law 92-500. (4.1.39)

Page III-12 Pumping stations are not good practice in this day on conserving energy, especially when a gravity sewer can be constructed. (4.1.40)

Page III-12 The statement of the West Scioto pumping to the East Scioto does not address the temporary nature of this Facility and the restriction of outletting capacity.

The "permanent" pump station cannot be permitted to usurp East area sewer capacity. (4.1.41)

Page III-14 The adding of additional Delaware area merely compounds the above comments and requires a complete reworking of this area analysis. (4.1.42)

Page III-17 No substantial information is presented to back up the EIS contention that some part of the Big Run area can be cross connected to easterly area sewers by gravity. Several proposals have been made to the City in the past and it has been the City's constant experience that pumping was required from each of the several locations that were within the eastern part of the Big Run area N & S of I-70. (4.1.43)

Page III-17 With regard to running an interceptor from the Minerva Park plant to the Alum Creek Interceptor, it would be quite a feat to do it going west. A considerable amount of money would be saved by going east.

Page III-20 For Big Walnut, the EIS considered the same three alternatives as was previously done in the FP with the addition of another alternate. The EIS recommends eventual implementation of Alternate A which was shown in the FP to be extensively routed along environmentally critical areas. (4.1.44)

Page III-25 Growth in the Blacklick Creek area is stymied by the lack of sewers and the reluctance by the County Commissioners and OEPA to approve package plants for the developers who hold large tracts of land. Once it becomes obvious that sanitary sewer will not be forthcoming, then the developers will most likely start construction anyway. Once the package plants are in, there will be little support if not outright opposition to paying a second time for interceptors. Conclusions drawn by EIS are not valid. (4.1.45)

Page III-28 The EIS should explain that the Big Walnut interceptor would also relieve the pollution load on Hoover Reservoir that now exists. One of the things the Sunbury-Galena facilities plan must address is the possibility of the interconnection with the City of Columbus via this interceptor as opposed to building a treatment plant and discharging directly to Hoover Reservoir.

Page III-30 The EIS does not consider all the facts regarding the Blacklick Creek Proposals. The Metropolitan Park is aware of the sewer alignment and supports its current location. They are desirous of seeing that reach of Blacklick Creek cleaned up immediately. (4.1.46)

Page III-31 The EIS recommends implementation of a force main along U.S. 40 for the Blacklick area. The environmental and aesthetic impacts of this alternate were grossly underestimated in the EIS. This force main travels along a U.S. highway and would cause severe traffic disruption as well as significant disruption of business which is located along a large portion of the proposed route. Tunnelling would be extensive due to the number of U.S. highway and Interstate highway crossings. (4.1.47)

The EIS proposed pumping station location set in the vicinity of S.R. 161 and the force main to Big Walnut Interceptor totally ignors the fact that a previous federal grant paid for a gravity sewer from the creek to the vicinity of Hamilton Road just south of Morse Road. This grant and construction was made to provide an outlet compatible with the New Albany plans. This situation will require a complete reworking of the cost effective analysis for the Big Walnut/Rocky Fork/Blacklick areas. (4.1.48)

Page III-32 Blacklick Alternative D has the most primary impacts (even considering the Blacklick Woods Metropolitan Park) and should not be constructed. The gravity interceptor sized to ultimate

flow is the best way to clean up the waters and to eliminate dual and triple construction impacts. (4.1.49)

No consideration was given to the existing treatment plants in the vicinity of I-70 and S.R. 256 and S.R. 204. (4.1.50)

Page III-40 Rickenbacker Air Force Base is not in the approved planning area. (4.1.51)

REVIEW OF
CHAPTER IV. ALTERNATIVES TO THE PROPOSED PLAN

General Comments

Pretreatment of Anheuser-Busch Brewery Wastes

The City of Columbus considered pretreatment of the brewery; however, this option was deemed unappropriate for the following reasons:

1) The brewery load is not considered incompatible according to EPA standards.
2) No pretreatment standards for brewery wastes have been published to date.
3) Economies of scale indicated that treatment at Southerly would be less expensive.
4) The environmental impacts of a sewage treatment facility at the brewery would be significantly greater as compared to treating the brewery waste at Southerly.
5) The City has no legal authority to impose pretreatment standards on the brewery.
6) Discharge of pretreated brewery wastes might be worthless due to the long travel time in the sewers to Southerly.
7) A two year research study, conducted by Ohio State University under contract with the City, has not shown brewery waste to be the direct cause of bulking problems at the Southerly Plant. (4.1.52)

The EIS recommends "pretreatment" of the brewery waste to the point that the soluble oxygen demanding load is largely removed (a roughing filter at Anheuser-Busch). The following questions should be taken into consideration:

(1) Have adequate provisions been taken to prevent odors?
(2) What is the success and feasibility of this method?
(3) What will be the impact on Southerly solids handling facilities?
(4) Will there be problems in the sewers?

(5) Is this being done anywhere successfuly? If so, what are the problems?

(6) Who would operate the Brewery facility?

(7) Were the basis of cost estimates the same?

(8) Can this proposal be implemented?

(9) Can any of sludge handling at Southerly be eliminated as proposed?

(10) What are EIS proposals for quantities of sludge generated and methods and costs of disposal?

(11) Table IV-2 Page IV-6. It appears in the EIS, that scenarios 2, 3 and 4, eliminate $24.5 million in solids handling costs at Southerly. While the Brewery costs reflect increases as level of treatment increases, the level of cost at Southerly doesn't vary. - <u>This isn't possible</u>. --- The solids processing cost at the Southerly in "Scenario 2" would have to be greater than in "Scenario 4"! (4.1.53)

Based on present worth equivalent estimates, which are within ten percent of each other, can it be reasonably concluded that Scenario 2 is the best overall brewery waste treatment strategy?

Were projected loads at the Brewery taken into consideration?

It appears that the data presented in Table IV-2 are erroneous and inaccurate. (4.1.53)

The bond issue for a refuse and coal fired power plant has been approved and planning is proceeding. The discussion of the use of the Jackson Pike Plant effluent as cooling water at the power plant is beyond the scope of this EIS or the facilities plan and should not be addressed. (4.1.54)

Land Disposal of Sludges

The City of Columbus is interested in developing a land application program but has been very reluctant to implement a full scale program because of some of the undefined environmental pollution problems that could result with attendant liability to the City. The City recently accepted an invitation by the Ohio Farm Bureau Federation to participate in a land application program which would investigate all aspects of land application of sludges under an EPA federal grant. Under this 3 year program, the City will be cooperating with the Ohio Farm Bureau and the Ohio State University's Department of Agriculture Engineering and College of Medicine, by applying sludge to land under completely controlled conditions. This program will generate valuable data and information which can be taken into consideration in the development of future land application programs.

Landfill disposal of sludge is against Ohio EPA policy and furthermore it is not implementable due to a considerable amount of public resistance. Reclamation of strip mines must be a total program which serves the need of the strip mine operator. This program is therefore not one which can be turned on and off by the failure of incinerators.

The City of Columbus considers the alternative of using land disposal of sludges as a backup to incineration as inadequate until further developmental programs have been performed. Therefore, the City requests immediate approval of the proposal as presented in the Facilities Plan for disposal of sludge. (4.1.55)

Design Parameters

In developing the design flows, the Infiltration/Inflow Analysis Report has been completely ignored. Instead, I/I flow data has been developed using assumptions which are not backed up by any actual local field work.

The wet stream processes in the Facilities Plan were designed to treat loads corresponding to projected average dry weather flows and peak hydraulic flows equal to twice the average dry weather flows. This would constitute the first stage of construction. During the second stage, additional facilities will be designed and constructed and as warranted by the results of combined sewer monitoring and sewer system evaluation survey. This approach is consistent with the phased construction concept of the Facilities Planning Regulations of the EPA.

In contrast, the EIS has attempted to develop average flows (including wet weather flows) and peak hydraulic flows and yet states (p.IV-2), "Pending the results of an ongoing sewer system evaluation survey, it is not recommended that any additional hydraulic capacity be provided at the two Columbus treatment facilities." (4.1.56)

Oxygen Production and Dissolution

The EIS recommends the use of the jet aeration system. This recommendation does not seem to be based on firsthand knowledge but "reported" standard oxygen transfer efficiencies as high as 5 lbs per brake horsepower hour at 15 feet of water depth. After conceding that "the acceptance of jet aeration system has been limited in the past due to high installation costs, cheap energy, and fears concerning maintenance", the EIS describes new developments and recommends this system even though it further states," jet aeration would not be the system of choice under the energy price of 1.5¢/KWH used in preparing the Columbus Facilities Plans". Thus, the EIS concedes that the jet aeration system would be uneconomical and unreliable in 74-75 when the Facilities Plan was prepared.

Even now, the jet aeration system, adopting what the EIS claims a savings of $1.3 million in first cost at Southerly, is not recommended from firsthand experience of the system or with full consideration of the maintenance and operation problems that it could present to the Columbus plants. Instead, the recommendation and the "saving" in cost

are based on "full scale performance data supplied by Pentech". Also, the EIS shows a higher installed cost for the jet aeration system (6.4 million vs 4 million dollars for fine bubble diffuser) and yet claims a "saving" in first cost!

At the planning stage, cost estimates to compare the available alternatives are usually worked out using proven technologies. During the final design stage a detailed evaluation of the available innovative technology can be worked out and the cost-effective technology which ensures effective operation and ease of maintenance can be chosen. Such a procedure ensures orderly development of plans. The Facilities Plan was developed accordingly. Thus, not only jet aeration but all available technologies for oxygen dissolution would be reviewed at the time of final design. (4.1.57)

Flow Equalization

The EIS states (p. IV-72), "Thus, the wisest flow peak management program for Columbus appears to be one that awaits the results of the sewer system evaluation and sewer separation project in order to rationally define the future benefits to be derived with a flow equalization strategy that makes full use of existing capabilities and considers the full potential of upstream storage within and external to the collection system. This strategy will maximize the City's pollution abatement program in the near term, and offers the potential to fully realize the treatment capability contained in the Columbus plants over the forseeable future".

The EIS here agrees with the Facilities Plan which recommended a phased approach in the construction of the facilities. Yet the EIS develops an

entirely different set of design flow parameters! This waste of time, effort and money could have been avoided.

The EIS states (Appendix Pg. I-27), "The design hydraulic capacity of a plant is normally selected at 2 to 2.5 times the average daily flow for facilities the size of the Columbus installation". We agree that this would normally be the case. However, the following points should be noted:

1. The plant facilities in the facilities plan are designed on the basis of average dry weather flow and not annual average daily flow as design annual average daily flow cannot be determined with certainty without obtaining the results of the sewer system evaluation survey and combined sewer studies.

2. With the construction of necessary equalization facilities in Stage 2, there is no reason for the peaking factor to be 2 to 2.5 times average flow as normally required for plants without equalization facilities. (4.1.58)

Specific Comments

Page IV-35 The anaerobic stabilization of heat treated sludges must be considered an unproven process. (4.1.59)

Page IV-37 Waste heat recovery boilers have been proposed but not installed at either plant. (4.1.60)

Page IV-50 In reviewing Table IV-15, the City assumes there is considerable amount of detailed data to back it up. The following is a number of questions which come to our mind:

(1) How many trucks is a fleet?

(2) What is the size and type of the trucks?

(3) What is the travel time?

(4) What union requirements were considered?

(5) What wage scale was considered?

(6) What secondary roads would they be permitted on?

(7) Where would they be housed?

(8) Where would they be maintained?

(9) Who would maintain them?

(10) What energy considerations were made?

(11) Were air pollution problems from added vehicular travel considered?

(4.1.61)

Page IV-51 The beginning of the paragraph at the top of the page is missing, and is believed to be highly important. (4.1.62)

Figure IV-1 Scheme C Thermal Conditioning - Anaerobic stabilization indicates that sludge cake is recycled to the main drain, is this true? (4.1.63)

Page IV-52 The EIS indicates the farmer should pay for the application of sludge to farm land. Normally it is just the opposite. (4.1.64)

Page IV-65 The City agrees that the present oxygen production and dissolution systems at the wastewater treatment plants severely affects plant operations as well as being maintenance intensive. However, a more in-depth analysis must be performed. A quick solution which has not been field tested for several years is not the answer, unless, U.S.E.P.A. is willing to participate in 100% of the costs. (4.1.65)

There is no lack of manufactured diffuser socks for the Columbus aeration system.

Page IV-67 Preliminary Columbus evaluation of belt pressure filter systems indicated low processing capacity for invested capital, with large numbers of moving pieces and intricate systems indicating potential for severe maintenance problems. (4.1.66)

Page IV-68, 69 Anaerobic digestion of thermally conditioned sludges or decant liquors has been explored by Columbus and should be further evaluated. (4.1.67)

Page IV-76 Comments on variations possible in total operating solids are valid. The need for an adequate air supply to meet demands of increased solids and the effect of contact times to remove soluble organic materials have not been discussed. (4.1.68)

Page IV-80 At the current time the Agency only permits one manufacturer to design at a maximum of 5 gpm/SF. Requiring the City of Columbus to design to this figure is specifying the equipment manufacturer and eliminating competitive bidding. (4.1.69)

REVIEW OF
CHAPTER V. FINAL ALTERNATIVE SELECTION FOR THE WASTEWATER TREATMENT FACILITIES

General Comments

First Stage Biological Treatment

1. We do not agree with the recommendation of the EIS that first stage biological treatment be eliminated at Southerly. (4.1.70)

2. The pump station for trickling filters at Jackson Pike is sized for 220 mgd to allow for "a 20 mgd credit for recycled flows". This shows the danger inherent in making recommendations based on design approach different from that used in the Facilities Plan. For example, the recycle flows do not necessarily have to go to the first stage biological treatment, they can go to the second stage. Also, they can be programmed for addition to the plant facilities during non-peak hours. (4.1.71)

3. As shown in Table K-1 on page K-2, the EIS assumes 58%, 37% and 27% removal of SS, BOD_5 and Phosphorus respectively during primary clarification and without the addition of aluminum to raw sewage on a regular basis. In comparison, the U.S.E.P.A. design manual for phosphorous removal shows the following range of removals obtainable in primary treatment without mineral addition:

Suspended Solids Removal	40-70%
BOD Removal	25-40%
Phosphorous Removal	5-10%

Thus the EIS, contrary to prudent design practice, assumes design removal rates near the higher limits of generally observed range of removal rates. By adopting this practice, it shows lower loads on subsequent treatment facilities which then would be sized smaller than would normally be required.

4. At Jackson Pike, the EIS recommends eight 78-ft. diameter trickling filters. The Facilities Plan recommended eight 104-ft. diameter trickling filters. (4.1.72)

Within the range of the design criteria available, it is easy to pick up a convenient design criterion such as a relatively high design hydraulic load and come up with an "economical" design at this stage. For example, according to the Process Design Manual for Upgrading Existing Wastewater Treatment Plants published by the EPA, "Synthetic media filters, because of their high surface area per unit volume, can perform as well as high-rate filters at volumetric BOD loadings of about 50 to 100 lb/1,000 cu. ft., and hydraulic loadings of 0.5 to 1.5 gpm/sq. ft." In comparison, the EIS design criteria are 1) BOD load of 170 lb/1,000 cu ft/day and 2) hydraulic load of 2.0 gpm/sq. ft. The Facilities Plan design criteria are 1) BOD_5 load of 95 lbs/1,000 cu ft/day and 2) hydraulic load of 1.05 gpm/sq. ft. The design BOD_5 load in the Facilities Plan was based on achieving a 70% BOD_5 removal during the low winter temperatures recorded in Columbus. The EIS claims a 65% substrate removal, while the design equation used to estimate this removal is not known. The USEPA design manual further states, "The results obtained by any design equation will be dependent upon the assumptions made in using the equation. Unfortunately, no equation has yet been developed which reflects the actual performance of filters, due to the complex interrelationship of the many variables involved. Since it is difficult to accurately predict trickling filter performance based on these equations, they have limited utility in trickling filter plant design. Wherever possible, it is recommended that treatability or pilot plant studies be used to verify performance predictions based upon the various design equations".

The Facilities Plan concurred with the above recommendation of the EPA manual and realizing the importance of the huge investment required for these facilities, recommended pilot studies to determine precise design parameters for trickling filters. The EIS recommends against such pilot studies! (4.1.73)

Second Stage Biological Treatment

The EIS recommends that the Busch Brewery treat its waste with trickling filters. The resulting waste reaching Southerly will be treated by single stage activated sludge nitrification process. The system is to operate as a combination of contact stabilization and step aeration. An additional 5.2 million gallons of aeration volume is to be used for the sludge stabilization tank. The remaining tanks (existing) are to be used as contact tanks and operated in a step feed mode.

On paper, this set-up looks good and the MLSS values given in the EIS are reasonable. However, there are some problems in operating in contact stabilization to step aeration mode when complete nitrification is desired. The EPA Process Design Manual for Nitrogen Control states the following concerning the use of contact stabilization for nitrification:

> "The process is not well suited for complete nitrification, even though relatively high solids retention times can be maintained in the process because of the inventory of solids in the sludge reaeration tank. Nonetheless, insufficient biological mass is present in the contact tank to completely nitrify the ammonia and since ammonia is not absorbed on the biological floc, ammonia will bleed through to the effluent. Partial nitrification can be obtained at levels which can be predicted by methods presented in Section 4.3.6. The ammonia bleed-through characterizing contact stabilization plants is avoided in a step aeration plant because of the greater contact times employed and backmixing of influent

> occurs. Nonetheless, some bleedthrough of ammonia as well as organic nitrogen can occur. This bleedthrough results from short circuiting of influent to the effluent and insufficient contact time for complete organic nitrogen hydrolysis (ammonification) and oxidation of ammonia"
>
> (4.1.74)

It would be better to incorporate flexibility in design so that the system may be operated in step aeration mode if desired. The contact stabilization-step aeration design would act as a safety factor if higher than design loads were encountered. If the nitrifying activated sludge system were operated in the conventional mode, the additional volume required for the EIS loading at 2000 Mixed Liquor Suspended Solids (MLSS) is 35.9 million gallons. It is very doubtful the EIS proposed single stage nitrification will meet the NPDES requirements.

There are 8 existing secondary clarifiers at Southerly with a total surface area of 135,400 ft.^{2}. The Facilities Plan designed the final clarification step for an overflow rate of 500 GPD/ft^2 at average dry weather flow. This would require an additional 37,400 ft^2 of tank surface area. The EIS proposes no additional clarification tanks, resulting in an overflow rate of 700 GPD/ft^2 for average daily flow and 1850 GPD/ft^2 for maximum design hydraulic flow. This might be justified for a very low solids loading.

However, the performance of clarification for activated sludge is governed by two factors; a) the area required for clarification and b) the area required for thickening. The EIS assumes that the area required for thickening governs. Thus a high overflow rate is required before thickening will be limiting. However, clarification must also be considered in the design.

The existing final clarifiers surface area at Jackson Pike is 110,160 ft^2. The Facilities Plan proposes an annual average overflow rate of 500 GPD/ft^2 which requires an additional 95,500 ft^2 of final clarifier area. The EIS proposes that no additional clarifiers be provided. The resulting overflow rates are: (1) 1,090 GPD/ft^2 for average daily flow and 2,000 GPD/ft^2 for maximum hydraulic flow. It is felt that the final clarifiers should not be designed for such a high overflow rate without obtaining justification for it through pilot testing as recommended by the facilities plan. If the nitrification operation deteriorates due to poor clarification, it will adversely affect the efficiency, operation and maintenance of the effluent filtration system. (4.1.74)

Effluent Filtration

The EIS recommends the use of Hydroclear filters. These filters have not been used to date for any major wastewater treatment plants. Reliable data regarding the operation and maintenance required for them when installed at a major wastewater treatment plant approaching the magnitude of those at Columbus are not available. Thereforem it is not possible to compare the total annual costs of the Hydroclear system with the filter systems proposed in the Facilities Plan. Furthermore, Hydroclear filters are a patented system available from only one manufacturer. This effectively eliminates any competition. (4.1.75)

Oxygen Dissolution System

Once an air activated sludge system is conceptually agreed upon to achieve nitrification, the selection of a cost-effective method of oxygen dissolution is a matter to be addressed during the

final design and could form an appropriate part of the applicable value engineering process. The EIS seems to have used this ploy to somehow come up with a cost "saving". (4.1.76)

Disinfection

The EIS recommends chlorination, dechlorination and postaeration.

The Facilities Plan envisioned using the following:

1. Chlorine residual monitoring and controlling to limit chlorine residual to less than 0.5 mg/l.

2. Aeration in the chlorine contact tanks. Work by Kappe[1] and Kothandaraman[2] et al has shown that aeration in chlorine contact results in D.O. from 6 to 9 mg/l, less chlorine use and more efficient bacterial kill.

3. In view of the latest Ohio State Water Quality Criteria published in February 1978, it may be required to reduce chlorine residual still further. In that case, the cost-effectiveness of ozonation compared to chlorination-dechlorination-post aeration system should be examined. The former precludes the generation of chlorinated hydrocarbons while the latter does not. (4.1.77)

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[1]Kappe, David S., "Improved Effluents by Aeration of Chlorine Contact Tanks" 42nd Annual Conference of Water Pollution Control Association of Pennsylvania, August 1970.

[2]Kothandaraman, V. and Lin, S. D. "Air Agitation of Treatment Plant Effluents". Public Works, August 1973.

"Savings" in Cost

For wet stream treatment, the EIS (p. 19, 20) shows savings in first cost over the recommendations in the Facilities Plan of $10.2 million and $16.8 million at Jackson Pike and Southerly, respectively. These "savings" are not true savings, as most of them are arrived at by adoption of design criteria even beyond the higher limit of accepted design criteria without acceptable justification or pilot testing.

Examples of this include 1) reduction of trickling filter area at Jackson Pike by using a high design loading ("Saving"-$1.1 million), 2) reduction of aeration tank and final clarification tank volumes at Southerly ("Saving-$1.3 million), 3) reduction of final clarification tank area and inadequate consideration of rehabilitation requirements for aeration tanks, clarifiers, blowers, piping and other auxiliary equipment at Jackson Pike ("Saving"-$9.1 million). The total "Saving" produced with these tactics is thus $11.5 million.

The remaining "Saving" of $15.5 million is achieved by eliminating first stage biological treatment at Southerly. This concept of treatment by the brewery is questionable, as its environmental impacts are not analyzed by the EIS. Also, the impacts on the annual cost of operation and maintenance of the plant with and without brewery are not thoroughly analyzed by the EIS. This "Saving" is thus doubtful.

Again, it must be emphasized that these apparent "Savings" are shown by using value engineering techniques (<u>without insuring reliable plant operation through reliable design</u>) which are irrelevant at this

preliminary planning stage.

In exchange for these questionable "Savings", the City of Columbus is required to bear an increase of $23 million in the cost of the wet stream treatment facilities due to inflation in the last two years. (4.1.78)

Pilot Plant

The Facilities Plan recommended a pilot plant study to test the effectiveness of the recommended process and confirm the design criteria. The pilot plant program was required to fulfill the following objectives.

- Verify the capabilities of the treatment processes.
- Optimize the design parameters of the treatment processes.
- Check the cost-effectiveness of the proposed process system alternate.
- Establish the efficiency and stability of each process under various weather conditions and with the normal variations in waste load characteristics.
- Establish sludge production rates.
- Establish the mode of operation for the process selected.

The EIS recommends that pilot plant study be carried out only to evaluate anaerobic digestion of thermally conditioned secondary solids and jet aeration.

We strongly disagree with the recommendation of the EIS. As already pointed out before, in absence of any reliable design equation which

is universally applicable for the design of trickling filters, development of design criteria by pilot testing is the only choice for large plants. Pilot testing will also determine the necessity for intermediate sedimentation. Operating experience with nitrification in various modes of activated sludge with varying characteristics of wastewater is still negligible. Pilot testing for nitrification and subsequent clarification is therefore absolutely essential. The Facilities Plan designed effluent filters for a loading rate of 3.0 GPM/Ft^2. If pilot tests show higher loadings are possible, a more cost-effective design can result. While pilot testing the various treatment processes, several oxygen dissolution equipment available on the market including jet aeration can be tested to make selection of cost-effective equipment possible.

It is emphasized that the relatively small expenditure incurred in pilot testing will provide an insurance against any costly redesign, modifications, or additions, that may be necessary if any plant additions made on the basis of traditional assumptions only, are found to be ineffective in producing the desired effluent quality.

(4.1.79)

Summary of General Comments

The EIS concedes that their analysis has no conceptual disagreement with the design proposed in the Facilities Plan.

The process of independent development of design and costs constitutes application of value engineering which is irrelevant at the facilities planning stage.

- Underdesigning of facilities amounts to applying value engineering costing techniques *without ensuring* reliable design to achieve the desired effluent quality.

- A thorough pilot testing of the process system recommended by the Facilities Plan is absolutely essential to provide an insurance against costly redesign, modifications, or additions that may be necessary if any plant additions, made on the basis of traditional assumptions only, are found to be ineffective in producing the desired effluent quality.

Specific Comments

Page V-2 The 200 mgd assumed hydraulic capacity at Jackson Pike must be verified. (4.1.80)

Page V-3 Item 11 The City of Columbus has a sewer use ordinance which is being enforced at the present time. (4.1.81)

Page V-8 The Division of Water, City of Columbus will not allow the use of its quarry or its useful life to be reduced with incinerator ash. (4.1.82)

Page V-14 The City questions whether contact stabilization proposed at Southerly for nitrification is practical. (4.1.83)

The EIS proposes to put 180 mgd through the filter complex at Jackson Pike and 205 mgd at Southerly. Since the EIS is proposing to treat 200 mgd at Jackson Pike why isn't the remaining 20 mgd being filtered. (4.1.84)

Page V-15 The original facility plan was to meet the first NPDES permit. Since then, the NPDES limits have changed and also particularly the water quality standards have changed so the original chlorination concept is no longer valid and the City really should be addressing the possibility of ozonation. (4.1.85)

In secondary thickening, the EIS recommends standby polyelectrolyte addition capability. An air flotation system will not work at all without some type of polymer addition.

Page V-16 Storage of thermally conditioned solids is not a viable concept as proved by operation of the Southerly facility.

The use of digesters for thickening of thermally conditioned solids is questionable without expensive remodelling. (4.1.86)

Page V-23 We question the savings and project cost. No. 1) they have undersized the facilities allowed the City, No. 2) they have proposed a treatment scheme for Anheuser-Busch that is totally unacceptable, No. 3) they have proposed flows through the plant that cannot possibly achieve NPDES limits with their inadequate facilities.

Page V-26 City Civil Service policy makes sharing of personnel between plants an unlikely event. (4.1.87)

REVIEW OF
CHAPTER VI. PRIMARY ENVIRONMENTAL IMPACTS OF THE PROPOSED WASTEWATER TREATMENT FACILITIES

General Comments

This chapter reaffirms the results of the Environmental Assessment (EA). The EA was reaffirmed in the introductory paragraph, but the bulk of the chapter contains extraneous discussions of matters with relatively minor importance. The following is a discussion of those extraneous items:

1. Land - The EIS gives a hypothetical discussion on abandonment of present sludge lagoons and possible related impacts. Also included is a lengthy dissertation on the difficulty of predicting negative impacts of the possible backup sludge disposal system.

   The EIS has suggested and implied that land disposal of sludge offers many advantages or benefits. However, the EIS fails to select any specific sites for any land disposal. Further, it fails to describe any potential impacts associated with disposal at any land site or sites. Thus, one of the major questions listed in the Notice of Intent to do the EIS has not been addressed in any meaningful way. (4.1.88)

2. Air - The EIS contains extensive discussions concerning:
   a. Aerosols carrying pathogenic organisms ("Although not presently thought to be a serious negative impact...")

b. The "uncertainty related to the health impacts of the particulate matter emissions" even though it was stated that a wet scrubber would be used to meet the New Source Performance Standard.

c. "Heavy metals such as those released from sludge incinerators could have adverse effects".

d. Discussion of cyanides and chlorobenzenes in sludge.

The EIS offers no documentation to support the above comments as related to the Columbus situation. (4.1.89)

REVIEW OF
CHAPTER VII. SECONDARY IMPACTS OF THE PROPOSED ACTION

General Comments

This chapter exacts heavy tribute from the land use effects of the proposed project while relegating "other environmental impacts" to be a miscellaneous discussion. Only two (2) of the thirty-one (31) pages deal with water-related secondary impacts. Only by adjusting the phasing of interceptor construction in some areas and proposing the substitution of pressurized mains in others were minor improvements in the secondary impacts described in the Environmental Assessment effected.

This chapter begins with the following:

The secondary impacts of a proposed action are "(1) indirect or induced changes in population and economic growth and land use, and (2) other environmental impacts resulting from these changes in land use, population, and economic growth."

Because one of the principal contentions of the EIS is that some interceptor sewers will induce growth, it is important that the statement above be analyzed carefully.

Two points are critical and have already been established and presumably sanctioned by the EIS. These are that the economy is healthy and will support additional population growth and that this growth will occur with or without the proposed action.

Thus far, our comments regarding induced growth have contended that development precedes the need for sewers. Development does logically occur where sewers can be provided, but that does not mean it will not occur if they cannot or will not be provided. It simply means that a delay might be incurred or other forms of treatment would be sought. We believe the lack of availability of sewer service has not alone materially reduced growth in metropolitan areas.

Given the function of interceptor sewers, i.e., to accumulate flow from smaller sewers for transport to the treatment plant, their function becomes almost incidental to or unrelated to being a stimulation to growth. We believe this to be the case because we are not aware of locations where interceptors have been built in advance of development in the speculative sense. They are built in response to need caused by expansion of or additions to smaller sewer systems built to serve growth as it occurs.

The primary reasons for the interceptor sewers proposed in the Facilities Plan are to correct existing problems and to prevent new ones from occuring.

Specific Comments

Page VII-8 The institutional changes suggested would tend to be exclusionary and the legality is questionable. (4.1.90)

Page VII-10 The cost of private disposal installations are substantially understated. Operation and maintenance has not been mentioned, and historically has been very poor. (4.1.91)

Page VII-11 Table VII-1 does not represent the proper flow and costs in Central Ohio. (4.1.92)

Page VII-13 The EIS is evidently not aware of the development pressures in the Blacklick watershed. If sewers are not provided, this will result in unsatisfactory installations and pollution problems. (4.1.93)

Page VII-17 While some demand may be placed on the City of Columbus where the already serviced developable areas are located, a review of local agency files will show that as much or more demand is made where services are not located. (4.1.94)

Page VII-18 Last paragraph. Where is the support for this EIS conclusion? The absense of interceptors has not stopped the growth. (4.1.95)

Page VII-20 Under Scioto West, the EIS recognizes two of the major factors why people place sewer service low in importance in deciding on a place to live.

Page VII-21 The EIS should be aware that New Albany is attempting to annex Plain Township. This can completely change the conclusions with reference to the Rocky Fork and Blacklick Interceptors.

The EIS conclusion for Blacklick is totally unacceptable because all the facts were not taken into consideration.
(4.1.96)

Page VII-30 The conclusions under section 7.5 with respect to Blacklick and Rocky Fork are totally unacceptable. This is also true of Big Walnut and Big Run areas.

REVIEW OF
APPENDIX A. BASELINE EVALUATION OF THE COLUMBUS, OHIO FACILITIES FOR WASTEWATER TREATMENT

General Comments

Appendix A of the EIS contains many incorrect statements and assumptions which significantly effect the proposals and decisions made in the EIS.

The most important of these errors deals with the EIS procedure for establishing design influent wastewater characteristics for the City's Jackson Pike Wastewater Treatment Plant, and results in proposed treatment facilities which are obviously and significantly undersized. Therefore, all portions of the EIS regarding the facilities to be constructed at Jackson Pike must be considered inaccurate and should be disregarded.

(4.1.97)

Specific Comments

Page A-3 The EIS states that the Southerly Plant receives flow from a single 108-inch interceptor. This statement is incorrect. The plant also receives flow from the 156" Interconnecting Sewer. (4.1.98)

Page A-4 The EIS states that the Facility Plan was prepared using 1973 and 1974 recorded plant influent data. Only by coincidence, did the Solids Handling Segmental Plan develop design data that equaled 1974 plant influent data. (4.1.99)

Page A-6 The EIS states that, in 1972, the City considered thermal sludge conditioning as "the panacea for the solids handling and recirculation problems that still plague the (Jackson Pike) plant". This statement is incorrect. Thermal conditioning was originally installed at Jackson Pike on an experimental basis with the expectation that it would aid in the dewatering process. The City was willing to try technology that was relatively new in the U.S. at that time. The problems that still plague the plant are probably due to the inadequate solids handling and disposal capability. (4.1.100)

Page A-8 The EIS states that the striking change in the Jackson Pike influent wastewater quality over the last two years cannot be attributed to the changes in the receipt of scavenger wastes from the 'night soil' dump station provided in 1971, and cites this load as 20,000 to 30,000 gallons per day. Since this section of the EIS is dealing with influent quality, not quantity,

the EIS should have cited the load in lbs. per day of pollutants, not in gallons per day of flow. (4.1.101)

Page A-8 The EIS states that the observed 1975-1976 change in influent quality at Jackson Pike was caused by recycle loads from the thermal conditioning unit, and that this recycle increased the measured influent BOD_5 and SS by 23% and 48%, respectively. City sampling data indicates that this recycle stream contributed less than 10% to the measured influent load in 1976. Actual 1976 influent strengths were probably about 18% higher in BOD_5 and 38% higher in SS than those cited and used in the EIS as a basis for design of the required facilities at Jackson Pike. Therefore, since the EIS procedure for establishing design influent wastewater characteristics for the Jackson Pike Plant is based on false assumptions and incorrect data, the resultant EIS Jackson Pike facilities are obviously and significantly undersized, and all portions of the EIS regarding the facilities to be constructed at Jackson Pike must be considered inaccurate and therefore must be disregarded. A comparison of the assumed EIS and the actual 1976 data for Jackson Pike is as follows:

	EIS 1976 Influent Data	Actual 1976 Influent Data	% Error in EIS
BOD_5	210 mg/l	248 mg/l	18%
SS	250 mg/l	345 mg/l	38%

For further back-up information, see Attachment 2.

(4.1.102)

Page A-9 Based on the data presented in the preceeding comment, the EIS 1976 Estimated Influent Characteristics presented here are again significantly in error. This error also significantly effects the data and recommendations in Appendix I and Appendix K of the EIS regarding the proposed facilites at the Jackson Pike Plant. (4.1.103)

Page A-11 The EIS states that the low flow reported in 1971 for the Southerly Plant was due to the bypassing associated with expanding the plant's main treatment capability. This statement is believed to be inaccurate. Expansion of treatment facilities had little effect on by-passing at Southerly during 1971 through 1973. The amount of by-passing due to the construction program would not be noticed in annual average flows. (4.1.104)

Page A-11 The EIS states that continuous recirculation of solids about the plant is caused primarily by operational difficulties in the present conditioning and dewatering processes. Inadequate solids handling and disposal facilities is probably more responsible. Had USEPA approved the City's grant application in 1975 for incineration and dewatering facilities, this situation would be essentially solved at the present time. (4.1.105)

Page A-14 With stated capacities and largest unit out-of-service, firm pumping capacity at Jackson Pike should be only 165 mgd. EIS cited blower capacities are believed to be inaccurate. (4.1.106)

Page A-15 Existing Jackson Pike aeration tank volume is cited incorrectly in the EIS. Plant "A" total volume should be 15 mg and Plant "B" should be 10 mg. Although this EIS error is only about 5.2%, it is just as or more significant than the reduced population projections used in the EIS. (4.1.107)

Page A-15 The areas of the existing final sedimentation tanks at Jackson Pike are slightly overstated in the EIS. Plant "A" should be 72,000 s.f. and Plant "B" should be 36,000 s.f. (4.1.108)

Page A-15 The EIS states that, at Jackson Pike, Waste Activated Sludge is largely applied to three tanks. This is false. The existing tanks are make-shift converted tanks originally designed to handle only about 1/3 of the flow. (4.1.108)

Page A-16 The existing supernatant aeration tank volume cited here for Jackson Pike is incorrect. Actual volume should be 5 mg. (4.1.109)

Page A-16 The three other tanks cited here were never used for aerated supernatant sedimentation as inferred by the EIS.

Page A-17 The EIS states that, at Jackson Pike, all incinerator scrubber water goes to the Scioto River. This statement is false, as there are presently no scrubbers on the incinerators.

Page A-18 The EIS states that at the Southerly Plant, no further expansion of the solids handling and incineration system was thought to be necessary by the City with the provision of the conditioning complex in June of 1976. This statement is absurd, completely false, and shows a lack of knowledge on the part of the EIS authors about local concerns and problems. The City's 1970 report on expansion of the Southerly Plant proposed additional incineration capacity and possible additions to the dewatering complex. Subsequent reports prepared in 1973 and 1974 called for immediate construction of two additional incinerators and nine additional dewatering units. Construction drawings and specifications for additional incinerators, rehabilitation of existing incinerators, and additional dewatering units were essentially complete in 1974. A grant application for same was submitted to USEPA early in 1975. Additions to the dewatering complex have already been approved by USEPA and are presently under construction. (4.1.110)

Page A-19 The EIS states that historically the Southerly Plant has long been plagued by hydraulic problems. This statement is incorrect. The plant has experienced severe solids handling problems since EPA refused to fund incinerators and dewatering facilities in 1975, as noted in the preceeding comment. (4.1.111)

Page A-19 The EIS states that the Southerly Plant has never fully achieved sustained, stable performance, and cites the cause as one of unit process limitations with the 'as received' wastewater load. This statement is believed to be incorrect. If the Southerly Plant has never achieved such performance, the cause is probably attributable to inadequate solids handling facilities, not the 'as received' wastewater load. (4.1.112)

Page A-20 The data presented in the EIS for the existing Southerly aeration system is incorrect. The tanks are presently operated in the step-aeration mode. Step feed can be accomplished at the 1/4, 3/8, 1/2, 5/8 and 3/4 points in the tanks, not as cited in the EIS. Center section tank volume is 10 mg and west section tank volume is 15 mg. Two of the tanks are not used for aeration. (4.1.113)

Page A-23 The EIS states that operational problems have increased for the Southerly incinerators due to the introduction of thermally conditioned sludge in 1976. This problem was probably due to the fact that the operators were originally trying to feed the incinerators at the same rate as had been done before with the wetter cake. Of more importance is the fact that the incinerators are over 10 years old and need major rehabilitation and modification. As mentioned previously, this rehabilitation and modification was scheduled to begin in 1975, but the project has been delayed pending completion of the final EIS. (4.1.114)

Page A-24
Page A-26 The EIS states that, at Jackson Pike and Southerly, failure of high recorded effluent BOD_5 data to correlate with elevated recorded effluent suspended solids concentrations can be attributed to the crudeness of the BOD_5 test itself. Why is the BOD_5 test suspect in this EIS discussion and not in other sections of the EIS regarding recorded influent wastewater characteristics? Influent suspended solids concentrations are even higher, and therefore, measured BOD_5 data should be less reliable suggesting higher concentrations than actually recorded. (4.1.115)

Page A-26 The EIS has concluded that the severe bulking problem at the Southerly Plant is caused by the brewery waste discharged from Anheuser-Busch. To the City's knowledge, no proof has ever been offered by anyone to substantiate this statement. (4.1.116)

Page A-28 The brewery waste is cited here in the EIS as 40 to 60% of the nominal BOD_5 load at the Southerly Plant. This is not consistent with the 37% cited on Page A-2 of Appendix A of the EIS. (4.1.117)

REVIEW OF
APPENDIX B. MATHEMATICAL CHARACTERIZATION OF THE SCIOTO RIVER BELOW COLUMBUS

General Comments

One of the most important statements in Appendix B of the EIS is found on Page B-1 and reads as follows:

> "Obviously, any attempt at future prediction (of water quality conditions) is fraught with difficulty and plagued with controversy. Indeed, the capability for mathematical sophistication via the computer far exceeds the fundamental knowledge needed to establish reasonably correct input parameters. The reader should remember that a mathematical model gives only correct relative results with constant input parameters. Specific finite results are a desired goal but are rarely achievable."

We would agree completely with this statement, but would wonder why the EIS then went on to present 24 pages of discussion and calculations in an effort to establish required release levels for the two Columbus Plants. In addition, the EIS models were not verified by meaningful in-stream sampling. The problems with the models are compounded by the use of assumptions which are themselves arguable. Therefore, the models and results obtained therefrom do not have credibility.

The above quoted opening statement coupled with the lack of sufficient and meaningful stream sampling and the use of questionable assumptions are probably justifiable reasons for deleting all of Appendix B and disregarding any EIS decisions made based thereon. (4.1.118)

Specific Comments

Page B-1
thru
Page B-24 For specific comments on Appendix B, see Attachment 3.

REVIEW OF
APPENDIX I. REVIEW AND EVALUATION OF THE WASTEWATER TREATMENT PROCESSES RECOMMENDED BY THE COLUMBUS FACILITIES PLANS

Specific Comments

Page I-1 The EIS cites the population projections used in the Facility Plan. It should be noted that the projections used in the EIS are only about 6% less than those used in the Facility Plan. Considering the accuracy of such predictions, we question the validity and necessity of the EIS using projections different than those presented in the City's plans. (4.1.123)

Page I-2 Table I-2 lists the 1995 Influent Design Flows and Loads used in the Solids Handling Facility Plan Segments. The table contains several errors in the Jackson Pike data as follows:

(1) BOD_5 should be 225 and 190 mg/l

(2) SS should be 302 and 270 mg/l

(3) Annual Secondary Sludge should be 175,300 lbs/day

(4.1.124

Page I-21 Table I-10 of the EIS contains the following errors:

(1) Facility Plan decant facilities for Jackson Pike were proposed at 0.56 mg and 3,825 sq. ft.

(2) Facility Plan decant facilities for Southerly were proposed at 0.75 mg and 5,100 sq. ft.

(3) Proposed recycle aeration tank volumes in the Facility Plan were 5.0 mg for Jackson Pike and 5.4 mg for Southerly. No sludge return rate was specified.

(4.1.125)

Page I-23 Table I-11 of the EIS contains the following errors:

(1) Southerly Facility Plan Contract Administration, Fees and Contingencies Costs were $5,100,000.

(2) Southerly Facility Plan Total Construction Cost was $31,400,000.

(3) Annual O & M costs cited from the Facility Plan are for year 1995 not for the average year during the planning period as stated. (4.1.126)

Page I-24 The EIS states that "two parameters are of importance in the design of any wastewater treatment installation: influent wastewater characteristics, and final effluent quality objectives" We would insist that of equal or more importance is a third parameter known as 'unit process design and sizing'. Proper or required unit process design and sizing can probably be more accurately defined than future influent wastewater characteristics or necessary effluent quality. This important third parameter can and should be used to effectively compensate for errors in predicting influent conditions and final effluent quality objectives. This EIS statement coupled with the EIS use of optimistic design criteria would suggest that the authors of the EIS have neglected this third and important parameter. (4.1.127)

Page I-25 The EIS states that final effluent quality objectives are "given (values) defined by the NPDES permits". This is true only if water quality predictions and NPDES effluent limits have been verified by meaningful stream sampling programs and computer models. Without such verification, imposed NPDES

final effluent limitations are lacking in credibility. Evidently, USEPA agrees with this conclusion, as witnessed by its July 6, 1976 statement pertaining to the scope of work to be performed by the EIS consultant under Contract No. 68-01-4378 as follows:

> "As a part of the liquid treatment alternatives, detailed water quality modeling shall be performed for the Scioto River to determine: (1) what the appropriate Water Quality Standards for the Scioto River should be and (2) the design parameters of Southerly and Jackson Pike STP's necessary to meet those Water Quality Standards."

At this particular point in time, it is questionable if final effluent quality objectives are, in fact, a given parameter. (4.1.128)

Page I-25 The authors state that the EIS 85 mgd average design flow for the Southerly Plant could substantially increase if a combined overflow pollution abatement program is undertaken on the Southerly collection system and treatment works. However, the EIS neglects this possibility in its actual design of facilities for the Southerly Plant. (4.1.129)

Page I-25 The EIS presents a formula for developing process peaks at the two Columbus wastewater treatment plants, and then uses the relationship for design of the required facilities. The validity of this formula is questionable, and, therefore, some rationale for its use should be presented and verified. (4.1.130)

Page I-26 Assuming that the use of the EIS process peak formula can be justified by USEPA, the EIS Southerly design process peak flow should be 135 mgd, not 130 mgd. The EIS appears to consistently round off calculated figures in a manner that results in smaller unit process sizing, less required facilities, and therefore fewer dollars. Such consistent practice can compound errors and significantly effect results. (4.1.131)

Page I-27 The EIS states that the existing conduit hydraulic capacity at Southerly is 230 mgd. This statement is highly questionable. The City's consultants believe that extensive modifications may be necessary in order to hydraulicly handle 230 mgd. Also, the EIS uses an existing hydraulic capacity of 200 mgd for Jackson Pike. This figure may also be excessive and needs to be verified. (4.1.132)

Page I-27 The EIS states that "an approximation of the future influent wastewater characteristics (for Jackson Pike) can be developed from the 'knowns' of today". The City requests a definition of these so-called 'knowns', and, a justification by the EIS authors as to why these 'knowns', whatever they are, can be considered as 'knowns'. (4.1.133)

Page I-28 Table I-13 develops the future Jackson Pike Influent Characteristics used in the EIS for design of plant facilities. As pointed out in the comments on Appendix A, the predictions are

based on erroneous data and assumptions. Using the same methodology as used in the EIS, year 1995 - 2000 influent design characteristics for Jackson Pike should be approximately 250,000 lbs/day, or 270 mg/l, for BOD_5 and about 335,000 lbs/day, or 365 mg/l, for SS. Since the figures in Table I-13 are obviously wrong, all EIS proposals regarding the required Jackson Pike facilities must be considered as inadequate and therefore disregarded. (4.1.134)

Page I-30 The EIS states that the lower value for SS developed in Table I-13 is believed to be more nearly correct than the value used in the Facility Plan. Based on the preceeding comments on Appendix A, we would disagree. If the same EIS methodology is used and Table I-13 is corrected for the wrong assumption made in regard to recycle loads, the EIS influent design parameters will be significantly higher than those used in the Facility Plan. We wonder whose values will then be assumed to be "more nearly correct" by the EIS authors. (4.1.135)

Page I-32 The EIS cites proposed USEPA Guidelines which allow future unforeseen industrial load to be eligible for grant funding if it is cost-effective. This guideline was used as a basis for increasing future industrial influent BOD_5 and SS by 15,000 lbs/day. We do not disagree with the appropriateness of these increases, but the EIS did not demonstrate the cost-effectiveness of such allowances, as required, in the cited guidelines. (4.1.136)

Page I-33 The EIS states that the brewery has made an informal commitment to the City to keep its untreated waste BOD_5 load below 60,000 lbs/day. This agreement was not informal. The limitation was imposed on the brewery by the City under the authority of its existing ordinances. (4.1.137)

Page I-33 The EIS suggests that the influent mass loadings developed for the Southerly Plant in the EIS are more correct than those presented in the Facility Plan, due to the fact that the Facility Plan used higher influent flows, and conditioned on a brewery release of no more than 60,000 lbs/day BOD_5. As pointed out earlier in the EIS, the lower design flow is only applicable if no combined overflow pollution abatement program is developed for the Southerly system. If such a program is initiated, the Facility Plan design characteristics may be more nearly correct. The EIS should account for such a possibility. (4.1.138)

Page I-34 Table I-15 for the Jackson Pike Plant is incorrect because of the errors in Appendix A in the development of the influent wastewater characteristics. See comments on Appendix A and previous comments on Appendix I. (4.1.139)

Page I-36 The EIS estimates the volatile fraction of the influent suspended solids for Jackson Pike and Southerly at 70% and 80%, respectively, and suggests that these values are more correct than the Facility Plan Segment estimates. The EIS should justify use of its estimates. (4.1.140)

Page I-36 The EIS states that the "upstream attached growth reactor at Southerly can be considered as mandatory as long as the highly soluble carbohydrate wastes from the brewery significantly impact the plant's influent pollutant load". At this stage in the development of the EIS, the brewery BOD_5 load is 60,000 lbs/day, or 29% of the EIS average design BOD_5 load. However, later in the EIS, after development of the final recommended treatment facilities in Appendix K which eliminates upstream attached growth reactors, the brewery BOD_5 load is still 19% of the Southerly average design conditions. This load is still significant, and therefore, in conformance with the EIS stated philosophy, upstream attached growth reactors should still be considered as 'mandatory' at the Southerly site. This would be especially true during periods of inefficient operation or upsets at the proposed brewery sewage treatment plant which could continue for extended periods of time. Also, the EIS recommends two stage treatment at Jackson Pike because of its critical position on the receiving stream and because such a system has the greatest potential for ease of nitrification kinetics and production of an effluent free of ammonium. The City believes that these reasons are equally applicable to the Southerly Plant, and that pretreatment at the brewery does not, in fact, eliminate the need for two-stage treatment, nor will it result in significant cost savings as stated in the EIS. This is particularly true since, in addition to the brewery load, the final EIS recommended plan still requires full treatment of all other industrial, commercial and domestic loads to be accomplished at the Southerly site. (4.1.141)

Page I-38 The EIS states that "alternatives for obtaining an autogenous cake other than thermal conditioning were not evaluated (in the Facility Plan)". This statement is true as there were no other proven alternatives available when the Facility Plan Segments were prepared and because it was and is not cost-effective to discard the City's recent multi-million dollar investment.

Page I-40 The EIS suggests that dissolved air flotation thickening was rejected in the Facility Plan at Jackson Pike based on unfavorable past experience at both plants. Other factors such as chemical usage, solids capture and product dry solids content were of more importance in the Facility Plan selection of centrifugal thickening at Jackson Pike. This concept and selection has already been approved by USEPA. Dissolved air flotation was retained in the Facility Plan at Southerly due to the City's recent investment in this process. The City's proposed solids management system for the Southerly Plant has been subsequently conceptually revised and approved by USEPA in November of 1976. Centrifugal thickening is now to be used for expansion of the Southerly facilities. The EIS authors should be aware of these revisions and USEPA approvals, and should have considered same in formulating the EIS document. (4.1.142)

Page I-40 The EIS technique used for evaluation of the proposed project plan incorporated the designed wastewater characteristics established in Table I-15. Since it has already been shown that portions of Table I-15 are incorrect, it follows that

many portions of the EIS evaluation of the proposed project plan must also be considered as incorrect.

Page I-40 Figure I-2 shows the ash decant in the Facility Plan as overflowing to the Scioto River. This is incorrect. The Facility Plan proposed to return this decant to the liquid treatment section of the plant. (4.1.143)

Page I-41 The figure quoted from the Facility Plan for Waste Solids Management Costs at Southerly should be $31.4 million. (4.1.144)

Page I-42 Ash lagoon overflow returned to the plant influent in the EIS is not a deviation from the Facility Plan proposals. However, this overflow may be more appropriately returned to other downstream processes. (4.1.145)

Page I-42 The EIS states that the design equilibrium pollutant quantities were established in the EIS through mass balance concepts at each unit process, and presents the results of these evaluations. Where is the presentation of the EIS mass balance concepts for each unit process? Calculations and criteria should be presented in the EIS, not just the results. (4.1.146)

Page I-42 The EIS uses the phrase "several potential opportunities for capital savings were found" during the EIS engineering evaluation of the Facility Plan proposals. The word "potential" seems to have been lost or forgotten between this EIS evaluation and the final EIS recommendations.

Page I-42 The EIS states that it appears that savings at Jackson Pike can result from the EIS proposals due to the backup provided by storage in the existing anaerobic digesters and the interconnecting sludge force main. However, little or no costs have been included in the EIS proposals for modifications to these digesters or for the pumping stations required to make the sludge force main operational. No wonder it appears that cost savings can be realized. Again the word 'appears' seems to have been lost or forgotten by the time the EIS makes its final decisions and recommendations. (4.1.147)

Page I-42 The EIS devotes considerable space and expense throughout the document in discussing anaerobic digestion of recycle solids. It is unfortunate that the authors of the EIS were not aware or did not recognize the City's present program, initiated prior to preparation of the EIS, to investigate anaerobic digestion and other recycle management alternatives. Perhaps some communication with the City prior to and during preparation of the EIS would have been appropriate. (4.1.148)

Page I-43 The EIS proposes about a 50% reduction in the trickling filter installation at Jackson Pike. This reduction is believed to be unrealistic, and will effect downstream processes significantly. The EIS also uses an oxygen transfer efficiency of 8%. It should be noted that a small change in this assumed design efficiency will significantly affect air requirements. (4.1.149)

Page I-44 The EIS uses a secondary waste sludge concentration of 1% as the basis of design for downstream solids processing facilities at Jackson Pike. Although this concentration is attainable, it may be optimistic for design purposes. 3/4% sludge, which is more realistic, would require at least 3 more thickening units. (4.1.150)

Page I-45 The EIS suggests that, at Jackson Pike, standby equipment auxiliaries for the thermal conditioning process may be a more economical option than a new unit. Operating experience would indicate that heat exchangers and reactors also can be out-of-service for extended periods of time and therefore require standby capability. The EIS proposes to store sludge or route it directly to dewatering in the event of a heat exchanger break-down. If such an alternative is followed, either huge storage facilities or several additional dewatering units must be provided. Storage of thermally conditioned sludge may be technically non-feasible due to its expected effect on dewaterability. (4.1.151)

Page I-45 The EIS suggests that proposed recycle treatment facilities for Jackson Pike can be abandoned due to excess main stream treatment capacity. First, where are these excess main stream treatment facilities; and second, direct return of recycles to main treatment units has historically proven to be a problem throughout the country. This suggestion would appear to be a step or two backward in modern technology and good engineering practice, and would be another reason to question the overall treatment efficiencies of the EIS proposals. (4.1.152)

Page I-47
thru
Page I-49 Many of the preceeding comments for Jackson Pike are applicable to the EIS proposals presented for the Southerly Plant.

REVIEW OF
APPENDIX J. INTERNAL UNIT PROCESS ALTERNATIVES

Specific Comments

Page J-1 As stated in the EIS, the Facility Plans for the Columbus Plants did recommend the use of centrifuges and dissolved air flotation for waste secondary solids thickening at Jackson Pike and Southerly, respectively. The reasons for these selections were discussed in previous comments on Appendix I. The proposed Southerly facilities were revised in 1976 to provide centrifuges for any necessary expansion. These concepts have already been approved by U.S.E.P.A. (Also see previous comments on Appendix I). It is not "equally certain that dissolved air flotation offers savings in terms of O & M expenditures" as stated in the EIS. 4% versus 5% or 6% solids to downstream processes will significantly increase O & M and capital costs of same. DAF will have major problems matching the solids capture and content of centrifuges even with large amounts of chemical additives. Centrifuges should require little or no chemicals. Since U.S.E.P.A. has already approved centrifuges for installation at both Jackson Pike and Southerly, we feel that this re-hashing of alternatives is inappropriate. (4.1.153)

Page J-2 This portion of the EIS suggests that the City should evaluate the following alternatives:

1. Belt-presses for sludge dewatering;
2. Prototype chemical sludge conditioning; and,
3. Abandonment of thermal conditioning.

Several comments are in order. First, belt press trials have been conducted at the Southerly Plant. These trials have indicated O & M problems. Large doses of chemicals are required to achieve the same solids content as centrifuges. Second, ferric chloride conditioning, as suggested in the EIS, is unthinkable with high-pressure induced draft fans on incinerators. Third, abandonment of the existing thermal conditioning process is not cost-effective at the present time, but is always a future option. And, last, it is highly

improbable that these EIS suggestions would have none of the recycle management problems found with thermal conditioning, as stated in the EIS. (4.1.54)

Page J-4 The EIS cites the results of California investigations on anaerobic digestion of thermal conditioning products. We do not believe that these investigations proved that "the dewaterability of the solids remains only marginally less than the undigested thermally conditioned product". Columbus experience indicates that the cooler sludge may have significantly different dewaterability properties. Also the studies are not believed to have addressed the effect of decreased volatile content on incineration efficiencies and auxiliary fuel requirements. These and other effects must be fully evaluated prior to recommending this anaerobic process.

The EIS states that Table J-1 summarizes the results of a hypothetical examination of each recycle management alternative. The use of the word "hypothetical" is appropriate, and the entire presentation on recycle management must be considered as such. A simple statement of concurrence with the City's present studies on recycle management would have sufficed, and eliminated many pages of discussion on hypothetical alternatives. This would have allowed the EIS to devote more time on issues which U.S.E.P.A. feels are still unresolved. (4.1.55)

The flow diagrams for alternatives B2 and C1 are believed to be incorrect. (4.1.56)

Page J-9 The EIS discusses the Contra Costa Sanitary District project on pyrolysis. Since we believe this project involved a combination sludge-garbage waste application, mostly garbage, its direct applicability to pyrolysis of sewage sludge is questionable. (4.1.157)

Page J-10 The EIS states that "starved air combustion cannot be recommended for Columbus except on an experimental basis", and then continues on to say that "the starved air conbustion furnace also be designed with a view towards conventional incineration". More appropriately, we would suggest that the proposed conventional incineration facilities be designed with a view toward starved air combustion. (4.1.158)

Page J-11 The EIS discussion on phosphorus removal is a duplication of Facility Planning efforts. (4.1.159)

Page J-12 The EIS discussion on intermediate sedimentation is a duplication of Facility Planning efforts.

Page J-16 The EIS mentions one particular manufacturer of one air system. The EIS should not have used one manufacturer's name unless it also mentioned names for the other systems discussed. (4.1.160)

Page J-17 The EIS recommends evaluation of just one aeration system. Several systems need to be evaluated, not just one. The document also states that the final EIS will consider the results of such an evaluation in the selection of a proposed dissolution system, and that jet aeration be given a detailed evaluation by the design consultant that prepares the plant improvements. We agree that this evaluation is a Step 2 process, either as an engineering report task or as a part of the value engineering process, not as a Step I EIS function. However, if the final EIS is to consider the results of these evaluations, it would appear that the EIS will not be final for quite some time.

The City does not agree with several of these EIS conclusions: First, re-review of the cost effectiveness of dissolved air flotation in detail is not considered necessary, especially since U.S.E.P.A. has already approved centrifuges; second, recent investigative efforts have not suggested that anaerobic

digestion of thermally conditioned products is the most effective means of recycle management, but rather suggest that it might be an effective alternative. It is premature to recommend this system for the Columbus Plants, as it must still be considered as unproven technology. Third, the inference is that the EIS has eliminated intermediate settling at Southerly at this stage of development of the recommended project plan without brewery pretreatment. This is not consistent with Pages J-12 and J-14. Fourth, the EIS should recommend testing of several aeration systems, not just one. Fifth, since the jet aeration system is presently energy intensive, the EIS recommendations would seem to imply that the City should install such a system with the hopes that electrical costs will increase. And last, the EIS conclusions and statements regarding air system evaluation would seem to infer that the final EIS will be completed during the Step 2 design phase and that the final EIS will select the air system. This is not an EIS task!

(4.1.161)

REVIEW OF

APPENDIX K, DESIGN QUANTITIES AND UNIT PROCESS SIZING FOR THE RECOMMENDED TREATMENT FACILITIES

Specific Comments

Page K-1 The EIS proposes to process only waste activated sludge in the Jackson Pike thermal conditioning facility. Dewaterability of this sludge after anaerobic digestion must be determined prior to making this recommendation. The dewaterability of straight thermally conditioned waste secondary sludge is known to be considerably less than the dewaterability of a mixed thermally conditioned sludge. (4.1.162)

Page K-2 The EIS Recommended Project Plan Design Conditions in Table K-1 are incorrect for Jackson Pike and have not been justified for the Southerly Plant. The Jackson Pike conditions are incorrect because of the errors made in Appendix A (See previous comments on Appendix A). The Southerly conditions have not been justified since the EIS did not address the environmental impacts of constructing and operating a Sewage Treatment Plant at the Brewery site, and therefore, pretreatment at the brewery cannot be considered as the most cost effective alternative. Since Appendix K deals only with expansion of the two treatment plants, this entire EIS appendix must be considered as inaccurate, inconclusive, incomplete and inappropriate, and must be disregarded. It follows that all EIS proposals regarding expansions of the Jackson Pike and Southerly Plants must also be discounted and disregarded.

(4.1.163)

THE FOLLOWING COMMENTS IN REGARD TO APPENDIX K ARE OFFERED FOR INFORMATIVE PURPOSES ONLY. THEY ARE NOT TO BE CONSTRUED AS CITY ENDORSEMENT OF THE EIS RECOMMENDED TREATMENT FACILITIES OR PROJECT PLAN.

Page K-2 Table K-2 in the EIS is based on removal efficiencies, many of which are believed to be over optimistic, especially in view of the unit process design parameters used elsewhere in the EIS. For instance, Primary BOD_5 removals, particularly at Southerly, may be overstated in view of the high soluble content from the brewery discharge and from the returned recycle stream without separate treatment. Primary solids removals are also believed to be excessive. All stated removal efficiencies may significantly decrease during EIS maximum peak loads of 1.9 times annual averages and during EIS peak flows of 1.8 to 2.7 times average flows at Jackson Pike and Southerly, respectively. These peaking factors coupled with the EIS required removal efficiencies and the EIS unit process design parameters are likely to cause excessive overloading of downstream treatment facilities and subsequent severe deterioration of effluent and river water quality. For additional back-up information, see Attachment 4. (4.1.164)

Page K-3 & Page K-4 The EIS sludge process stream characteristics shown here and used for design of the solids handling facilities at the Columbus Plants leads to some serious questions regarding the EIS recommended project plan. In general, the information is sketchy

and therefore one must speculate somewhat as to the design parameters used for the various unit processes proposed. The authors of the EIS should submit and furnish all calculations, design parameters, influent solids, solids captures and other data used to prepare this table. However, the following comments can be made at this time. First, there is an obvious 100,000 lbs/day dry solids error in the Jackson Pike Minimum Maximum Day data for secondary solids. Second, 8% digested sludge dry solids content is probably speculative and may not be attainable on a continuous basis. Third, 1% dry solids concentration for secondary sludge, although attainable, is optimistic for design purposes. Fourth, 95% to 96% solids capture for design of secondary sludge dewatering units and 92% solids capture for design of Primary Solids dewatering units are probably attainable some of the time, with significant chemical expenditures, but are highly speculative for design purposes. Fifth, it is probable that the dry solids content of the dewatered sludge coupled with the volatile destruction in the anaerobic digesters will not achieve autogenous combustion in the incinerators. In addition, incineration capacities will be reduced by the wetter cake. And last, the EIS proposals require storage of sludges prior to dewatering during periods of above average conditions. Storage times can be as much as 15 to 16 days for primary sludge and 10 to 15 days for secondary sludges after thermal conditioning and anaerobic digestion. City experience would indicate that this EIS proposal may result in odor and dewaterability problems, and until such problems are solved or proven to be non-existent by the EIS authors, this recommendation cannot be seriously considered. If this EIS

process scheme is shown to be inappropriate, then additional dewatering and incineration units must be provided at both plants. Historically, across the country, inadequate and improperly designed solids handling and disposal facilities, lacking the capability of disposal on a day-to-day basis, have caused severe problems and decreases in the overall treatment efficiencies of many plants. Solids handling and disposal has been neglected too long and it is believed that the EIS proposals will likely promote continuance of these historic trends. The EIS proposed solids handling and disposal facilities at both plants are believed to be undersized, inadequate and lacking in the day-to-day and standby capacity necessary for continuous, dependable operation. (4.1.165)

Page K-5 The EIS again suggests that the existing Jackson Pike facilities are rated at 200 mgd. The City questions the accuracy of this statement. (4.1.166)

The EIS states that rehabilitation of the four existing primary sedimentation tanks at Jackson Pike "is not a strong requirement for successful wastewater treatment". With the EIS removal efficiencies listed on Page K-2 and the unit process design parameters used, rehabilitation of the tanks may be absolutely necessary. The Facility Plan recommended complete replacement of these tanks as they are over 40 years old and probably beyond rehabilitation and modernization.

Page K-8 The EIS recommends a 45% reduction in the size of the Jackson Pike first-stage trickling filter installation on the basis of the Facility Plan organic loading rates for the Southerly Plant. Such rationale is believed to be tenuous grounds for such a decrease. Hydraulic loading rates are nearly doubled over that proposed in the Facility Plan. At EIS peak flow, the hydraulic loading rate is 3.64 gpm/sf. At EIS peak mass loadings, BOD_5 load will be 325 lbs/1000 cf.-day. Both rates would appear high, and could be anticipated to cause overloading of downstream facilities. In any event, EIS trickling filter removal efficiencies will be less than the Facility Plan proposals causing significant increases in power costs for the subsequent treatment processes. It is probably more cost-effective to provide larger trickling filters.

The EIS proposes a 5% increase in the size of the Jackson Pike Intermediate Settling Tank area. Did the EIS include additional costs for this increase? (4.1.167)

Page K-11 The EIS proposes surface overflow rates for secondary settling tanks considerably in excess of normal practice, acceptable Ohio EPA standards, and USEPA design manuals. EIS average overflow rates at Jackson Pike are 36% to 445% higher than Agency standards. EIS peak overflow rates at Jackson Pike are 44% to 116% higher than Agency standards. Similar statements can be made about EIS Southerly overflow rates. EIS peak overflow rates are also two times the acceptable or allowable proposed Ohio EPA standards. These EIS design parameters will likely result in severe degradation of plant effluent and Scioto River

water quality standards. For sure, this EIS design will save initial capital costs, but, equally sure, such dollar savings will be at the expense of the objectives of Public Law 92-500. For additional back-up data, see Attachment 5.

(4.1.168)

Page K-12 The EIS states that "it is believed (by the authors) that Jackson Pike can maintain a suitable performance with the ..... higher surface overflow rate, and deviation from the conventional standards is strongly recommended". The City would suggest that the EIS authors had better be "sure" instead of just "believing" that such suitable performance levels can, in fact, be maintained with these high overflow rates. (4.1.169)

Page K-13 The EIS again discusses secondary solids thickening, and states that the Facility Plan provides approximately three times the average day requirement at Jackson Pike. First, since USEPA has already approved the City's concept, this discussion is probably inappropriate. And second, the Jackson Pike Facility Plan does not provide three times the required number of centrifuges, especially in light of the errors in the EIS regarding influent wastewater characteristics.

Page K-14 The EIS project plan calls for anaerobic solids destruction of recycles at both plants. As stated previously, it is premature to make this decision, since the process must still be considered as unproven technology. Full scale pilot testing must be conducted and the results analysed to determine the full effect and net efficiencies of such a system prior to inclusion in any Columbus treatment scenario.

Page K-15 The EIS uses assumed peaking factors for waste solids production in the design of solids handling and disposal facilities. The authors should present some justification for the use of these assumed values. (4.1.170)

Page K-16 The EIS states that, under the Facility Plan proposal, neither plant would ever realize its maximum incineration potential due to the fact that the plant's dewatering capability did not match the rated maximum solids loading capacity of the incinerators. This statement is false. All unit processes in the Facility Plan were designed on the basis of solids productions. Therefore, maximum incineration potential was not limited by dewatering capability but rather, and more appropriately, by actual plant solids productions. (4.1.171)

Page K-17 In Table K-5, the average dry solids content of the sludges to incineration is 32% to 34%. It is doubtful that the EIS process schemes will yield these contents. Centrifuging of 3% to 5% primary solids and 8% to 9% secondary solids will probably yield a maximum of 25% dry solids to the incinerators. Average dry solids may be less. This will require considerable auxilliary fuel in the incinerators and significantly derate the incineration capacity. (4.1.172)

Table K-5 shows diversion of 50,000 lbs/day of solids from Jackson Pike to Southerly via the interconnecting sludge force main, In order to transport these solids, flows in the force main must be about 470 gpm at approximately 0.9% dry solids, not 105 gpm at 4% as proposed in the EIS. The EIS allows

40 gpm in additional dewatering capacity to handle this load. The EIS is either concentrating these diverted solids from 0.9% to over 10% somewhere at the Southerly Plant prior to dewatering, or is suggesting that the force main can be operated at velocities in the range of 1/4 ft./sec. if these solids are put into the primary tanks and come out as primary solids, either 2 to 3 more dewatering units must be added or 1 more heat treatment unit will be required. If they come to the system at 0.9% solids, 3 more concentration centrifuges and 1 more heat treatment unit will be required.

The EIS authors should furnish a detailed diagram with calculations showing the entire sludge processing system at both plants and the design parameters used.

Page K-18 The City does not agree with the EIS concepts and proposals for solids handling and disposal. First, construction of pumping stations for the sludge force main is less cost-effective and has higher O&M problems than additional incineration. Second, the long term potential of applying dewatered thermally conditioned solids to strip mined land is not believed to be as great as suggested in the EIS. The City has been studying this alternative for about a year. Third, using the dry solids figures in the EIS and correcting for the attainable dry solids content of the dewatered cake, 4 incinerators will be required at both Southerly and Jackson Pike. Fourth, it is inappropriate for the EIS to consider installation of the new dewatering centrifuges in the existing vacuum filter building. Construction of

a new building housing six centrifuges has already been funded by USEPA and is presently under construction. Fifth, it is doubtful that the water plant solids disposal quarry will be available for use for incinerator ash disposal. Its entire capacity is needed for water plant solids, and OEPA will not approve its use for codisposal of incinerator ash. And last, it is unlikely that the EIS proposal with their significantly reduced facilities will permit reprocessing of the solids from the existing Jackson Pike lagoon.

(4.1.73)

SUMMATION

In summary, several important points must be reiterated:

1. The EIS has been prepared without input from the City of Columbus. The City has had no input to the EIS decision making process. USEPA has been reluctant to communicate.

2. USEPA has not cooperated with the City of Columbus in its requests for the original Booz, Allen and Hamilton and the Havens and Emerson EIS reports.

3. USEPA has no reason or authority to design facilities as a part of the EIS process.

4. USEPA's inappropriately included design criteria is inconsistent with its own published standards, is unapprovable by OEPA, and is unacceptable to both the City and the City's consultants. If such design criteria remain in the EIS and are thereby imposed on the City of Columbus, two important questions must be answered. First, who will be responsible for design of the facilities, and second, who will have final responsibility for the resultant treatment facilities meeting NPDES permit requirements. Hopefully, these issues will not require resolution in the courts.

5. The EIS document does not address the environmental impacts of many of its own controversial and questionable proposals.

6. The EIS seems to be an attempt to stymie area growth by providing inadequate sewers, inadequate facilities, and delayed construction schedules. In addition it appears to attempt to justify its preparation by presenting

fictitious cost savings at the expense of planning area water quality.

In the guise of an "Environmental Impact Statement" this document attempts to dictate every aspect of Columbus' pollution abatement program for the next 20 years. The Federal Government is dictating what sewers can be constructed, when, and what size. They have decided what wastewater treatment processes can be constructed, their size and what flows and loads they must treat. They further dictate what effluent limits these facilities must meet and provide criminal penalties with fines of $25,000 per day for any violation. These fines will have to be paid by the users of the system. The City has not been permitted to participate in the development of any of these decisions. The only role left for the City of Columbus in this whole process is the operation of the facilities, and since the Federally designed facilities when constructed will not meet their own limits, we suggest that USEPA also assume the operation of these facilities. The City of Columbus <u>will not accept</u> responsibility for operating inadequate facilities and incurring severe fines as a result.

In conclusion, the City intends to challenge these USEPA decisions and will strongly urge adoption of its original Facility Plan. The project delays caused to date by the Federal EIS have already cost the taxpayers an additional 30 million dollars. The taxpayers of this community do not need to be further burdened with additional unnecessary delays and the associated increased cost and adverse environmental impacts.

ATTACHMENT 1

Hearing before the subcommittee on investigations and review of the committee on Public Works and Transportation:

94th Congress
2nd Session
September 21, 1976

The above subcommittee investigation related that the New York Region of EPA in April, 1975, prepared a general report on the cost of sewer construction versus the size of pipe. With the results of their analysis, they said "it is cost effective to build interceptors that are sized to handle ultimate flows."

Recommended standards for Sewage Works-Great Lakes-Upper Mississippi River Board of State Sanitary Engineers - 1971 Revised Edition: Design Period "In general, sewer systems should be designed for the estimated ultimate tributary population, except in considering parts of the systems that can be readily increased in capacity."

The statement by USEPA that the EIS solutions will save the City money is completely erroneous and misleading. The sewers proposed do not meet the tributary area total service needs as do those sewers proposed by the City in the Facilities Plan. It will be necessary to <u>at least</u> duplicate the EIS proposed sewers in the year 2000 or later and the EIS purposely fails to point this problem out to the readers. The doubling or tripling of the cost of these sewers by making future sewer construction an assured problem will result in a much heavier economic load on the City for not solving this problem correctly now. The future construction cost associated with R/W acquisition, which could prevent the eventual construction of the future sewers, or a tremendous increase in construction cost (beyond the inflation impact) due to restrictive construction room impacts due to adjacent development is not addressed either.

ATTACHMENT 2

Calculation of 1976 Actual Jackson Pike Influent Load Concentrations

1976 T.C. Operating Time = 7,300 Hrs. (83.33%)

1976 Recorded Influent BOD_5 = 260 mg/l (160,000 lbs/d)

1976 Recorded Influent SS = 370 mg/l (220,000 lbs/d)

1976 Recorded Flow = 72 MGD

EIS T.C. Average Recycle BOD_5 = 30,000 lbs/d

EIS T.C. Average Recycle SS = 71,000 lbs/d

Maximum T.C. Inlet Capacity = 200 gpm

Maximum T. C. Solids Capacity @ 4½% D.S. and 83.33% Operation = 90,000 lbs/d

EIS T.C. Solids Capture = 21% (Unrealistic)

Maximum T.C. Recycle Flow = < 180 gpm

EIS T.C. Avg. Recycle BOD_5 = 16,600 mg/l (83.33% Operation)

EIS T.C. Avg. Recycle SS = 39,400 mg/l (83.33% Operation)

(Note: EIS T.C. Recycle SS = 4% D.S.)(Unrealistic)

Actual 1975 T.C. Recycle BOD_5 = 8,400 mg/l (Plant Records)

Actual 1976 T. C. Recycle SS = 3,400 mg/l (Plant Records)

Actual 1977 T.C. Recycle BOD_5 = 6,000 mg/l (Plant Records)

Actual 1977 T.C. Recycle SS = 2,000 mg/l (Plant Records)

Contributions to influent quality by T.C. recycle have been grossly overstated in the EIS.

Actual Estimated 1976 Avg. Influent BOD_5 = 245 - 250 mg/l

Actual Estimated 1976 Avg. Influent SS = 340 - 350 mg/l

(T.C. = 8,000 mg/l BOD_5 & SS, 83.33% Operation, 180 gpm)

ATTACHMENT 3

March 17, 1978

Mr. William Baker, P. E.
Grant, Brundage, Baker & Stauffer, Ltd.
Consulting Engineers
960 Checkrein Avenue
Columbus, Ohio 43229

Dear Mr. Baker:

As you requested, I have reviewed "Appendix B - Mathematical Characterization of the Scioto River Below Columbus" which is incorporated into the draft EIS entitled "Wastewater Treatment Facilities for the Metropolitan Area Columbus, Ohio". This Appendix is deficient in several particulars, the most important of which are the following:

1. The authors have made no attempt to verify the dissolved oxygen (DO) model they employed to evaluate the impacts of future Jackson Pike and Southerly discharges. This deficiency alone vitiates their analysis and reduces Appendix B to merest speculation. It is compounded by assumptions which are themselves arguable. (4.1.119)

2. On Page B-2, the authors present an equation they assert to be that employed in their analysis. However, the given equation is the integrated form of a modified Streeter-Phelps model which assumes constant values (in both space and time) for the parameters K_1, K_2 and K_3. Since the authors state that these parameters are variable, the equation on Page B-2 is inapplicable to the problem at hand, and cannot be used as an analytical tool. (4.1.120)

3. The carbonaceous biochemical oxygen demand (CBOD) decay rates they employed are extraordinarily large, ranging from 0.6 day $^{-1}$ (base e, 20° C) to 6.0 day^{-1} (base e, 20° C), although the lower value was apparently used in most reaches. As a result, a summertime DO minimum is predicted to occur between Jackson Pike and Southerly only 2 miles (6 hr time-of-flow) below the Jackson Pike outfall; a substantially complete DO recovery between the DO minimum and the Southerly outfall is also entailed by these K_1's. These predictions should be compared with the results obtained by the U.S. Public Health Service survey of the Scioto River conducted from February 1937 through July 1939 (R. W. Kehr, et al., "A Study of the Pollution and Natural Purification of the Scioto River", Bull. No. 276, US Pub. Health Serv., Washington, 1941). Under summertime low flow conditions (125 to 345 cfs at Jackson Pike), the DO minimum was observed to occur near Commercial Point (30 to 40 hr. time-of-flow below Jackson Pike), corresponding to a CBOD decay rate of about 0.14 day^{-1} (base e, $\geq$ 20° C). The Public Health Service data represent a variety of Columbus effluents ranging from plain sedimentations to activated sludge and include L_o's expressed as

To: Mr. William Baker

BOD_5 from 5. to 18. mg/l. Therefore, it seems likely that the K_1 values employed in the EIS are excessively large and predict a DO sag more severe than can be reasonably expected. (4.1.121)

4. The authors assume that the CBOD and the nitrogenous biochemical oxygen demand (NBOD) are exerted simultaneously. However, long term BOD tests conducted on Scioto River samples collected near South Bloomfield indicate that the NBOD exertion commences only after a lag of about 8.7 days at 20° C (S. Strand, "The Statistics of the BOD Parameters", M.S. Thesis, The Ohio State Univ. 1975). The average NBOD of these samples was 16 mg/l. Thus, the assumption of simultaneous exertion of CBOD and NBOD appears to be unwarranted and predicts a DO sag more severe than can be reasonably expected. (4.1.122)

In summary, the stream quality modeling described in Appendix B is inadequate and cannot be relied upon to accurately simulate the water quality conditions resulting from the proposed Jackson Pike and Southerly discharges. There is reason to believe that stream conditions resulting from those discharges will be better than those suggested by the Draft EIS, but lacking good water quality simulations, no accurate predictions can be made.

Respectfully yours,

Robert M. Sykes

Robert M. Sykes, Ph.D.

ATTACHMENT 4

EIS DESIGN REMOVAL EFFICIENCIES FROM TABLE K-1

(a) Influent vs. Primary Effluent loads (no recycles) indicate 58% SS removal at JPWTP and 71% SS removal at SSTP.

(b) Influent vs. Primary Effluent loads (with recycles) indicate 45% net SS removal at JPWTP and 61% net SS removal at SSTP.

(c) Influent vs. Primary Effluent loads (no recycles) indicate 37% BOD_5 removal at JPWTP and 44% BOD_5 removal at SSTP.

(d) Influent vs. Primary Effluent loads (with recycles) indicate 26% net BOD_5 removal at JPWTP and 39% net BOD_5 removal at SSTP.

(e) First stage removal efficiencies at JPWTP are 73% for SS, 67% for BOD_5, 24% for TKN and 63% for P.

(f) Second stage removal efficiencies at JPWTP are 44% for SS, 92% for BOD_5, 90% for TKN and 41% for P.

(g) Second stage removal efficiencies at SSTP are 94% for SS, 96% for BOD_5, 91% for TKN and 71% for P.

(h) Efficiencies of polishing filters, etc. at JPWTP are 74% for SS, 27% for BOD_5, 30% for TKN and 50% for P.

(i) Efficiencies of polishing filters, etc. at SSTP are 13% for SS, 29% for BOD_5, 35% for TKN and 45% for P.

(j) Overall removal efficiencies for JPWTP are 98% for SS, 99% for BOD_5, 94% for TKN and 90% for P.

(k) Overall removal efficiencies for SSTP are 98% for SS, 98% for BOD_5, 94% for TKN and 90% for P.

Many of the above EIS removal efficiencies are believed to be over optimistic especially in view of the unit process design parameters used in EIS.

ATTACHMENT 5

COMPARISON OF SUGGESTED SECONDARY CLARIFIER OVERFLOW RATES

gpd/sf

	EIS Recommendations		Proposed Facility Plan		USEPA	Approvable by OEPA
	Jackson Pike	Southerly	Jackson Pike	Southerly	Stds.	
Average Day	1090	700	500	500	200-800	500
Maximum Rate	2000	1850	975	985	800-1200	1000

CITY OF COLUMBUS

OHIO

DEPARTMENT OF PUBLIC SERVICE
ZIP CODE 43215

April 24, 1978

RECEIVED

APR 26 1978

EPA REGION 5
OFFICE OF REGIONAL
ADMINISTRATOR

Mr. George Alexander, Regional Administrator
U.S. Environmental Protection Agency
Region V
230 S. Dearborne
Chicago, Illinois 60604

(4.1.74)

Attention: Gene Wojcik, Chief
EIS Preparation Section
Planning Branch

Dear Mr. Wojcik:

The City of Columbus have reviewed the report entitled "Draft Environmental Statement-Wastewater Collection and Treatment Facilities - Columbus, Ohio" dated November 14, 1977, prepared by Booz Allen-Havens and Emerson, Inc. The City's review indicates that several important passages in this report were altered or eliminated in the draft EIS published by USEPA which changed the original intent of Booz Allen-Havens and Emersons proposals. Furthermore, several significant environmental impacts are omitted which seems to confirm that USEPA had preconceived ideas regarding several key issues in the EIS.

More specifically, the City notes the following major alterations referenced to the original Booz Allen-Havens and Emerson report:

1. Page 14 of Executive Summary - The end of the third paragraph was changed to delete the phrase "and a flexible waste solids handling disposal system... while assuring dependable solids processing within the confines of the plant on a day to day basis." Why does USEPA not want to provide a flexible, dependable solids handling system for processing solids at the plant on a day to day basis?

2. Page I-6 - The last sentence of the first paragraph originally stated the "USEPA has directed... that the EIS utilize this larger planning area". The draft EIS was changed to delete the words "USEPA has directed". What is the reason for this change?

3. Page III-22 - The last line of the first paragraph was omitted from the Draft EIS. This statement read "Due to possible

ORIGINAL: WATER

contamination of the Hoover Reservoir resulting from poorly performing individual home treatment systems, a No Action Alternative will not be considered." What is the reason for the USEPA EIS to omit an important environmental issue such as the contamination of a public drinking water supply for a city of 800,000 people?

4. Page III-46 - In the last sentence of the last paragraph, the word "uneconomical" was changed to read "not cost effective". USEPA is improperly using the term "cost effective", as such term by definition, must also include environmental assessments. Since this sensitivity analysis considers only economics, the original report correctly used the word "uneconomical", thereby implying that environmental issues were not considered.

5. Page IV-24 - The Draft EIS omitted several statements on this page related to sludges, chlorinated pesticides, and PCB's. One of these sentences stated "Ten mg/l of effluent suspended solids will result in an effluent chlorinated benzene concentration of about 0.0001 mg/l at Columbus; a value 100 times more than the maximum allowable PCB concentration." We believe that this statement refers to application of waste solids in agricultural applications. Regardless of the alternative, we question why USEPA chose to remove a passage related to such a significant environmental issue as PCB's. Does USEPA feel that such high levels of PCB's are not an environmental consideration and justify omission from the Draft EIS?

6. Page IV-33 - In the third paragraph, USEPA has deleted the statement that a parallel force main may be necessary for fail-safe reliability. Does USEPA believe it proper to disregard such a distinct probability?

7. Page IV-38 - The USEPA Draft EIS omitted the statement referring to sludge cake application to the land, as follows: "The ultimate analysis revealed that this alternative was harder to implement and less cost effective than an incineration alternative. Further, only the incineration alternative provided continuous availability and reliability." Why was this passage omitted? Since the City and USEPA consultants all agree that incineration is most cost effective, and considering the PCB's, chlorinated pesticides, etc in the sludge, why does USEPA continue to pursue land application of sludges? Does USEPA feel that the chlorinated benzenes and PCB's will disappear from the Columbus sludge in the course of further modelling studies? What criteria were used

by USEPA in omitting the recommendations of its consultants? In this particular case, what are the reasons of the USEPA which led them to a decision which is different from that of their consultants?

8. Page IV - 39 - The draft EIS omits the following passage in relation to land application of sludge: "The resistance of the service area population to the subsidizing of operations which are not cost effective..." Why does the USEPA want to omit the reference to the costs of land application of sludges? Why does USEPA omit the sentence in the following paragraph of the EIS that relates to the State and Federal agencies that will have to make a firm commitment to the municipality to accept any liabilities which may arise from applying these solids to the land? We are particularly interested in knowing why the USEPA chose to omit the fact that there would be long term liabilities from the effects of land application of sludges that contain PCB's and chlorinated pesticides.

9. Page IV-45 - USEPA has deleted three significant paragraphs and one table showing that nutrient recovery alternatives do not appear attractive for implementation by Columbus. Here again, the draft EIS attempts to reduce and omit the negative impacts of its preconceived ideas. Counting USEPA's own engineers, five consulting firms have now shown the fallacy of land application for Columbus.

10. Page IV-49 - The Booz Allen-Havens and Emerson report made this statement in regards to strip mine reclamation, "However, these grants fail to relate to the significant operation and maintenance expenditures associated with a land application scheme." The Draft EIS modified this statement to read, "These grants do not provide for operation and maintenance expenditures." This is a prime example of how USEPA has altered the work of the consultants to minimize the negative impacts of some of USEPA's recommendations.

11. Page IV-52 - In the first paragraph, the draft EIS has deleted the statement "Thus, from the standpoint of the City, any land recovery scheme is uneconomical." We would like to know why this was omitted.

12. Page IV-63 - In the first paragraph, the draft EIS has omitted references to the large land areas of 95,000 and 44,000 acres required for nutrient recovery schemes and to the poor implementability of these schemes. Why? Where in Ohio is this amount of land available for land application?

13. Page VI-8 - The Booz Allen-Havens and Emerson report made the statement, "Although the air quality standards for particulate matter will be met at both incinerator sites...". The USEPA EIS changed this sentence to read, "Irrespective of whether the air quality standards for particulate matter is met or not...". This changes the meaning of the sentence as originally written by the consultants.

14. Page VI-9 - The Booz Allen-Havens and Emerson report states, "The sludge from the Columbus area contains trace amounts of hazardous organic substances such as cyanides. A relatively greater amount of potentially toxic chlorobenzenes has been detected in this sludge." The USEPA EIS modified these sentences to read, "The sludge from the Columbus area contains trace amounts of potentially hazardous organic substances such as cyanides and chlorobenzenes." Further in the paragraph the USEPA modifies a sentence that said, "However, test data shows that virtually all of the PCB's and chlorobenzenes are destroyed during the sludge incineration." Why?

The content of the original Booz Allen-Havens and Emerson report clearly shows that they felt they had enough reliable data regarding Columbus sludge to make strong recommendations for incineration and against land application. This is evidenced on pages IV-38, IV-39, IV-40, IV-45, IV-46, IV-47, IV-49, IV-50, IV-51, and many other pages in the Booz Allen-Havens and Emerson Report.

The USEPA Draft EIS has extensively modified the original document submitted by the EIS consultants and changed the original meaning of many statements. Furthermore, the USEPA has omitted references to important environmental issues: to name a few, contamination of Hoover Reservoir, PCB concentration of 100 times the maximum allowable limits and chlorinated pesticides in the sludge. The omission of these environmental issues is in conflict with USEPA's regulations. We ask that USEPA explain the reasons why environmental issues of such magnitude were not addressed in an Environmental Impact Statement?

The City requests that this statement be entered in the public record of the public hearing on the Draft Environmental Impact Statement for the Metropolitan Area of Columbus, Ohio held in City Council Chambers, Columbus, Ohio on March 30, 1978.

Sincerely,

Robert C. Parkinson

ROBERT C. PARKINSON, P.E.
Director of Public Service

RCP:DDR:jms

cc: O.E.P.A.
Grant, Brundage, Baker & Stauffer, Ltd. (Consulting Engineers)
Malcolm Pirnie, Inc. (Consulting Engineers)
Burgess & Niple (Consulting Engineers)
D. D. Robbins
G. B. Walkenshaw
R. Smith
E. Ary

4.1 City of Columbus

The following sections refer to the general and specific comments raised by the City of Columbus, Ohio, in its review of the Draft EIS. Comments are responded to in the same order as they are presented in the City's review document. The responses are limited to those points raised in the City's detailed review since the concerns expressed by the City in pages one through ten of their document merely summarize those found in the detailed review. Where general comments are further detailed by subsequent specific comments, response is made only to the specific comment.

4.1.1 Comment: The EIS incorrectly states that the Franklin County Board of County Commissioners co-applied with the City of Columbus for the Federal Construction Grant.

Response: The correct identification of the City as the sole applicant has been noted in Chapter I.

4.1.2 Comment: Separate brewery wastewater treatment was not an issue in the U.S. EPA "Notice of Intent" to do the EIS.

Response: The following issues raised in the Notice of Intent implicitly define brewery wastewater treatment or pretreatment as an issue in and of itself:

- The level of sewage treatment necessary to meet water quality standards in the Scioto River
- The liquid sewage treatment alternatives that would enable the attainment of water quality standards in the Scioto River
- Alternative methods of sludge treatment and disposal.

Moreover, the "Notice of Intent" does not preclude from examiniation any issues raised during or as a result of preparing an EIS. In fact, raising of issues early in the process is encouraged by the new CEQ EIS regulations.

4.1.3 Comment: The EIS states that it will use the same planning area as delineated in the Facilities Plan; yet, the alternatives considered for interceptors use a different planning area.

Response: Section 1.5.1 has been changed to indicate that the planning areas are roughly equivalent, with the EIS planning area somewhat larger.

4.1.4 Comment: The EIS did not use the same flow data available at the time the Facility Plan was prepared.

Response: See response 3.1.7 to Ohio EPA comments.

4.1.5 Comment: The EIS claims that plans to revitalize the downtown area may reduce the decentralization trend of the 1960's and 1970's. To say that growth in the downtown area would be responsible for measurably reducing the decentralization trend is almost incomprehensible.

Response: This statement has been taken out of context. If the entire paragraph 2.2.4(1) on projected trends is read carefully, it is clear that the EIS assumes "both the growth and spatial redistribution trends of the 1970's are likely to continue in the foreseeable future."

4.1.6 Comment: No hydrologic discussion of Little Walnut Creek is included in Section 2.1.3.

Response: Information on the hydrology of Little Walmut Creek was unavailable to the authors. Lack of this information is not a serious deficiency in evaluating alternatives.

4.1.7 Comment: 282 mgd is the total safe yield from surface water sources instead of 182 mgd reported in the EIS.

Response: This typographical error has been corrected in Section 2.1.3(1).

4.1.8 Comment: Surface water quality information contains no significant discussion of nonpoint sources.

Response: Problems with septic tanks and urban stormwater discharges are discussed in the EIS. Other nonpoint source problems (e.g., agriculture, mining) are not discussed since they would have negligible, if any, impact on the selection of alternative actions.

4.1.9 Comment: Reports of several fish kills on the Olentangy River are unsupported by documentation.

Response: This has been corrected with additional information from Ohio EPA.

4.1.10 Comment: There is no discussion of fecal coliforms within the section on surface water quality.

Response: Fecal coliform levels are mentioned in general for the Scioto River, Olentangy River, and Blacklick Creek; with specific discussion of values for the Scioto River both in Chapter II and Chapter VI (Pages IV-16-18). Appendix C provides a summary of the available information.

4.1.11 Comment: Statements concerning dissolved oxygen concentrations in the Olentangy River are too hypothetical.

Response: Dissolved oxygen is reported as "high" at Worthington and in standards contravention during low flows at Goodale Street. This is substantiated in Appendix C.

4.1.12 Comment: The EIS incorrectly states that the northwestern quarter of Franklin County was not covered by Climax beech forests.

Response: This has been corrected.

4.1.13 Comment: Why were new population projections developed in the EIS?

Response: The rationale for developing new population projections is given in Section 2.2.2(1). Further discussion of the original Draft EIS projections is presented in VolumeI.

4.1.14 Comment: The City of Columbus does not suffer from an inadequate water supply and does not anticipate any shortage throughout the planning period.

Response: This section has been modified in the EIS and responded to in comment 3.1.18 under Ohio EPA.

4.1.15 Comment: The EIS should address how much vacant land is active farmland.

Response: See response to Ohio EPA comment 3.1.12.

4.1.16 Comment: The EIS should explain that the Scioto West Interceptor would also relieve the constraints imposed now on flow to the Scioto East.

Response: See response to Ohio EPA comment 3.1.13.

4.1.17 Comment: Table II-23 does not reflect sewer charges currently in effect.

Response: See response to Ohio EPA comment 3.1.16.

4.1.18 Comment: Safe water yields appear to be incorrect according to City of Columbus figures.

Response: See response to Ohio EPA comment 3.1.18.

4.1.19 Comment: The EIS designs interceptors to flow half-full in the year 2000 rather than on ultimate population.

Response: EPA Guidelines (40 CFR 35E) state that: "Interceptor pipe sizes (diameters for circular pipes) allowable for construction grant funding shall be based upon a staging period range of from 20 to 40 years, since direct monetary costs vary little within this range. Since the projection of population flows beyond 20 years is highly conjectural, the pipe size may be based upon a staging period of 20 years and an assumption that the pipe, at peak flow, will be flowing at half depth at that time."

4.1.20 Comment: The 0.25 percent of the construction cost as annual O&M for interceptors is an estimate that is unreasonably high.

Response: The 0.25 percent of construction cost was used as an estimate for the annual O&M of interceptors. This is an estimate of the cost required to staff and equip a maintenance crew and to allow some contingencies for repair or replacement of interceptor sections.

4.1.21 Comment: Salvage values were not straight lined, but appear to have followed a decreasing rate trend. This approach has no justification for interceptors.

Response: Salvage values were depreciated using the straight line method.

4.1.22 Comment: By using a 20 year planning period, the EIS does not consider construction of interceptors for the period 2000 to 2025.

Response: See previous comment 4.1.19.

4.1.23 Comment: EIS states that it used costs for interceptors based on recent bids in the Columbus area. Where is the documentation?

Response: The bids used as a check on the validity of the EIS cost estimates are as follows:

Date Bid Submitted	C.I.P. No.	Contract Dwg. No.
March 22, 1977	710031	CC-2553
December 7, 1976	710046	CC-2382
March 2, 1976	N.F.	CC-2382
December 14, 1976	710021	CC-2196
March 8, 1977	N.F.	CC-2416
March 2, 1976	710106	N.F.
June 29, 1976	710030	N.F.
October 12, 1976	7100538	N.F.
December 28, 1976	710158	CC-2243
March 9, 1976	N.F.	N.F.
August 24, 1976	N.F.	CC-2493
February 24, 1976	710124	CC-2192
February 15, 1977	710123	N.F.

4.1.24 Comment: The environmental impacts as well as cost of building parallel interceptors at some future date are significantly greater than designing to full at ultimate population and have not been analyzed.

Response: The impacts of constructing sewers of the cost-effective size (20 year - half full) have been analyzed. In addition it is not EPA policy to design sewers based on ultimate population as this can greatly overstate needs for adequate protection of the water. See Comment 4.1.19.

4.1.25 Comment: The EIS recommends extending and enlarging the interceptor to convey flow from Southwestern Delaware County and does not provide a cost-effective analysis.

Response: The first paragraph on Page III-12 of the Draft EIS under "Costs" states that a present worth basis was considered for a pump station versus an interceptor above Manhole 3. The detailed analysis was not presented in the report but is reproduced below:

	West Scioto	
	Interceptor	Pump Station
1980 Capital Cost		
(50 year life)	$1,421,000	$ 63,000
(20 year life)	0	350,000
1980 Present Worth of Salvage	-248,000	-11,000
1980-2000 O&M P.W. Interceptor and Force Mains	40,000(1)	2,000(1)
1980-2000 O&M P.W. Pumping Station	0	318,000(2)
	$1,213,000	$733,000

(1) 0.25% of construction cost.
(2) O&M varies from $20,200/year in 1980 to $33,600/year in 2000.

The P.W. of the interceptor is some 65 percent greater than the P.W. of the Pump Station.

The EIS did not size the West Scioto Interceptor in an effort to instruct Columbus to serve southwestern Delaware County. The sizing was put forth so that the lower section could be constructed without further delay. If this section is constructed of the size mentioned in the EIS, it would not have to be paralleled in the event a future decision does call for the transport of sanitary flow from southwestern Delaware County.

4.1.26 Comment: For the Big Run Interceptor, the EIS considered the same alternative presented in the Facilities Plan. The EIS overlooked the fact that the section between MH 4 and 5 could not be constructed unless the section from MH 5 to 6 was constructed.

Response: The EIS reviewed the same alternative as the Facilities Plan since it appeared to be the only feasible solution for regionalization of this subarea. The interceptor section between MH 4 and 5 was the only section projected to require service during the planning period. The EIS did take into account the fact that to provide service to the first section, the interceptor section between MH 5 to 6 would also have to be constructed, as shown in Table III-3.

4.1.27 Comment: The interceptors proposed by the EIS are incapable of being extended in the future.

Response: With population projections pointing toward a fairly heavy growth in an area surrounding Interstate 70 close to the City of Columbus, modification to the Facilities Plan alternative was described in the EIS. The modification was suggested only as an option to collect flow from this area without requiring additional construction of the Big Run Interceptor above Manhole 4.

4.1.28 Comment: The EIS duplicated the alternates used in the Facilities Plan, except to change the sewer pipe size and incorrectly states the location of the Alum Creek Interceptor.

Response: EPA policy and design criteria dictated smaller sewer sizes. The City is correct, however, in suggesting the change from "westerly" to "easterly". The change has been made in the EIS.

4.1.29 Comment: The delayed construction of the interceptor will increase the threat of contamination to Hoover Reservoir. The pump station and force main sizes would be affected by annexation plans contemplated by New Albany.

Response: For the Big Walnut Creek area, the suggested section of the interceptor to be constructed during the planning period is below the reservoir. When and if the area north of this point is constructed, the route suggested by Alternative A or Alternative B may be selected. 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 Subarea. Provision of public utilies and highways have been show 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.

4.1.30 Comment: The EIS is inconsistent and incorrect throughout its analysis of the Blacklick Creek alternatives.

Response: Comments pertaining to the Blacklick Creek Subarea will be addressed in the response to questions raised by the City of Reynoldsburg.

4.1.31 Comment: The force main referenced in section 3.1.2 crosses the Scioto River at Martin Road, not at S.R. 161.

Response: Description of the crossing has been corrected.

4.1.32 Comment: The model on combined sewered areas is questionable since it was based on theoretical concepts and was not verified by actual field measurements.

Response: The lack of verification is explicitly mentioned in the combined sewer modeling discussion. It was never intended to draw definite, detailed conclusions from this analysis, and it is so stated in Appendix H. The broad conclusions which are drawn will be either substantiated or revised at the completion of the City's combined sewer overflow analysis.

4.1.33 Comment: Outletting the Sunbury/Galena area into the Columbus system is not dealt with in the Big Walnut or Rocky Fork alternatives.

Response: In Sunbury/Galena localized facilities planning will be evaluated to determine the need for sewer service for that service area.

4.1.34 Comment: The EIS uses a 90 gallons per capita per day dry weather flow without documenting the figure.

Response: The 90 gallons per capita per day came from the I/I report prepared by Malcolm Pirnie. The EIS examined 19 of the 22 areas evaluated in the I/I, and then used the average wastewater flow (45.8 mgd) divided by the population served (45.8 mgd/528,553).

4.1.35 Comment: The EIS allowance for infiltration is not nearly enough and should be calculated on an acreage basis and not tied to population.

Response: The point made in the comment as to the fallacy of a per person allowance could just as easily be made concerning a per acre allowance. Until a collection system for the year 2000 population is designed, any estimate for I/I to an interceptor has similar weaknesses.

4.1.36 Comment: The EIS does not truthfully represent the facts about the Scioto East Interceptor and Dublin's limited discharge.

Response: The limiting discharge of 29 cfs (18.7 mgd) from Dublin is over twice the peak flow estimated to come from both Dublin and the southwest portion of Delaware County (if this flow is collected by the City of Columbus), as pointed out in Table III-2 for the modified plan.

4.1.37 Comment: The EIS cost estimates for construction and O&M are inappropriate and use an unrealistic plant life figure.

Response: The 0.25 percent of construction cost was used only as an estimate of annual O&M costs for the interceptors, and if removed would not change any decision made by comparative cost analyses. If treatment plant lives were shortened, the cost-effective analysis involving the consideration of a treatment plant would not be changed.

4.1.38 Comment: Use of half full criteria provides for capacity beyond the planning period, but no analysis was done to relate the 20 to 50 years population flow demands to the sewer which has a stated sewer life of 50 years, to determine whether the sewer will serve the area throughout its stated life.

Response: Please see response to comment 4.1.19.

4.1.39 Comment: Allowing population problems to develop in New Albany violates the spirit of P.L. 92-500 and 95-217.

Response: Please see response to comment 3.1.28.

4.1.40 Comment: Pumping stations are not good practice in this day on conserving energy, especially when a gravity sewer can be constructed.

Response: The cost of energy has been included in the comparison between pumping station and gravity sewer options.

4.1.41 Comment: The "permanent" pump station cannot be permitted to usurp East Area sewer capacity.

Response: The costs reported in the Draft EIS were for a permanent pump station and force main with the knowledge that at a time after the planning period this station would be abandoned. The 29 cfs previously cited by the City as the limiting flow from the Dublin area was found to be twice the capacity needed through the planning period, as pointed out in Table III-2 of the EIS.

4.1.42 Comment: The adding of additional Delaware County area merely compounds the above comments and requires a complete reworking of this area analysis.

Response: The addition of Delaware County causes a suggested increase in size for the sections of the interceptor which must be constructed by 1980. This merely allows for future flexibililty in decision making by southwestern Delaware County without holding up needed construction.

4.1.43 Comment: No substantial information is presented by the EIS to support contention that some part of the Big Run area can be cross connected to easterly area sewers by gravity.

Response: A review of City construction drawings showed the invert of manhole 19 north of I-70 and the intersection of Hilliard and Renner Roads to be 919.58. The sewer at this location is shown as 27" at a slope of 0.4% and is over 10 feet deep. The manhole at the intersection of Feder and Hilliard Roads which would serve the area south of I-70 is shown to have an invert elevation of 901.43 feet. The 27" sewer at this point is over 25 feet deep. With this data, it was assumed that the areas to the west of these manholes could be served by gravity utilizing a limited extension of these sewers.

4.1.44 Comment: The EIS recommends implementation of Alternate A for Big Walnut which was shown in the Facilities Plan as being extensively routed through environmentally critical areas.

Response: The proposed construction during the planning period for the Big Walnut Creek subarea could accommodate the future choice of either Alternative A or B for service to the area further north. This decision can be made at the time the extension is needed.

4.1.45 Comment: The lack of sewers in Blacklick Creek will not halt development. Developers will build regardless.

Response: Please see response to comment 3.1.34.

4.1.46 Comment: The EIS does not consider all the facts regarding the Blacklick Creek proposals.

Response: All comments regarding Blacklick Creek are dealt with in responses to comments made by the City of Reynoldsburg in Chapter IV, Section 4.3 of this volume.

4.1.47 Comment: The environmental and aesthetic impacts of installing a force main along U.S. 40 for Blacklick Creek were grossly underestimated.

Response: Please see response to Comment 4.1.46.

4.1.48 Comment: The EIS proposed pumping station location set in the vicinity of S.R. 161 and the force main to Big Walnut Interceptor totally ignores the fact that a previous Federal grant paid for a gravity sewer from the creek to the vicinity of Hamilton Road just south of Morse Road. This grant and construction was made to provide an outlet compatible with the New Albany plans. This situation will require a complete reworking of the cost-effective analysis for the Big Walnut/Rocky Fork/Blacklick areas.

Response: See the revised analysis in Chapter III of Volume I and the revised regionalization chapter appended to this volume.

4.1.49 Comment: Blacklick Alternative D has the most primary impacts and should not be constructed. The gravity interceptor sized to ultimate flow is the best way to clean up the waters and to eliminate dual and triple construction impacts.

Response: Please see responses to comments made by the City of Reynoldsburg in Section 4.3 of this Volume.

4.1.50 Comment: No consideration was given to the existing treatment plants in the vicinity of I-70 and S.R. 256 and S.R. 204.

Response: Please see responses to comments made by the City of Reynoldsburg in Section 4.3 of this volume.

4.1.51 Comment: Rickenbacker Air Force Base is not in the approved planning area.

Response: The analysis for the base has been deleted since the base has been phased out.

4.1.52 Comment: The pretreatment of brewery waste was considered by the City to be inappropriate for seven reasons:

1. The brewery load is not considered incompatible according to EPA standards.

2. No pretreatment standards for brewery wastes have been published to date.

3. Economies of scale indicated that treatment at Southerly would be less expensive.

4. The environmental impacts of a sewage treatment facility at the brewery would be significantly greater as compared to treating the brewery waste at Southerly.

5. The City has no legal authority to impose pretreatment standards on the brewery.

6. Discharge of pretreated brewery wastes might be worthless due to the long travel time in the sewers to Southerly.

7. A two year research study, conducted by Ohio State University under contract with the City, has not shown brewery waste to be the direct cause of bulking problems at the Southerly Plant.

Response: The City cites seven reasons why brewery pretreatment was deemed inappropriate. These points were not generally raised in any of the documents made available during the preparation of the EIS. Responses to each point are as follows:

1. This is not related to questions of where and to what level it is cost-effective to treat the brewery waste.

2. See above response. Further, no hard pretreatment standards should be established for an industrial waste that is compatible with conventional wastewater treatment technology since the cost-effectiveness of pretreatment is obviously situation specific.

3. The City or brewery should provide supporting documentation of this conclusion. Our costing analysis, which we believe is conservative, suggests an opposite conclusion. Conceptually, it is difficult to imagine how 3 mgd of non-pretreated brewery waste, which contributes nearly 30 percent of the entire anticipated 85 mgd Southerly BOD_5 load (and over fifty percent of the soluble BOD_5 load) can be more cost-effectively treated once diluted with normal municipal wastewater. Economies generally result when handling wastes in their most concentrated form.

4. The City or brewery should cite what they believe to be the significantly greater environmental impacts with the brewery pretreatment. Proper safeguards have been incorporated into the EIS pretreatment scenarios to minimize local impacts, particularly in terms of odor control.

5. Pretreatment can be thought of as load limitation. The City and brewery have agreed that the average day brewery load should be no more than 60,000 lbs of BOD_5/day. If the brewery uses public sewers or public treatment facilities, it would appear that the City can develop any statutes that it needs to deal with the situation.

6. In reference to Scenario 2, it should be noted that the average day primary sedimentation overflow rate at Southerly is only about 700 gpd/SF and that the proposed means of phosphorus removal will incorporate metal salt (alum) addition to the influent wastewater. Alum is an effective coagulant, especially when backed up by organic polyelectrolyte addition. It is likely that the sloughed solids from the brewery's roughing trickling filter can be effectively controlled at Southerly even with changing settling characteristics due to the long conveyance time in the interceptors.

7. This document was not available to us during the EIS preparation, and, we therefore could not comment on the validity of its conclusions. The key word in the City's comment may be "direct"; obviously the bulking problem will be directly caused by some organism whose growth is selected for by the means of operating or the operating limits of the existing facilities. The key question is, "Would this bulking problem exist without the brewery with the present installation and loads?" We find that it would not, as addressed in the supplemental analyses.

4.1.53 Comment: The EIS recommends "pretreatment" of the brewery waste to the point that the soluble oxygen demanding load is largely removed. The following questions should be taken into consideration regarding this Scenario 2:

1. Have adequate provisions been taken to prevent odors?

2. What is the success and feasibility of this method?

3. What will be the impact on Southerly solids handling facilities?

4. Will there be problems in the sewers?

5. Is this being done anywhere successfully? If so, what are the problems?

6. Who would operate the Brewery facility?

7. Were the basis of cost estimates the same?

8. Can this proposal be implemented?

9. Can any of sludge handling at Southerly be eliminated as proposed?

10. What are EIS proposals for quantities of sludge generated and methods and costs of disposal?

11. Table IV-2 Page IV-6. It appears in the EIS, that scenarios 2, 3, and 4, eliminate $24.5 million in solids handling costs at Southerly. While the Brewery costs reflect increases as level of treatment increases, the level of cost at Southerly doesn't vary. - This isn't possible. The solids processing cost at the Southerly in "Scenario 2" would have to be greater than in "Scenario 4"!

Response: In reference to Scenario 2, the City raises 11 questions. Our responses are as follows:

1. Yes, to the level of detail incorporated with the development of the scenarios. It is so stated in the Draft EIS and has been further stated in our response of March 29, 1978, to the brewery's requests for additional information.

2. We do not limit the brewery to a specific treatment method, but believe the one defined for the purposes of cost estimating is a reasonable alternative.

3. The overall effect will be to slightly increase the magnitude of waste solids from Southerly's primary sedimentation system and significantly decrease the magnitude of waste solids from the secondary treatment system.

   Although it is unclear what problems are contemplated, three common problems are: Solids - no more than presently experienced and perhaps less, since we are dealing with a biological suspension, which is unlikely to settle under the velocity conditions found in a sewer; H_2S and methane formation - no more than presently experienced since the deposits should not increase; Odors - possibly less in the sewer reaches near the brewery due to biological stabilization of brewery load, in the sewer reaches away from the brewery we doubt if there will be a significant change over present conditions.

5. The use of synthetic media trickling filters for stabilization of soluble, simple carbohydrate, and readily biodegradable industrial wastes is not a unique treatment technology, and has been successfully applied throughout the United States. Use of this treatment technology to reduce the soluble oxygen demanding load prior to release to a sewer has not been tried anywhere to our knowledge, but we believe the concept to be technically valid.

6. It is recommended that the brewery will operate its own facility.

7. Southerly costs and operating costs were determined from the values cited in the Facilities Plans and elimination of parallel or complete unit processes when they were no longer required. Capital cost estimates for brewery treatment facilities were independently determined.

8. This question is more dependent upon the willingness of the participants rather than on technical concerns.

9. Yes, Table IV-2 clearly shows what sludge handling facilities can be eliminated.

10. Appendix K clearly states the quantities and methods for sludge disposal. Capital and operating costs were largely developed from the informational basis contained in the Facilities Plans. The validity of any final cost estimate is dependent upon the original validity of the costs found in the Facilities Plans.

11. The $24.5 million difference is associated with the elimination of both main stream ($15.5 million) and waste solids handling ($9.0 million) unit processes. It is our view that with the 60,000 lbs/day of BOD_5 brewery load scenario, no further significant capital or operating savings can be realized at Southerly once the soluble oxygen demand of the brewery's waste is controlled.

4.1.54 Comment: The discussion of the use of the Jackson Pike plant effluent as cooling water is beyond the scope of the EIS or the Facilities Plan and should not be addressed.

Response: The potential use of the Jackson Pike effluent for cooling water at the proposed refuse/coal fired power plant is entirely appropriate within the scope

of an EIS. It represents a clear beneficial use of wastewater and avoids the use of the river water/effluent mixture for cooling.

4.1.55 Comment: While the City of Columbus is interested in developing a land application program for sludge, the potential liabilities and environmental risks are still not resolved to a point where the City is willing to implement the proposal recommended in the EIS,

Response: See Volume I Section 3.3

4.1.56 Comment: The I/I Analysis Report was ignored in developing design flows, and the approach used in the EIS is inconsistent with the phased construction concept of the facilities planning regulations of the EPA.

Response: The Infiltration/Inflow Analysis report made available to use did not monitor combined sewer areas. Further, the Facilities Plans concluded that the results of the I/I study could not be used in developing peak flows. The EIS developed infiltration/inflow estimates based upon the information available.

The Facilities Plan specifically states that the average annual design flows for Jackson Pike and Southerly are 120 mgd. How these flows were derived, particularly at Southerly, was not stated. The firm hydraulic capacity to average annual flow ratio of less than two is indicated for both plants. The use of such flow ratios violates conventional design practice.

The EIS checked the validity of the average day design flow values. An insignificant difference was found at Jackson Pike (110 mgd for the EIS versus 120 mgd for the F.P.) while a significant difference was found at Southerly (85 mgd for the EIS versus 120 mgd for the F.P.). Thus, it was believed that Southerly had an adequate hydraulic capacity but Jackson Pike's hydraulic capacity was still below accepted norms. It seemed pointless to expand the Jackson Pike hydraulic capacity to 240 mgd or more when the 150 to 156 inch diameter connecting sewer was available for flow diversion to Southerly, which, save for its firm pumping capacity, had sufficient reserve hydraulic capacity to handle a diverted 50 mgd. Thus, the EIS offers an easy-to-implement program which provides 430 mgd of hydraulic capacity against the 380 mgd proposed in

the Facilities Plan. Most fundamentally, this yields (using the EIS average day flows) a hydraulic capacity peaking factor of 2.2 times the average day flow of both plants against the 2.8 and 2.1 factors (at Jackson Pike and Southerly, respectively) derived with the proposed project plan of the Facilities Plan. (Refer to pp. I-24 through I-27).

4.1.57 Comment: The EIS recommends use of the jet-aeration system. This recommendation is not adequately supported. All available technologies for oxygen dissolution should be reviewed at the time of final design.

Response: The EIS recommends a detailed evaluation of jet aeration in plant-scale studies as a possible replacement for the antiquated, maintenance intensive, sock diffuser systems. Other alternatives are also suggested. We readily admit that we have no first-hand knowledge of the system's oxygen transfer efficiency; we do have test data from reputable independent consultants.

Nowhere does the EIS state a first cost savings for the Pentech system, with all analyses pointing to its cost-effectiveness when operating costs are considered. The $1.3 million savings mentioned in the comment is for the overall biological treatment system at Southerly, a point noted in the "Processing Concept" line in the cost summary table. The end result of this entire comment is exactly what the EIS recommends.

4.1.58 Comment: The EIS states (Appendix I Pg. I-27), "The design hydraulic capacity of a plant is normally selected at 2 to 2.5 times the average daily flow for facilities the size of the Columbus installation." We agree that this would normally be the case. However, the following points should be noted.

1. The plant facilities in the facilities plan are designed on the basis of average dry weather flow and not annual average daily flow as design annual average daily flow cannot be determined with certainty without obtaining the results of the sewer studies.

2. With the construction of necessary equalization facilities, there is no reason for the peaking factor to be 2 to 2.5 times average flow as normally required for plants without equalization facilities.

Response: The point of the flow equalization comment is unclear, although it would seem that the comment addresses oversizing of the hydraulic capacity of the treatment facilities. The EIS proposal for a 2 to 2.5 average day to peak flow ratio is realized through minimal expansion of existing facilities and a matching sizing of proposed hydraulically-dependent processes. This would be accomplished through the use of the interconnecting sewer; an existing facility which the Facilities Plan did not incorporate. If the SSES and separation projects show the need for equalization facilities, the EIS does not preclude their construction.

If the 120 mgd flows cited in the Facilities Plans do indeed represent average dry weather flows as claimed, we find no justification whatsoever in the Facilities Plans. Further, if they were, a design with no equalization facilities such as proposed in the Facilities Plans would certainly use a higher peaking factor than that found in the Plans. The second point of the comment assumes a conclusion before the data is in to perform the required analysis.

Finally, since the EIS has revealed a significant difference in the design average annual flow at Southerly and provided an economical means of achieving a normal hydraulic capacity for the wastewater flows at Columbus, an independent quantification of design flows has not been a waste of time, effort, and money. The need for such effort can be attributed to the lack of justification in the Facilities Plan in deriving these flow values and the apparent neglect in addressing normal hydraulic capacity considerations.

4.1.59 Comment: The anaerobic stabilization of heat treated sludges must be considered an unproven process.

Response: Agreement with this point was clearly expressed in the EIS (see Appendix J). It must be pointed out, however, that the cost for trying this process is minimal, and provisions for its abandonment if unsuccessful have been incorporated into the EIS proposal.

4.1.60 Comment: Waste heat recovery boilers have been proposed, but not installed at either plant.

Response: The EIS statement has been changed to recommend that the proposed waste heat recovery boilers be installed.

4.1.61 Comment: The information in Table IV-15 has not been adequately documented.

Response: Please see the response to Comment 3.1.48 of OEPA in Chapter 3 of this volume.

4.1.62 Comment: The beginning of the paragraph at the top of page IV-51 is missing.

Response: The missing text has been incorporated.

4.1.63 Comment: Scheme C Thermal Conditioning-Anaerobic stabilization indicates that sludge cake is recycled to the main drain, is this true?

Response: The bottom II pointing to the left should have been III in Scheme C-1 and has been corrected. We cannot believe that this caused any question in a reviewer's mind since the remaining four schemes show a correct identification.

4.1.64 Comment: The EIS indicates the farmer should pay for the application of sludge to farmland. Normally it is just the opposite.

Response: While this is generally the case, no operation should be conducted for a loss. As a first step, the City should still attempt to cover operating expenses for their vehicles and drivers. Also see response to comment 3.1.50.

4.1.65 Comment: The City believes a more indepth analysis of the present oxygen production and dissolution systems must be performed. A quick solution which has not been field tested for several years is not the answer. There is no lack of manufactured diffuser socks for the Columbus aeration system.

Response: The EIS does not suggest a quick solution (See Appendix J). The Facilities Plan did not suggest that an in-depth analysis was going to be performed. The EIS suggests this. Our interviews with plant personnel and Mr. Walkenshaw led us to believe that there was a lack of manufactured replacement socks and fittings. The comment has been deleted.

4.1.66 Comment: Preliminary evaluation of belt pressure filter systems indicated low processing capacity for invested capital, with large numbers of moving pieces and intricate systems indicating potential for severe maintenance problems.

Response: The EIS suggests the testing of such a system: testing which was not underway during the plant tours conducted for the EIS. The City's experiences with belt pressing should be evaluated against their experiences with thermal conditioning. The intent here is to remind the City that continued investment in thermal conditioning may not be the wisest course of action.

4.1.67 Comment: Anaerobic digestion of thermally conditioned sludges or decant liquors has been explored by Columbus and should be further evaluated.

Response: Further evaluation of any data available to Columbus is an excellent approach.

4.1.68 Comment: The need for an adequate air supply to meet demands of increased solids and the effect of contact times to remove soluble organic materials have not been discussed.

Response: Appendix K defines the design conditions and recommended oxygen transfer needs. Air supply cannot be defined until a dissolution system is selected. The design provides adequate solids contacting for removal of soluble oxygen demanding pollutants. If the reviewer believes this not to be the case, he should so state with a supporting rationale.

4.1.69 Comment: Requiring the City of Columbus to design to 5 gpm/SF is specifying the equipment manufacturer and eliminating competitive bidding.

Response: The designer could obtain an indexed prebid guarantee from the manufacturer of the proposed system and alternatives which are allowable under lower hydraulic loads and perform a cost-effective analysis. Alternately, he could prepare drawings and specifications for each filtration alternative to assure competition. The lack of competition should not be used to penalize the manufacturer of a potentially superior system if significant savings can be derived.

4.1.70 Comment: We do not agree with the EIS recommendation that first stage biological treatment be eliminated at Southerly.

Response: The elimination of first stage biological treatment at Southerly is contingent upon the provision of load reduction and flow equalization at the brewery at a level at least the equivalent of that defined by Scenario 2. If a Scenario 2 treatment scheme proves to be inadequate for Southerly in the future, then implementation of Scenario 3 at the brewery will become the cost-effective solution.

4.1.71 Comment: The pump station for trickling filters at Jackson Pike is sized for 220 mgd to allow for "a 20 mgd credit for recycled flows". This shows the danger inherent in making recommendations based on design approach different from that used in the Facilities Plan.

Response: The Facilities Plans made no such allowance for any recycle flow volume, nor did it consider buffering the effluent filter backwash or a programmed return of any recycle. A recycle credit of 20 mgd at the trickling filter pumping station was chosen to assure flexibility and to highlight the fact that recycles must be considered. Where recycle flows are applied obviously depends upon the anticipated quantity and quality characteristics. Provision of an extra 20 mgd at the trickling filter pumping station would have no economic impact while assuring future flexibility.

4.1.72 Comment: The EIS, contrary to prudent design practice, assumes design removal rates near the higher limits of generally observed range of removal rates. By adopting this practice, it shows lower loads on subsequent treatment facilities which then would be sized smaller than would normally be required.

Response: These comments show the danger of blind use of manuals, and ignore key questions such as the soluble and particulate influent and effluent characteristics for each pollutant and the hydraulic loadings applied to the sedimentation tank. The design influent wastewater quality characteristics for Jackson Pike are

clearly developed in Appendix I. In Table I-15, it is clearly referenced that some phosphorus insolubilization can be expected due to the heavy metal load contained in the Jackson Pike influent. This situation was revealed in the course of preparing this EIS by brief sampling and analysis of the influent and by the iron content in the Jackson Pike sludges. The value used is believed to be conservatively stated.

The assumed particulate BOD_5 value and volatile suspended solids concentrations are both reasonably defined, in our opinion. Therefore, the key question is what removal efficiency would be expected for an applied suspended solids concentration of 240 mg/l with a volatile content of 70 percent and a surface overflow rate of 880 gpd/SF. 58 percent was used. Acceptance of this suspended solids removal efficiency and the particulate phase characteristics for BOD_5 and phosphorus automatically yields the efficiencies defined in the EIS. This procedure is more valid than that found in the Facilities Plan which uses constant removal efficiencies for suspended solids (50%), BOD_5 (30%), and phosphorus (30%) with uniquely different wastewatersuunder similar hydraulic loading rates.

4.1.73 Comment: On trickling filter design recommendations, the EIS claims a 65 percent substrate removal, while the design equations are not shown. Further, the EIS recommends against the use of pilot studies to determine precise design parameters for trickling filters.

Response: The EIS could find no valid reason why the trickling filters at Jackson Pike and Southerly were designed in the Facilities Plan for exactly the same hydraulic loading rate, since the organic load at both plants would be so different in form and mass. The sizing recommended at Jackson Pike in the EIS represents cost-effective utilization of synthetic media treatment in a first stage application.

We agree with the reviewers comments concerning the magnitude of unknowns in the design of synthetic media installations. We did not use formulas but preferred to use curves provided by a representative manufacturer. These data suggest that a 70 to 75 percent soluble organic removal is an envelope of poor return for investment and that a 60 to 65 percent soluble organic removal represents a more cost-effective expenditure. It is difficult to assume any overall removal from a trickling filter complex and believe that it should be designed in view of the anticipated oxidation and synthesis with a separate design of the sedimentation system. The EIS assumed an effluent suspended solids of 30 to 35 mg/l on an average day basis with a surface overflow rate of about 1400 gpd/SF. If the Facilities Plan is designed on an overall basis for suspended solids and BOD_5, we are curious as to how adjustments in design for different hydraulic loading rates are made.

4.1.74 Comment: There are problems in operating in contact stabilization to step aeration mode when complete nitrification is desired... it is very doubtful the EIS proposed single stage nitrification will meet the NPDES requirements... the EIS proposes no additional clarification tanks.

Response: The comments on the recommended activated sludge system result from the complicated nature of nitrification kinetics and their practical application as well as the intent of the recommended system of the EIS. The recommended system, although it does make use of a return sludge reaeration capability, does not in any way reproduce the short aeration or substrate to solids contacting times found in conventional contact stabilization which the manual refers to. The EIS Southerly system has been designed to handle a nitrogen peak 1.8 times the average day value, under a liquid temperature of 10°C, and in recognition of the nitrifier dilute-out found in single state systems. We are confident that the proposed system will meet the NPDES requirements.

The use of arbitrary criteria in the sizing of any sedimentation system is not recommended. It is noted that the surface overflow rate of 500 gpd/SF is the same design

value used in the Facilities Plan's Alternate I analysis, whether or not the applied sludge was produced in an oxygenated environment (MLVSS = 3700 mg/l) or air environment (MLVSS = 2,250 mg/l) or at different plants where a different volatility of the activated sludge could be expected. The comment incorrectly assumes that the EIS design is based upon governing thickening considerations and suggests that the final sedimentation system is not designed conservatively enough.

There is no problem deviating from arbitrary criteria if they can be shown to be invalid. Arbitrary use of a 500 gpd/SF final surface overflow rate is one such criterion. The table on the following page was prepared to illustrate this point, for it shows that although the recommended sedimentation area of the EIS is less than that found in the Facilities Plan, the EIS system is sized more conservatively when a solids loading parameter is used. Although it is recognized that solids load parameters should be used with caution, they are certainly more valid than a simplistic use of surface overflow rates independent of the nature (sludge volume index) and concentration of the applied mass.

4.1.75 Comment: The recommendation of Hydroclear filters is not substantiated with reliable operating data, nor are they available from more than one manufacturer.

Response: The EIS recommends Hydroclear as the apparent cost-effective filtering process. If evidence is made available during detail design that such is not the case, the EIS does not preclude the installation of another filter system. See our previous response to Comment 4.1.68 regarding competition. It should be noted that the Facilities Plan's effluent filter recommendations violated the standards for both Hydroclear and lower rated competition.

4.1.76 Comment: Once an air activated sludge system is conceptually agreed upon to achieve nitrification, the selection of a cost-effective method of oxygen dissolution is a matter to be addressed during the final design and could form an appropriate part of the applicable value engineering process. The EIS has used this ploy to come up with a cost "saving".

Response: The intent of the EIS is to assure the consideration of an apparent cost-effective system when final design is undertaken. Capital cost savings are not claimed in the EIS for the dissolution system costed.

	Jackson Pike		Southerly	
	F.P.	E.I.S.	F.P.	E.I.S.
Proposed Sedimentation Area, sf	205,000	110,000	172,400	135,000
Applied MLSS - mg/l	4,100(1)	1,500	3,200(1)	2,000
Required R/Q to satisfy mass balance if return sludge = 10,000 mg/l	0.69	0.18	0.47	0.25
Average day waste-water flows - mgd	120	110	120	85
Hydraulic Capacity - mgd	200	200	180	230
Maximum Return Sludge	103	55	87.5	90
Ave. day solids loading rate - lbs/SF.day	34	15	27	13
Return Sludge Required under Hydraulic Capacity Flows - mgd	138	36	85	58
Solids load at hydraulic Capacity flows and above return sludge lbs.SF.day	50	29	41	36

(1) Obtained from our evaluation of the Facilities Plan (Appendix I) since this document reported only MLVSS. We used 55 and 70 percent volatility for Jackson Pile and Southerly, respectively. Although this solids loading rate is only slightly less than that found for the F.P., it should be noted it is handling some 28% more influent wastewater.

4.1.77 Comment: The cost-effectiveness of ozonation compared to chlorination - dechlorination - post aeration system should be examined. The former precludes the generation of chlorinated hydrocarbons while the latter does not.

Response: The Facilities Plan did not mention that an aerated chlorine contact tank was envisioned, nor did it mention the air requirement or the planned means of supply for such a tank. Whether or not this is provided, we know of no conclusive data that suggest that the NPDES permit requirements for chlorine residual and fecal coliform can be consistently met without dechlorination. Post aeration after dechlorination was provided in the EIS since overdoses of SO_2 may deplete dissolved oxygen. The references to Kappe and Kothandaraman in the comments are meaningless unless actual fecal coliform and chlorine residuals are known, as well as the temperature and quality of the test wastewater and the experimental conditions of the investigation.

Although reduced chlorine residual is certainly a present and future concern (and is addressed in the EIS), an equally pertinent point can be made regarding the need for year around disinfection (see pages IV-16 through 18 of the EIS). If the installation of ozone equipment can be justified in light of future disinfection requirements, the EIS does not preclude its implementation.

4.1.78 Comment: For wet stream treatment, the EIS (p. 19, 20) shows savings in first cost over the recommendations in the Facilities Plan of $10.2 million and $16.8 million at Jackson Pike and Southerly, respectively. These "savings" are not true savings, as most of them are arrived at by adoption of design criteria even beyond the higher limit of accepted design criteria without acceptable justification or pilot testing. Also, the impacts on the annual cost of operation and maintenance of the plant with and without brewery are not throughly analyzed by the EIS. This "Saving" is thus doubtful.

Again, it must be emphasized that these apparent "Savings" are shown by using value engineering techniques (without insuring reliable plant operation through reliable design) which are irrelevant at this preliminary planning stage.

Response: This is truly a critical point. Two important points must be made regarding costs:

- All costs are approximate and are based on Facilities Plan estimates.

- The bulk of the savings at Southerly are due to Brewery pretreatment, the alternative shown to be cost-effective in the EIS. In fact, if the Brewery did not pretreat, total net possible savings at both facilities would be reduced to only $22 million with a minimum (~ $3 million) savings at Southerly.

4.1.79 Comment: We strongly disagree with the recommendation of the EIS that pilot plant study be carried out only to evaluate anaerobic digestion of thermally conditioned secondary solids and jet aeration. As already pointed out before, in absence of any reliable design equation which is universally applicable for the design of trickling filters, development of design criteria by pilot testing is the only choice for large plants.

Response: As mentioned previously, we fail to see how an extensive pilot plant program would serve a tangible benefit under the recycle problems which plagued the plants at the time of the preparation of the Facilities Plans and the EIS. The comment is still framed in generalities. It should specifically explain how to achieve the listed goals at what plant, under what time frame, for

what expenditure, with what control, with what simulated stress, and with what size equipment under the present operation at both plants. The EIS recommendations were for full-scale testing of considerations not influenced by the spin-around of solids or liquids.

4.1.80 Comment: The 200 mgd assumed hydraulic capacity at Jackson Pike must be verified.

Response: The 200 mgd hydraulic capacity at Jackson Pike was obtained through a review of the available unit sizing as published by consultants to the City.

4.1.81 Comment: The City of Columbus has a sewer use ordinance which is being enforced at the present time.

Response: The influent heavy metal levels recorded at both treatment facilities indicate the need for the EIS goal statement. In any case, the City should initiate an industrial pretreatment program to control heavy metal discharges.

4.1.82 Comment: The Division of Water, City of Columbus will not allow the use of its quarry or its useful life to be reduced with incinerator ash.

Response: This goal is probably worded too strongly in the EIS. Ultimate ash disposal is left to the City's discretion, and if the codisposal scheme is not internally desirable, the EIS does not wish to force its use. Our intent was to point out that this was a possible outlet for the incinerator ash and, since both the water and sewerage and drainage divisions answer to one Director, it might be easily implemented.

4.1.83 Comment: The City questions whether contact stabilization proposed at Southerly for nitrification is practical.

Response: Please see the response to comment 4.1.74.

4.1.84 Comment: The EIS proposes to put 180 mgd through the filter complex at Jackson Pike and 205 mgd at Southerly. Since the EIS is proposing to treat 200 mgd at Jackson Pike, why isn't the remaining 20 mgd being filtered?

Response: This point is addressed on page IV-78 of the EIS. There is no reason to overtreat during a condition which must coincide with swollen stream flows.

4.1.85 Comment: The NPDES limits and the water quality standards have both changed so the original chlorination concept is no longer valid. The EIS recommends standby polyelectrolyte addition capability. An air flotation system will not work at all without some type of polymer addition.

Response: We agree that the disinfection system proposed in the facilities plan does not address the disinfection-detoxification needs of the Columbus treatment plants.

At high solids loading rates, polymer addition is necessary to assure reliable performance of an air flotation system; or, at lower solids loading rates, float solids concentrations can be increased with polymer addition. The EIS's recommended system uses the existing Southerly flotation units with anticipated dry solids loadings of 10 and 14 pounds per SF/day under average and maximum day conditions; values which do not suggest the use of polymers unless one or more units are out of service.

4.1.86 Comment: Storage of thermally conditioned solids is not a viable concept as proved by operation of the Southerly facility. The use of digesters for thickening of thermally conditioned solids is questionable without expensive remodelling.

Response: We are not aware of any operational data from Southerly which prove that storage of thermally conditioned solids is not viable. This data must be proved before we can analyze the statement, since it may be out of context or the operational problem may be incorrectly identified in terms of causative agent.

Thickening on thermally conditioned sludge occurs automatically in any laminar flow condition such as found in an anaerobic digester or the sludge storage tanks. What are the expensive remodelling needs that the comment refers to? If the reference is to sludge collectors, this expense should be weighed against the Facilities Plan's proposal of an isolated aerobic treatment system. We have included approximately $0.7 million at both plants for rehabilitation of the digestion complexes to meet the recommendations of the EIS.

4.1.87 Comment: City Civil Service policy makes sharing of personnel between plants an unlikely event.

Response: The EIS is merely attempting to point out a potential way to save operating expenditures. Perhaps this plan could be implemented by new position descriptions with elimination of the old through natural attrition of personnel. This EIS took no cost credit for this contingency.

4.1.88 Comment: The EIS has suggested or implied that land disposal of sludge offers many advantages or benefits. However, the EIS fails to select any specific sites for any land disposal and does not discuss potential impacts associated with any sites.

Response: Land disposal sites for strip mine reclamation have been generally specified as being both the quick-start areas identified by ODNR (page IV-48) and the publicly-owned strip-mined land in Perry County. In addition, the potential sites and impacts will be thoroughly addressed in the additional sludge handling facilities planning.

4.1.89 Comment: The EIS offers no documentation to support the discussion of air quality impacts as related to the Columbus situation.

Response: See Volume I for a revised analysis of air quality impacts due to sludge incineration.

4.1.90 Comment: The institutional changes suggested would tend to be exclusionary and the legality is questionable.

Response: The EIS does not recommend institutional changes to prohibit development. Rather the EIS indicates that growth can and will occur in nonsewered areas and that the regulatory agencies responsible for controlling onsite discharges from package plants and private disposal systems might consider various options to improve overall performance of waste disposal systems in the nonsewered areas undergoing or targeted for development.

4.1.91 Comment: The cost of private disposal installations are substantially understated. Operation and maintenance has not been mentioned and historically has been very poor.

Response: Installation costs for a conventional septic system were obtained from Columbus, Ohio, sources and appear to be reasonable with cost estimates obtained in other similar urban areas. However, depending on the site and the type of system installed, costs may, indeed, run up to $5,000 per house. Operation and maintenance costs similarly will vary anywhere from $35-70 for a conventional tank pump-out to several hundred dollars if repairs or replacement to existing equipment is needed. A conventional system adequately designed and properly installed should require cleaning or pumping only every 2 or 3 years. However, if the system has been poorly designed, sited, or installed, it may require cleaning every 6 months. Poor operation and maintenance histories are common throughout the country and cannot be considered unique to the Columbus area. Localized facilities planning must identify the O&M problems, and recommend and implement the cost-effective alternative. This will minimize or eliminate inadequate on-site systems in the planning area for the planning period.

4.1.92 Comment: Table VII-1 does not represent the proper flow and costs in Central Ohio.

Response: The use and relevance of the cost data presented in Table VII-1 have been referenced in the text.

4.1.93 Comment: The EIS is evidently not aware of the development pressures in the Blacklick watershed. If sewers are not provided, this will result in unsatisfactory installations and pollution problems.

Response: Pressures for development in Blacklick or any other outlying area need not be curtailed because of public decisions not to sewer. Rather, development can

be encouraged to occur within environmentally compatible guidelines and with the improved regulation of onsite sewage disposal systems. Over the long term the improved management and regulation of onsite systems can be much less expensive than sewering. Unsatisfactory installation practices resulting in pollution problems can and should be prevented in any case.

4.1.94 Comment: While some demand may be placed on the City of Columbus where the already serviced developable areas are located, a review of local agency files will show that as much or more demand is made where services are not located.

Response: Please see response to comment 3.1.71.

4.1.95 Comment: Where is the support for this EIS conclusion? The absence of interceptors has not stopped the growth.

Response: The point the EIS has repeatedly made is that the Columbus sewer system and the various proposed expansions will not significantly increase or decrease the total population growth anticipated for Franklin County. Rather, the impact that the sewer expansions will have is on the distribution of that population growth among communities and areas within the county.

4.1.96 Comment: The EIS conclusion for Blacklick is totally unacceptable, because all the facts were not taken into consideration.

Response: Please see responses to comments made by the City of Reynoldsburg in Section 4.1.3 of this volume.

4.1.97 Comment: Appendix A contains many incorrect statements and assumptions which significantly effect the proposals and decisions made in the EIS. The most important of these errors deals with the EIS procedure for establishing design influent wastewater characteristics for the City's Jackson Pike treatment plant, and results in proposed treatment facilities which are obviously and significantly undersized. Therefore, all portions of the EIS regarding the facilities to be constructed at Jackson Pike must be considered inaccurate and should be disregarded.

Response: The identification of so-called "errors" in Appendix A is very disturbing, since the City was given the opportunity to comment on, and provided with draft versions of, not only this Appendix but also Appendix B and Chapter IV (which originally included Appendix I). It was the intention to resolve all conflicts in baseline data early in report preparation (the City was supplied these documents in July, 1977). No objection was expressed by the City to the conclusions drawn either in a July 6, 1977, meeting or in the intervening time frame.

It is recommended that the City provide an itemization of so-called "errors" prior to initiation of design work.

4.1.98 Comment: The Southerly Plant receives flow from the 156" interconnecting sewer as well as the 108" interceptor.

Response: The statement has been revised.

4.1.99 Comment: The EIS states that the Facilities Plan was prepared using 1973 and 1974 recorded plant influent data. Only by coincidence, did the Solids Handling Segmental Plan develop design data that equaled 1974 plant influent data.

Response: Footnote (1) on Table A-2 will be deleted.

4.1.100 Comment: The EIS states that, in 1972, the City considered thermal sludge conditioning as "the panacea for the solids handling and recirculation problems that still plague the Jackson Pike plant". This statement is incorrect.

Response: The use of the word "panacea" has been deleted from the text.

4.1.101 Comment: Regarding the receipt and impacts of the 'night soil' dump station on influent wastewater quality at Jackson Pike, the EIS should have cited the load in pounds per day of pollutants, not in gallons per day of flow.

Response: The impact of this source can be quickly identified by the flow volume cited, about 0.025 mgd. If the scavenger waste solides concentration is taken as 15,000 mg/l (reflecting the collected mixed vault contents of a septic tank), then in 1971 this source contributed about 5 mg/l of influent SS; a value too insignificant to be the source of the change in influent suspended solids concentrations noted in 1975 and 1976.

4.1.102 Comment: The City disagrees with the data used to establish influent quality parameters at Jackson Pike.

Response: The EIS states that the dramatic change in influent quality is due to recycle loads and upstream bypassing. It did not state the percentage increase. The Facilities Plan did not consider this recycle load in any of their published documents. In fact, the Unit Operations Process Schematic for Jackson Pike published as a portion of the cost-effective analysis of the Plan specifically shows this recycle to be to the filtrate tank, with the flow from this tank sent aeration. Interviews with the plant staff suggested that no recycle to the influent sample point did occur; it was only after repeated questioning that this situation was discovered. However, it is not certain that this recycle sewer contains only decantate considering the manner in which sludge streams and their separate liquors are moved around the plant. The data presented in Attachment 2 is in no way conclusive proof that the EIS is wrong, as we do not know the duration of the 1976 sampling program, the sampling point, the compositing technique and time. More conclusive proof could be

provided by sampling the influent before and after the point of recycle introduction for any extended period of time (daily samples over several months).

There are two key points in this discussion. First, what is the difference in the EIS and F.P. influent quality characteristics? Values are repeated below:

EIS

BOD_5 = 210 mg/l @ 110 mgd = 190,000 lbs/day
SS = 240 mg/l @110 mgd = 220,000 lbs/day

Solids Handling F.P.

BOD_5 = 190 mg/l @ 120 mgd = 190,000 lbs/day
SS = 270 mg/l @ 120 mgd = 270,000 lbs/day

From the above, if the EIS influent quality and mass for BOD5 is wrong, then so must be the Facilities Plan. The significant difference rests with the 50,000 lbs/day of suspended solids.

4.1.103 Comment: Based on the data presented in the preceding comment, the EIS 1976 Estimated Influent Characteristics presented here are again significantly in error.

Response: We disagree (see preceding response) until an alternate explanation which justifies the plant's records is provided.

4.1.104 Comment: The EIS states that the low flow reported in 1971 for the Southerly Plant was due to the bypassing associated with expanding the plant's main treatment capability. This statement is believed to be inaccurate.

Response: The flows in question really do not affect the conclusions of Appendix A from 1973 on, and the discussion as to bypassing during construction could be

dropped. However, no data are provided to justify the comment and are probably not available, since by-passed flows were not monitored historically.

4.1.105 Comment: The continuous recirculation of solids about the plant is probably caused by inadequate solids handling and disposal facilities.

Response: The statement has been revised.

4.1.106 Comment: The EIS stated blower capacities are believed to be inaccurate.

Response: The firm influent pumping capacity of Jackson Pike will be changed in the EIS from 170 mgd to 165 mgd. The EIS will read that there are two 21,000 cfm blowers and four 15,000 cfm blowers in the influent pump building.

4.1.107 Comment: Existing Jackson Pike aeration tank volume is cited incorrectly in the EIS. Although this EIS Error is only about 5.2 percent, it is just as or more significant than the reduced population projections used in the EIS.

Response: The sizes reported in the EIS are those of the Facilities Plan. The revised population figures of 1.025 million have been acknowledged by the City to be consistent with other projections.

4.1.108 Comment: The areas of the existing final sedimentation tanks at Jackson Pike are slightly overstated in the EIS.

Response: The tankage called out in the EIS is one-quarter of the plant volume of the Facilities Plan.

The EIS does not mean to imply the historic use of the three abandoned tanks. Their mention in conjunction with the sedimentation tank is merely because all four are the same size.

4.1.109 Comment: The existing supernatant aeration tank volume is actually 5.0 mg.

Response: The figure has been corrected.

4.1.110 Comment: The EIS states that no further expansion of the solids handling and incineration system at Southerly was thought necessary by the City. This statement is completely false.

Response: The statement has been deleted.

4.1.111 Comment: The EIS states that historically the Southerly Plant has long been plagued by hydraulic problems. This statement is incorrect.

Response: As described on Page A-28, it is the return sludge pumping limitations which cause the breakdown in liquid stream processing at Southerly in conjunction with the many solids handling inadequacies.

4.1.112 Comment: The EIS statement that the Southerly Plant has never fully achieved sustained, stable performance because of unit process limitations with the 'as received' wastewater load is believed to be incorrect.

Response: This comment seems to indicate that the admitted bulking problem at Southerly is due to solids handling limitations rather than the nature of the "as received" wastes. This is hard to believe, and we contend that effluent deterioration due to carryover of bulking sludge could occur regardless of the adequacy of solids handling equipment. Page 67 of Volume One of the Cost Effective Analysis of the Facilities Plan would seem to support the EIS statement.

4.1.113 Comment: The data presented in the EIS for the existing Southerly aeration system are incorrect.

Response: The tanks may presently be operated in a step-aeration mode, but they were not being operated in this manner at the time of the plant tour by the writers of this EIS. In fact, it may very well have been the review of the draft submittals mentioned earlier that promoted the changeover to a step-aeration mode at Southerly. Such an operation should give a better load distribution, potentially higher dissolved oxygen levels throughout the aeration system, and allow a lower MLSS to be applied to the final settlers.

The EIS stated capability of quarter-point addition has been changed to correspond to the points listed in the comments. Dimensions of the aeration tanks stated in the Facilities Plan were used to derive the volumes listed in the EIS.

4.1.114 Comment: The problem with the Southerly incinerators was probably due to the fact that the operators were originally trying to feed the incinerators at the same rate as had been done before with the wetter cake.

Response: The EIS is merely quoting the operators. Thermally conditioned cake is known to result in upper hearth burning without modifications of the incinerator and operational practices.

4.1.115 Comment: Why is the BOD_5 test suspect in this EIS discussion and not in other sections of the EIS regarding recorded influent wastewater characteristics?

Response: BOD_5 values, when considered alone, are regarded as suspect by the EIS throughout. However, better correlation between BOD_5 and SS is evidenced in reported influent concentrations than effluent, which is the point of the discussion commented upon. This should be expected, as raw wastewater typically contains a colloidal suspension which, in comparison to a biologically stabilized, flocculated, and clarified effluent, will show poorer suspended solids settleability at equivalent concentrations and settling conditions.

4.1.116 Comment: To the City's knowledge, no proof has ever been offered by anyone to substantiate the statement that the severe bulking problem at the Southerly Plant is caused by the brewery waste discharged by Anheuser-Busch.

Response: The City specifically noted this statement when discussing the draft submittals and did not object to its inclusion. We must retain this contention until proven otherwise, for the circumstantial evidence is overwhelming. Further work in this area since publication of the draft EIS substantiates this finding. See Appendices AA and BB for further discussion.

4.1.117 Comment: The brewery waste is cited here in the EIS as 40 to 60 percent of the nominal BOD_5 Load at the Southerly Plant. This is not consistent with the 37 percent cited on Page A-2 of Appendix A of the EIS.

Response: The 37 percent value cited on Page A-2 is specific for the breweries records (which the City cautioned us in using) in January, 1976. The 40 to 60 percent range on Page A-28 is for the entire year. Figure I-1 shows the chronological variation of the plant's influent BOD_5. We see no inconsistency.

4.1.118 Comment: The EIS models were not verified by meaningful in-stream sampling. The models and results obtained therefrom do not have credibility and probably justify the deletion of Appendix B entirely and any EIS decisions made thereon.

Response: The general comments made could apply as well to the modeling activities of both the OEPA and the Facilities Plan, since hypothetical flowing loads are analyzed in all instances. Criticism of specific model inputs used in the Facilities Plan beyond effluent flows and loads is difficult since none were published. There is essential agreement in all modeling results, however, and we are not sure if the comments imply the EIS is too severe, too lenient, or simply too detailed.

We believe that the caveat on Page B-1 is necessary as a cautionary statement. We find that too often modeling efforts and descriptions do not adequately describe the assumptions, uncertainties, and input values.

4.1.119 Comment: There was no attempt made to verify the DO Model. (From Attachment 3, City of Columbus)

Response: Given the practical constraints in terms of time and resources, committing substantial resources and time to verify a situation when the modeling results of three independent entities (OEPA, the Facilities Plan, and the EIS) all show essentially the same result is a waste of time and resources. True verification can only be achieved with installation of the proposed facilities and achieving the anticipated effluent quality under the seasonal flow regimes of interest. Verifying the input parameters at

other conditions is misleading because of sensitivity considerations in terms of these same inputs, the model's output, and often, the analytical tolerance of the measured constituent. If the comment could identify the questionable assumptions used in this modeling effort, the alternatives, and the results thereby desired, we would gladly discuss the arguability of each effort.

4.1.120 Comment: The equation used in the EIS is a modified Streeter-Phelps model which assumes constant values for the parameters K_1, K_2, and K_3 and therefore is inapplicable and cannot be used as an analytical tool.

Response: The equation stated on Page B-3 is the cornerstone of all commonly conducted stream modeling activities. The parameters mentioned are adjusted at specified reaches and subreach points, a fact which is certainly known to the City. Or is the City arguing for:

- constant values for K_1, K_2, and K_3 - (a seemingly naive desire), or
- a new equation -what is the alternative?

4.1.121 Comment: It seems likely that the K_1 values employed in the EIS are excessively large and predict a DO sag more severe than can be reasonably expected.

Response: We have not seen the 1937 study mentioned, but question whether the Jackson Pike effluent made up nearly the same percentage of the downstream flow as it does under the proposed plan. The comment also seems to indicate that the CBOD coefficient derived in this study does not vary with temperatures greater than or equal to $20^{o}C$. To understand and interpret the comments, we would like to see the report. Key questions include: How was K_2 calculated? What were the dissolved oxygen profiles? What were the sampling stations? Was ammonium present? What was the time of travel in various stream stretches? How many samples were taken and at what frequency? Did the study include day and night samples? Was an attempt made to define long term BOD values? We don't question the data in this report, only the interpretation.

4.1.122 Comment: The assumption of simultaneous exertion of CBOD and NBOD appears to be unwarranted and predicts a DO sag more severe than can be reasonably expected.

Response: Again, to respond to this point we need to see the report. Key questions include: What is the similarity of the rates observed in a quiescent 300 ml BOD bottle to those found in the stream? Were any samples taken closer to the Columbus plants? How was the NBOD measured? What were the river flow conditions at the time of sampling? What was the entire data base instead of the average? Does the City really mean to imply that it expects no nitrogen oxidation in the river until a time of travel of about 8.7 days has elapsed?

4.1.123 Comment: As the EIS population projections differ only 6 percent from the Facilities Plan, we question the validity and necessity of using the EIS projections.

Response: The EIS projections are as valid as any others particularly given information published prior to the Draft EIS. Further analysis has led us to identify 1.025 million as the most appropriate number to use in Step 2 design work for the wastewater treatment plants.

4.1.124 Comment: Table I-2 contains several errors.

Response: This transposition of the BOD_5 and SS data in the table was not caught in internal review. The text on Page I-30 shows that correct values were used in comparing the F.P. and EIS influent quality and pollutant mass. All values have been changed to agree with this comment.

4.1.125 Comment: Table I-10 of the EIS contains several errors.

Response: According to page 84 of Volume 1 of the Cost Effective Analysis of the Facilities Plan, the existing decant tank at the time of Plan preparation is 35 feet in diameter. The values quoted in the EIS assumed the construction of a duplicate tank (which was underway) along with the addition of the single extra tank proposed in the Plan.

We understand these four tanks to be 35 feet in diameter with a 13.5 SWD. The Jackson Pike value has been changed to 5.1 mg from 5.4 mg.

4.1.126 Comment: Table I-11 of the EIS contains several errors.

Response: The values have been changed to $5.1 million from $5.2 million and $31.4 million from $31.6 million.

The footnote has been changed to state O&M costs are for 1995.

4.1.127 Comment: We would insist that of equal or more importance than influent wastewater characteristics and final effluent quality objectives, is a third parameter known as 'unit process design and sizing'. The authors of the EIS have neglected this third and important parameter.

Response: We would agree that unit process sizing is important, and feel confident in the parameters selected for use in the EIS. Indeed, in several instances we are more conservative than the Facilities Plans in system requirements, as summarized in Table K-3 which shows:

19 recommended expansions (c) and additions (e), and

16 recommended contractions (d) and eliminations (g)

Further, although it may superficially appear that we are not conservative enough, in many instances (as shown previously with the final sedimentation systems), we are actually more conservative than the Facilities Plan with alternate design parameters.

4.1.128 Comment: Without verification of water quality predictions and NPDES effluent limits, imposed NPDES final effluent limitations are lacking in credibility.

Response: The criticism of this comment could have been made as easily of the Facilities Plan. All predicted modeling done for critical low flows on the Scioto River has shown contravention at NPDES levels and all (OEPA, Facilities Plan, and EIS) have recommended construction of facilities required for the NPDES specified effluent. The door is left open for future additions, and we doubt that any evidence can be presented for treatment capabilities less than those of the NPDES permits.

4.1.129 Comment: The EIS states that the 85 mgd average design flow for the Southerly Plant could substantially increase if a combined sewer overflow pollution abatement program is undertaken on the Southerly collection system. However, the EIS neglects this possibility in its actual design of the Southerly Plant Facilities.

Response: This cannot be done without a definition of flows as a function of time and quality characteristics. Treatment facilities should be provided once the needs of a CSO pollution abatement program are properly defined.

4.1.130 Comment: The validity of the formula for developing process peaks is questionable, and, therefore, some rationale for its use should be presented and verified.

Response: This formula is merely used to define process peak flows for design. We feel that it states a flow which will occur with a frequency corresponding to a four hour peak in a one week period. We used this internally at Columbus. Process design for a reliability (e.g., 97.6 percent) beyond this point is generally not cost-effective.

4.1.131 Comment; Assuming that the use of the EIS process peak formula can be justified by USEPA, the EIS Southerly design process peak flow should be 135 mgd, not 130 mgd. The EIS habit of rounding off figures compounds errors and significantly affects results.

Response:

$$1.95\ (85)^{0.95} = 132.7$$

The EIS is rounding off to the nearest 10 mgd for flow peaks. We feel a round off to 135 mgd is insignificant.

4.1.132 Comment: The EIS states that the existing conduit hydraulic capacity at Southerly is 230 mgd. This statement is highly questionable.

Response: Information supplied during preparation of the EIS led us to believe that both plants contained conduit capacity for the cited flows. If not, they should be reduced for the true values and one or both plants should be expanded to assure that at least twice the design average flow of each plant or 390 mgd (and maximum recycles) can be treated by the collective Columbus treatment works.

4.1.133 Comment: What are the "knowns" regarding future influent wastewater characteristics for Jackson Pike?

Response: The knowns are represented by present wastewater characteristics and flows, and results of the analysis presented in Appendix A.

4.1.134 Comment: The figures in Table I-13 are obviously wrong, therefore the EIS proposals regarding the Jackson Pike facilities must be considered inadequate.

Response: The EIS methodology produces the loads shown for 1995-2000, while the basis for calculation of the loads in the comment is unknown. See the response to Comment 4.1.102 for more discussion.

4.1.135 Comment: If the same EIS methodology is used and Table I-13 is corrected for the wrong assumption made in regard to recycle loads, the EIS influent design parameters will be significantly higher than those used in the Facility Plan.

Response: No other reasons (bypassing and recycles) for the dramatic rise in the Jackson Pike influent suspended solids and, to a lesser extent, BOD_5 are known. The Facilities Plan and associated document did not adequately discuss the situation. In terms of the bypassing, if it did not occur and the EIS did not attempt to quantify it, the average day flow at Jackson Pike would have been lower.

4.1.136 Comment: The EIS did not demonstrate the cost effectiveness of such allowances (unforeseen industrial load), as required, in the cited guidelines.

Response: The cost-effectiveness of providing this additional loading at the time of original construction rather than as a separate future add-on to the proposed facilities should be evident. However, if the reviewers of the EIS can present data showing the value of such a future addition and a reduction in initial sizing, such a system is not precluded.

4.1.137 Comment: The City - Brewery agreement was not informal as referenced in the EIS.

Response: The word informal will be changed to formal.

4.1.138 Comment: The EIS should account for the possibility of a combined overflow pollution abatement program.

Response: See the response to Comment 4.1.129.

4.1.139 Comment: Table I-15 for the Jackson Pike Plant is incorrect because of errors in Appendix A re: influent wastewater characteristics.

Response: See earlier responses.(4.1.102 and 4.1.133)

4.1.140 Comment: The EIS should justify use of its estimates for the volatile fraction of the influent suspended solids for the plants.

Response: The influent volatile suspended solids measurements for Southerly were provided by the plant operators. The values given for the first four months of 1977 averaged 79 percent with a monthly average range of 71 to 85 percent. It seemed reasonable to conclude that the Jackson Pike volatile solids were lower due to normal BOD_5 and SS considerations and recognition of the heavy metal load received at the plant. We are unaware of data that would invalidate these assumptions.

4.1.141 Comment: The City believes that pretreatment at the brewery does not, in fact, eliminate the need for two-stage treatment, nor will it result in significant cost savings as stated in the EIS.

Response: The percentages stated do not reflect the parameter of concern, soluble BOD_5 associated with the brewery waste, which, due to its simple carbohydrate nature, is more rapidly biodegradable than complex domestic contributions. As shown in Table I-15, the brewery is anticipated to contribute more than 50 percent of the soluble BOD_5 component at Southerly without pretreatment. With pretreatment, (Scenarios 2 and 3 in Table IV-1), a 35,000 lb/day soluble BOD_5 reduction is anticipated at Southerly. Thus, on a soluble basis, the remaining brewery BOD load is only 25 percent of the total received at Southerly.

4.1.142 Comrent: The EIS authors should be aware of these revisions (solids management system) and USEPA approvals, and should have considered same in formulating the EIS document.

Response: We were not made aware of approval by the U.S. EPA or the pending application during our interviews.

4.1.143 Comment: Figure I-2 shows the ash decant in the Facility Plan as overflowing to the Scioto River. This is incorrect.

Response: Statements in the EIS as to ash lagoon overflow to the Scioto under the Facilities Plan have been deleted.

4.1.144 Comment: The figure quoted from the Facility Plan for Waste Solids Management costs at Southerly should be $31.4 million.

Response: The correction has been made.

4.1.145 Comment: Ash lagoon overflow returned to the plant influent in the EIS is not a deviation from the Facility Plan proposals. The overflow may be more appropriately returned to other downstream processes.

Response: The EIS does not preclude lagoon overflow to alternate main stream points.

4.1.146 Comment: Where is the presentation of the EIS mass balance concepts for each unit process? Calculations and criteria should be included in the EIS as well as the results.

Response: It is unclear as to whether this comment questions that mass balances were ever done or complains as to their not being included in a document that has already been severely criticized for being overly technical. Tables K-1 and K-2 provide sufficient process information for review purposes along with the individual process discussions in the remainder of Appendix K.

4.1.147 Comment: Little or no costs have been included in the EIS proposals for modifications to the digesters or for the pumping stations required to make the sludge force main operational.

Response: Again, operation of the force main as originally proposed during EIS preparation has not been retained by U.S. EPA as a part of the initial project plan, therefore no costs are included.

4.1.148 Comment: The EIS does not reflect the City's present program to investigate anaerobic digestion and other recycle management alternatives.

Response: If the City knew of this process prior to the July 6, 1977 meeting with Havens and Emerson, they disguised it well both in their questions and interest expressed. Perhaps the City's program could be attached to the EIS, describing the methodology and results obtained to date.

4.1.149 Comment: The EIS proposed 50 percent reduction in the trickling filter installation at Jackson Pike is unrealistic, and will affect downstream processes significantly.

Response: See previous responses to Jackson Pike trickling filter questions. In regards to oxygen transfer, the Facilities Plan merely lists the air requirements, and does not include oxygen needs nor assumed oxygen transfer efficiencies.

4.1.150 Comment: The City recommends the use of 3/4 percent sludge as the basis for design of the downstream solids processing facilities at Jackson Pike. This would result in a requirement for three more thickening units.

Response: The majority of the waste secondary solids from Jackson Pike will be sloughed trickling filter humus. A solids concentration of one percent or more is normally achieved easily with this source of solids. The activated sludge from the secondary system should easily concentrate to one percent based upon historic SVI's, an old CRT, and dosages of metal salt. With proper pump selection and polymer usage, it is possible to derive a greater production from a centrifuge to satisfy emergency conditions. Note that differences in the number of thickening units selected is more due to differences in the design influent suspended solids. Since the EIS believes a lower value is more correct and ends with the same number of dewatering units, it is more conservative than the F.P. in this controlling unit process step.

4.1.151 Comment: The EIS suggests that, at Jackson Pike, standby equipment auxiliaries for the thermal conditioning process may be a more economical option than a new unit. Operating experience in this regard is questionable.

Response: The City should present information to support the contention that the thermal conditioning system experiences significant downtime due to problems

with the heat exchanger and reactor rather than the system's auxiliaries. In answer to storage questions, Jackson Pike's digesters do have a huge storage capability. We do not understand the City's contention that storage of thermally conditioned sludge may be technically nonfeasible due to changes in dewaterability and believe data should be supplied to justify this contention.

4.1.152 Comment: Where are the "Excess main stream treatment facilities" the EIS suggests could be abandoned, and direct return of recycles to main treatment units has historically proven to be a problem.

Response: We do not believe that direct recycle of decantate and filtrate or centrate derived from concentrating thermally conditioned solids has been shown to be a problem if their impact has been anticipated in design. Indeed, today this practice is recommended by the manufacturers of the thermal conditioning equipment as the one where success is most likely. Further, odor control is most easily achieved by this concept as operating experience at Columbus and elsewhere suggests.

4.1.153 Comment: It is not "equally certain that dissolved air flotation offers savings in terms of O&M expenditures" as stated in the EIS.

Response: The EIS only questions the abandonment of existing facilities which may have failed due to overloading. At this time, we don't believe that centrifugal thickening has been conclusively shown to be superior to dissolved air flotation for waste secondary sludge. We note that if disc centrifugation is chosen (it was not clear in the Facilities Plan) its pretreatment needs can be quite significant (screening, degritting, etc.). We agree that since the installation of thickening centrifuges for Southerly, the argument for retaining DAF at Southerly is now academic.

4.1.154 Comment: Belt press trials have been conducted at Southerly and indicate O&M problems. Ferric chloride conditioning, as suggested in the EIS, is unthinkable, and abandonment of the existing thermal conditioning process

is not cost-effective at the present time. All of these suggestions probably would have recycle management problems.

Response: We assume that the argument against ferric chloride is due to iron "clinker" formation. The City should note that Jackson Pike has an iron content in its sludge of about 2 percent already. The EIS never said only inorganic conditioning chemicals could be used and would suggest using conditioning chemicals which perform best for the service needs.

The EIS in no way suggests the present abandonment of thermal conditioning, and the comment is in agreement with statements made in the EIS regarding future abandonment if the operation of these units becomes untenable.

The closing comment as to recycle impact is merely a semantic argument by the City. Thermal conditioning systems have unique recycle impacts, especially in terms of the energy required to stabilize solubilized pollutants. It is these unique impacts which are the point of the EIS statement. We are merely trying to point out that if a maximum day standby thermal conditioning system and isolated aerobic liquor treatment system are necessary, as suggested in the Facilities Plan, perhaps a re-evaluation of conditioning and dewatering alternatives is in order in light of the plant's operating experience with thermal conditioning.

4.1.155 Comment: We do not believe that the California investigations proved that "the dewaterability of the solids remains only marginally less than the undigested thermally conditioned product."

Response: We would agree that these effects must be investigated. We did not know that alternative recycle investigations were underway at the time of the July 6th meeting with the City, and if the need for such investigation was considered in the preparation of the Facilities Plan no mention of it was included in the published documents. The stated and costed means of recycle stabilization in the plan was by isolated aerobic treatment, a process which has proven to be unsuccessful in actual operation at the Columbus facilities.

4.1.156 Comment: The flow diagrams for alternatives B2 and C1 are believed to be incorrect.

Response: In alternate B.2, an arrowhead has been placed on the waste sludge from the return sludge line to ahead of the thickening unit. In alternate C.1, II to the left has been changed to III.

4.1.157 Comment: Since the Contra Costa project involved a sludge-garbage waste application system, its direct applicability to pyrolysis of sewage sludge is questionable.

Response: Test data from Contra Costa were with a refuse/sludge mixture. However, both Envirotech and Nichols offer present information for pure sludge systems, which we describe. The EIS deliberately leaves all options regarding pyrolysis or starved air combustion open for detail design.

4.1.158 Comment: We would suggest that the proposed conventional incineration facilities be designed with a view toward starved air combustion.

Response: The suggestion is appropriate and has been incorporated within the text.

4.1.159 Comment: The EIS discussion on phosphorus removal and intermediate sedimentation are duplications of Facility Planning efforts.

Response: The EIS considers several items regarding phosphorus removal not mentioned in the Facilities Plan, including the possibility of reduced future influent levels. It is this possibility that pointed toward the choice of metal salt addition, for the economic analysis under present conditions (which was not included in the published Facilities Plan) was extremely close (See Table J-3 of the EIS). Finally, the Facilities Plan was not clear as to point (or points) or metal salt addition nor the anticipated production of metal hydroxy phosphates.

4.1.160 Comment: The EIS should not have used one manufacturer's name unless it also mentioned names for the other systems discussed.

Response: The maintenance-intensive dissolution system presently utilized at both Columbus wastewater treatment facilities prompted the EIS to include a discussion of an alternative system, and in no way precludes consideration of other air dissolution systems which can be shown to be cost-effective.

4.1.161 Comment: The EIS recommends evaluation of just one aeration system. Several systems need to be evaluated with a detailed evaluation study done at Step 2. Hence, the final EIS cannot include the results of this detailed evaluation.

Response: The City is correct in that such a consideration can not be finalized in any version of an EIS.

Most of these comments have been addressed previously. The analysis of intermediate settling is pertinent to Jackson Pike only, and brewery pretreatment is assumed throughout Appendix J. To say that the EIS conclusions put the City in a position of hoping for electrical rate increases in regards to aeration systems is unsupported either by the analysis of the EIS or the realities of electrical rate trends. The conclusion on page J-20 clearly states the likelihood of the present worth of the jet aeration system being within ten percent of the apparent least cost alternative. If rates stay the same, the cost to the City to operate the jet aeration system will be less than the other methods evaluated, a savings which would be accentuated by any future rate increases. This comment carried a substantial verbal impact at the public hearing on the EIS.

4.1.162 Comment: The dewaterability of straight thermally conditioned waste secondary sludge is known to be considerably less than the dewaterability of a mixed thermally conditioned sludge.

Response: The EIS makes provisions for the dewatering of a decanted thermally conditioned sludge either directly following conditioning or after anearobic digestion. The constant comment on the anaerobic process is remarkable, for the EIS is only proposing an evaluation of a system using facilities which would be abandoned under the published Facilities Plan proposal.

4.1.163 Comment: The EIS Recommended Project Plan Design Conditions in Table K-1 are incorrect for Jackson Pike and have not been justified for Southerly.

Response: See pertinent previous responses.

4.1.164 Comment: Table K-2 in the EIS is based on removal efficiencies, many of which are believed to be over optimistic.

Response: These comments have been addressed elsewhere and we believe they provide a reasonable quantification of system performance for average day conditions. The reviewer should remember that the Southerly influent already reflects the pretreatment benefits by the brewery. We note that the Facilities Plan ignored the soluble component of the Southerly influent BOD_5. In regards to Attachment 4, we would remind the reviewer that systems generally perform to residuals which in turn dictate efficiencies - not the reverse. The peaking factors were used to establish processing needs under maximum conditions.

4.1.165 Comment: The EIS sludge process stream characteristics shown here and used for design of the solids handling facilities at the Columbus plants, lead to some serious questions regarding the EIS recommended project plan.

Response: We believe that the assumptions made are clear in these tables and that they are overwhelmingly clear in comparison to those found in the Facilities Plan.

1. The minimum maximum day Jackson Pike digested solids to dewater should be 98,000

lbs/day - not 198,000 lbs/day. Supporting data show 98,000 lbs/day value was used.

2. An eight percent solids content for a thermally conditioned, anaerobically digested sludge is not unrealistic to us when it is remembered that without anaerobic digestion a good design number is 10 percent or more.

3. A one percent secondary solids concentration is not optimistic when it is remembered that Jackson Pike's sludge will be dominated by sloughed humus. At Southerly, the bulking component has been eliminated by pretreatment at the brewery while the activated sludge system has received the beneficial densification characteristics derived from a old cell residence time and the accumulation of metal hydroxy phosphate precipitates.

4. The solids capture efficiencies are believed reasonable. If values substantially less than these are encountered, chemical aids should be added to avoid needless suspended solids recycles and handling.

5. Cake solids concentrations used in the EIS do not significantly differ from those used in the Facilities Plans. Since the Facilities Plan assumed a lower influent suspended solids volatility, it is likely that their cake volatility is essentially the same. We note that the sludge cake volatility in the Facilities Plans suspiciously stays at 60 percent for both Southerly and Jackson Pike with their two uniquely different wastewaters and different assumptions for influent suspended solids. Finally, note that the EIS's anaerobic digesters offer the potential use of digester gas as a supplementary fuel source for the incinerators if autogenous sludge cake conditions are not achieved.

6. Section K.2.9 of the EIS shows that the Facilities Plans' dewatering system was undersized for realization of the maximum incineration capability.

4.1.166 Comment: The EIS again suggests that the existing Jackson Pike facilities are rated at 200 mgd. The City questions the accuracy of this statement.

Response: The EIS includes rehabilitation or replacement of the sedimentation tanks. See previous comments on hydraulic capacity.

4.1.167 Comment: It is probably more cost-effective to provide larger trickling filters. Also the EIS proposes a 5 percent increase in the size of the Jackson Pike Intermediate Settling Tank area. Were costs for this increase included?

Response: See previous trickling filter responses. The cost difference, although minimal, is included in the EIS.

4.1.168 Comment: The EIS proposes surface overflow rates for secondary settling tanks considerably in excess of normal practice, acceptable Ohio EPA standards, and USEPA design manuals.

Response: Please see appropriate responses to earlier comments on surface overflow rates.

4.1.169 Comment: The EIS authors had better be sure that suitable performance levels can, in fact, be maintained with the high overflow rates.

Response: It is believed that testing, if it could be done, would show that the design offered in the EIS would perform equivalently or superior to the design defined in the Facilities Plan at equivalent plant flows.

4.1.170 Comment: The EIS should present some justification for the assumed values used in determining peaking factors for waste solids production.

Response: We believe they are reasonable. Present operation and data available at both plants largely preclude the establishment of plant specific values.

4.1.171 Comment: The EIS states that, under the Facility Plan proposal, neither plant would ever realize its maximum incineration potential due to the fact that the plant's dewatering capability did not match the rated maximum solids loading capacity of the incinerators. This statement is false.

Response: After reconsideration we still think the statement in the EIS is true.

4.1.172 Comment: In Table K-5, the average dry solids content of the sludges to incineration is 32 percent to 34 percent. It is doubtful that the EIS process schemes will yield these contents. The EIS should furnish a detailed diagram with calculations showing the entire sludge processing system at both plants and the design parameters used.

Response: Excluding the presence of the anaerobic digesters, the EIS used a similar waste solids handling sequence as the Facilities Plan and similar cake solids. We would expect similar performance.

The EIS did not mean to suggest that the force main should be run at 105 gpm, but rather that this reflects the transport needs. It does suggest the transport of thermally conditioned and anaerobically digested solids. The visualized system would dilute these solids down with settled wastewater to the required transport concentration. The pipeline's pumping system should be designed to assure turbulent flow. At 4 percent solids, we would suggest a velocity on the order of 5 fps or, for the 8-inch diameter pipeline, a flow rate of 790 gpm. For a 1 percent solids concentration, we would suggest a velocity of 1 fps or a flow rate of 160 gpm. In both cases, we would recommend that the incoming sludge be diverted to Southerly's primary sedimentation system, where it should reconcentrate to some 8 percent solids (since it remains as a conditioned

sludge), causing the minimal recommended increase in dewatering capability. Whether or not it is more cost effective to pump a short time with high head losses or a long time with low head losses is beyond the scope of the EIS; superficially, the 1 percent case is most attractive.

4.1.173 Comment: The City does not agree with the EIS concepts and proposals for solids handling and disposal. First, construction of pumping stations for the sludge force main is less cost-effective and has higher O&M problems than additional incineration. Second, the long term potential of applying dewatered thermally conditioned solids to strip mined land is not believed to be as great as suggested in the EIS. The City has been studying this alternative for about a year. Third, using the dry solids figures in the EIS and correcting for the attainable dry solids content of the dewatered cake, 4 incinerators will be required at both Southerly and Jackson Pike. Fourth, it is inappropriate for the EIS to consider installation of the new dewatering centrifuges in the existing vacuum filter building. Construction of a new building housing six centrifuges has already been funded by USEPA and is presently under construction. Fifth, it is doubtful that the water plant solids disposal quarry will be available for use for incinerator ash disposal. Its entire capacity is needed for water plant solids, and OEPA will not approve its use for codisposal of incinerator ash. And last, it is unlikely that the EIS proposal with their significantly reduced facilities will permit reprocessing of the solids from the existing Jackson Pike lagoon.

Response: See Volume 1 for a discussion of findings regarding incineration. The proposal to apply sludge to strip mined lands will be free of the daily pressures of being the sole ultimate sludge outlet, and we believe it can be properly evaluated under these conditions.

If the quarry is not available for ash, the EIS in no way requires its use. The EIS does not propose reprocessing of soilds from the Jackson Pike lagoon.

4.1.174 Comment: On April 24, 1978, a letter from Robert C. Parkinson concerning the report entitled "Draft Environmental Statement-Wastewater Collection and Treatment Facilities-Columbus, Ohio" November 14, 1977, prepared by Booz, Allen—Havens and Emerson, Inc. was received.

The essence of this April 24, 1978, letter questions revisions that the U.S. Environmental Protection Agency (EPA) made to the Draft Environmental Statement (DES) report from Booz, Allen—Havens Emerson prior to issuing the Draft Environmental Impact Statement (DEIS).

Response: The working relationship between USEPA and its contractors is defined in the document: "RELATIONSHIP OF EPA WITH CONTRACTORS & SUBCONTRACTORS IN THE EIS PREPARATION PROCESS..." which is included in Volume II Appendix HH. The responsibility for content of the Draft EIS is that of USEPA and as such USEPA has sole discretion as to the appropriateness of the subject material. The 14 points identified in the April 24, 1978, letter represent changes that were made by USEPA to produce the most objective analysis possible consistent with the knowledge concerning cost-effectiveness and environmental effects (impacts) as determined by USEPA. Response to these 14 points are as follows.

1. As of February 1978, the air modeling of primary impacts associated with the incineration alternative was inconclusive and therefore no one could state that incineration would provide the reliability desired without adverse environmental impacts, nor could it be demonstrated to be the lowest cost alternative.

2. It is not necessary to state that USEPA directed itself since the EIS is our document.

3. By law the No Action Alternative must be considered and evaluated. See response to City of Columbus, March 30, 1978, comments for discussion of Hoover Reservoir.

4. We agree that the cost sensitivity analysis itself does not establish cost-effectivenes. Analyses of Chapters 3 and 7 lead us to conclude that preparing designs based on an ultimate population concept are generally not cost-effective for the Columbus area. This section of the final EIS has been appropriately revised.

5. The passage omitted was determined to be misleading by USEPA.

6. There is no evidence that a parallel sludge force main is the most cost-effective way to provide for the flexibility and reliability required.

7. See response to comment #1.

8. Since the City has the authority and responsibility to restrict toxic substances from their sewer system, they are the ones who control the ultimate composition of their sludges and its disposition.

9. The sections omitted by USEPA were determined to be misleading.

10. We believe the DEIS wording to be more objective and accurate.

11. One point of view is that any operation and maintenance expenditure by the City should be minimized irrespective of the capital costs involved. This approach does not satisfy the requirements of a cost-effective analysis which states that all alternatives shall be evaluated and compared on a present worth basis. When this is done both capital and Operation and Maintenance costs are included in the analysis, and the conclusion that can be drawn then reflects more completely the economic costs to society. In addition, the primary impacts of the incineration alternative were inconclusive at the time the DEIS was issued. See response to comment #1.

12. We believe the revised discussion to be more accurate and objective than the paragraph omitted.

13. The air modeling analysis by The Ohio Environmental Protection Agency (OEPA) did not support that sentence in the DES.

14. We believe the revised discussion to be more accurate and objective than the draft version.

4.2 City of Columbus Division of Water

TOM MOODY
MAYOR
ROBERT C. PARKINSON, P.E.
DIRECTOR OF PUBLIC SERVICE

CITY OF COLUMBUS
OHIO

JACK A. HOLT, P.E.
SUPERINTENDENT

DIVISION OF WATER
90 W. BROAD STREET
COLUMBUS, OHIO 43215

March 14, 1978

TO: D. D. Robbins, P.E., Supt.
Division of Sewerage and Drainage

FROM: Jack A. Holt, P.E., Supt.
Division of Water

RE: Review of Columbus Facilities Plan E.I.S.

Dear Mr. Robbins:

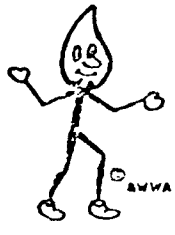
First we wish to thank you for the opportunity to review and comment on the referenced E.I.S. insofar as it pertains to the operation of our Division. We are sure you can appreciate that time does not give us the opportunity to study all related documents in great detail. We have found the E.I.S. concerns us directly in the following ways:

1. Adequacy of Water Supply
2. Protection of Hoover Reservoir
3. Protection of Ground Water in vicinity of our proposed Southern Well Field
4. Solids Disposal
5. Water Rates
6. Water Reuse

We will comment on each of these items.

1. ADEQUACY OF WATER SUPPLY

On page 11 the following statement is made, "The ability of the area's economy to support additional population and the adequacy of water supplies may be more significant determinants of population growth and development patterns than availability of public sewer services."



On page II-42 the following statement is made, "The region faces the following constraint:

Inadequacy of water supply".

"Sufficient water is available at least through the year 2000. This estimate, however, takes into consideration the development of deep water wells and the possible damming of Big Darby Creek. Therefore, the siting of manufacturing units requiring large quantities of water is constrained. Provided the economic growth continues to be focused on the trade and service sectors, water supply problems may not develop."

On page II-57 existing safe yields are reported as 100mgd. This figure is based upon the worse drought of record. Some of the central Ohio streams have rather short records and as a result all yields are currently being reported on the basis of a 50 year drought (98% dependable supply). This basis is consistent with State and Federal Water Supply practices. Using the 50 year drought criteria. Safe yield of existing sources (Griggs, O'Shaughnessy and Hoover) is 81mgd NOT 100mgd. The Alum Creek Raw Water Supply will be available in 1978 and will add 35mgd making the current 98% yield 116mgd. This will be adequate until the early 1980's. Our South Well Field project is currently under design and well construction is scheduled this year. It is estimated that this project will add 50mgd to bring our total supply safe yield to 166mgd. Our estimates indicate this will meet average daily demand through the year 1990 at which time additional sources will need to be brought on line.

Work we have done with the Ohio Department of Natural Resources on the Central Ohio Water Plan (COWP) has identified a year 2020 supply deficiency of 100mgd. The following sources are being investigated to meet this need.

		Potential Yield MGD
A.	Scioto River Upground Reservoir	50-80
B.	Olentangy Diversion	20+
C.	South Well Field Expansion	20-50
D.	Upper Darby	30
		120-180

Alternates to the Scioto River Upground Reservoir include Mill Creek Reservoir (38mgd) and/or Bellepoint Reservoir (68mgd) or (106mgd total).

The abundance of water to meet future (year 2020) needs is indicated by a statement made on page IV-13 of the E.I.S.

"a future water demand on the Columbus system of about 250mgd, with a developable upstream reservoir safe yield of about 350mgd. The ultimate supply from Delaware County sources was estimated to be 530mgd."

This statement apparently is referring to data contained in Table 9a, page 45 of the Environmental Assessment Report of the Facilities Plan. This data was in turn taken from a 1972 report by Mid Ohio Regional Planning Committee. This information has been up-dated by work on the previously mentioned Central Ohio Water Plan which is scheduled for printing later this year.

Comments made on page II-11 require clarification as reference is made to a total safe yield of 352mgd with 182mgd being from surface supplies and 105mgd being developed from ground supplies. This leaves 65mgd unaccounted for. Since reuse has been discounted how is this to be interpreted.

(4.2.1/4.2.2)

Conclusion

We are well aware of the need for future water supplies and are taking the necessary steps to procure same for the City of Columbus. There are ample available resources which can be developed to meet Columbus' needs through the year 2020 and beyond.

2. HOOVER RESERVOIR

In addition to our concern for future supplies we are deeply concerned for protecting existing ones. We note a major change recommended by the E.I.S. for the Big Walnut Sanitary Sub Area. The Facilities Plan proposed an interception along the east side of Hoover Reservoir. The E.I.S. recommends this be postponed until such time as population densities in the area approach or exceed 2 persons/acre. The analysis indicates this should not happen before 1985.

We call attention to the following statement on page 5 of the E.I.S.

"Many locations within the Columbus planning area are now experiencing water pollution problems because of inadequate septic tank and package plant performance."

Also on page 10 "In Big Walnut, the attractiveness of the Hoover Reservoir area may stimulate growth with or without the proposed action."

We are very concerned that this situation be monitored very closely and facilities made available to dispose of sanitary water in this area. As we all know, it is a lot easier (and less costly) to protect a source than to try to clean one up.

The E.I.S. assumes in its density calculations that the year 2000 population will be spread out uniformly over the 24,300 acre drainage area. Is this likely to happen or will infact there be pressure for group (sub-divisions) concentrations. In short, can we depend on the Ohio EPA to disapprove any package plant requests within the Hoover Dam Area? (4.2.3)

3. GROUND WATER QUALITY

On page II-15 the following statement is made, "Wells located close to streams and having hydraulic connections to the streams are vulnerable to pollutants." On page IV-13-14 discussion is made concerning recharging the aquifers adjacent to Scioto River in the vicinity of Walnut Creek. The E.I.S. conclusion is that because of nitrogen content of discharge and problems with low flow augmentation this should not be done.

We agree. As already mentioned we are well underway in developing of 50mgd water supply utilizing ground waters from this very area. Direct ground water recharge using plant effluents should not be considered.

4. SOLIDS DISPOSAL

There is a considerable amount in the E.I.S. concerning solids handling with a recommendation that solids be disposed of at the Water Division's Quarry on McKinley Avenue. This recommendation is made on the basis of the following assumptions:

1. Dublin Road Water Plant producing three (3) tons of dry solids per mg of water processed.
2. Morse Road Water Plant producing one and one half (1½) tons of dry solids per mg.
3. Parsons Avenue (SWF Plant) producing same amount of dry solids as Morse Road Plant. (Page IV-28 & IV-29)

The E.I.S. questions the useful life of the quarry. The City has estimated 60 years on the basis of disposing Dublin Road Plant sludge only and assuming a 30% compaction of solids The E.I.S. suggests 75 years may be more likely. (Page IV-30)

We have reviewed this matter in some detail with our chief chemist, Mr. Mair (See Appendix). It is his feeling that due to nature of quarry and lack of decanting facilities sludge will only compact to 20%.

Also we are presently preparing plans to dispose of sludge from the Morse Road Plant via a pressure pipe line. This project should be on line in 1979.

The E.I.S. assumption concerning Parsons Avenue (SWF) solids is in great error. Solids production at this plant will be four (4) tons/mg.

Using average day processing rates between now and the year 2000 we estimate that the three water plants will exhaust the capacity of the quarry by the year 2000.

We are therefore much concerned about any plans to dump other materials into this location.

We are very much interested in the E.I.S. recommendation concerning mixing water plant sludge with secondary solids from your plants for land disposal in surface mine reclamation projects and suggest this be pursued with the appropriate agencies in the very near future.

(4.2.4)

5. WATER RATES

A rather minor item, but on page II-54 a statement is made concerning the discontinuing of suburban surcharges being in 1978. The context of the statement implies it refers to both water and sewer surcharges. This of course is not true.

6. WATER REUSE

This was referred to early but we feel deserves special mention. Page IV-13 emphasizes that there should be no need to consider reuse of waste water plant to a point suitable for potable reuse.

We wholeheartedly agree. Recent developments in the field of water quality analysis have shown the presence of many substances heretofore unknown to be present. This is going to have a very decided impact in treatment process, technolcgy and cost. It is doubtful we have even come close to identifying all the contaminates in raw water supplies.

This brings up another somewhat unrelated point. As a result of the discovery of certain synthetic organics in the various raw water supplies the Federal EPA is modifying the Safe Drinking Water Regulations to require source monitoring. It would, with the benefit of hindsight, have been helpful if the discharge permits being issued under the Clean Water Act had included this information.

It might be worthwhile to suggest EPA consider revising the information required to be obtained under this permit system to include these new parameters.

Should you have questions concerning any of the above, please contact myself or Mr. Francis.

JAH:JLF:kk

cc: R. C. Parkinson
J. L. Francis
J. R. Doutt
File

TOM MOODY
MAYOR
ROBERT C PARKINSON, P.E.
DIRECTOR OF PUBLIC SERVICE

JACK A. HOLT, P.E
SUPERINTENDENT

CITY OF COLUMBUS

OHIO

DIVISION OF WATER
90 W. BROAD STREET
COLUMBUS, OHIO 43215

March 20, 1978

To: Mr. D. D. Robbins, Superintendent
Division of Sewers and Drains

From: Jack A. Holt, P.E.,
Superintendent

Subject: Columbus - E.I.S./Additional Comments

Reference is made to our submittal to you of March 14, 1978. Upon further review of the E.I.S., it appears some additional comments are in order.

Adequacy of Water Supply.

On Page 2 of our memo we make reference to recent analysis of future water demand and potentail developable resources. The results of this analysis showed a year 2020 need of an additional 100 mgd with resources of 120 to 180 mgd.

The footnote at the bottom of Page II-42 of the E.I.S. implies that Upper Darby may not be able to be developed due to adverse environmental considerations and that if such were the case, it would have an adverse effect on the region's water supply capability - to the extent growth and industrial development would be seriously impaired.

First of all, we point out that the analysis showed other resources as available to meet water needs even if Upper Darby cannot be built. Secondly, we have completed an indepth environmental assessment of the Upper Darby Project which identifies adverse impacts and suggests methods to eliminate or reduce them.

1.

Since the Upper Darby Project is the only future alternative that has been studied in great detail and the only one with a "proven" yield at this point - in time it obviously plays a major role in our future planning. It would be in error to conclude that the area growth and economy will depend on this one project. We feel our average daily demand projections include sufficient allowance for industrial growth or expansion through the Year 2000.

The decision to limit industrial users need not be made on the basis of inadequate water supplies. It is, or should be, entirely a local option.

Hoover Reservoir.

There is no mention in the E.I.S. of the effect of the Galena-Sunbury waste discharges into Hoover Reservoir. It would seem that at least one regional solution to be considered would be interception of these wastes by a Columbus trunk instead of "treated" discharges directly to the Reservoir.

JAH:bc

cc: Director Parkinson
J. L. Francis
J. R. Doutt
File

4.2 City of Columbus, Division of Water

4.2.1 Comment: The discussion of safe water yields and water supply needs in the Columbus area need modification.

Response: The discussion and references to safe-water yields and supply needs has been modified where recommended.

4.2.2 Comment: The safe water yields from ground and surface waters on page II-11 need clarification.

Response: The figures have been modified.

4.2.3 Comment: We are very concerned that the Hoover Reservoir area be closely monitored to detect deterioration in the water quality due to malfunctioning septic tanks, poorly operated package plants and development exceeding environmentally compatible levels.

Response: Monitoring water quality in Hoover Reservoir is a prudent step to take which should be accompanied by the "monitoring" of growth allowed to occur in the area and improved regulation of onsite disposal systems in the area. The pressures to develop can be balanced by pressures not to develop in order to protect the water supply.

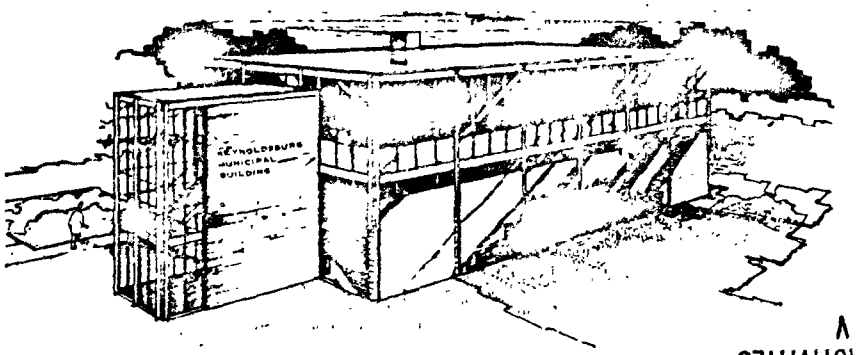
4.2.4 Comment: The EIS assumption concerning Parsons Avenue (SWF) is in great error. Solids production will be 4 tons/mg. We are much concerned about any plans to develop other materials into the quarry.

Response: The EIS did not intend to call into question work done by the Division of Water in regard to the amount of solids produced at the present and proposed water treatment plants or the useful life of the quarry. Our only purpose in discussing the wastewater ash-water sludge codisposal alternative was to point out a system which would seem to be worthy of consideration by the City in terms of both implementability and ease of future operation. If the life of the quarry is indeed only 20 years when receiving all present and future water sludges, the

City is free to explore alternate means of ultimate ash disposal - an option which was intended to be left open in the EIS regardless of the actual projected quarry life.

4.3 City of Reynoldsburg

4.3



CITY OF REYNOLDSBURG

7232 Main Street
REYNOLDSBURG, OHIO 43068
866-6391

OFFICE OF FEDERAL ACTIVITIES
EPA, REGION V
RECEIVED
MAY 30 1978

ICHARD J. DAUGHERTY
Mayor

FRANK T. BALDY
Service Director

May 24, 1978

United States Environmental Protection Agency (4.3.1)
E. I. S. Section
230 South Dearborn Street (4.3.2)
Chicago, Illinois 60604

Attention: Mr. Eugene Wojcik (4.3.3)

Re: Columbus, Ohio
Environmental Impact Statement
Blacklick Creek - Reynoldsburg Area

Dear Sir:

This office has been advised by our City Engineer that Dale Luecht has requested from Malcolm Pirnie, Inc., certain information in regard to locating a force main in the Livingston Avenue right-of-way which would serve the Blacklick drainage area, particularly Reynoldsburg, Ohio.

Again this office has conferred with our City Engineer, Evans, Mechwart, Hambleton & Tilton, Inc., and wishes to emphatically express the following information which, in our opinion, should be addressed in this alternate routing of the force main.

(1) Livingston Avenue is a main east-west traffic artery which will be expanded to a 48-foot pavement width, as is a portion of the existing pavement. The existing 60-foot right-of-way will have to be expanded to 80 feet at that time. If a force main or force mains of the sizes necessary for the present flows are constructed along this route, we would suggest at least a 90-foot right-of-way to accommodate these force mains, existing and proposed utilities and sidewalks. Nowhere along the existing route do we have 90-foot right-of-ways. It would take at least one year to procure the necessary right-of-ways without court action. However, with court action, at least two years would be necessary.

(2) There is a highly congested and commercialized area of Livingston Avenue east and west of Brice Road which is very similar to the Main Street area. The force main would have to be constructed in the pavement in this area which, needless to say, would involve premium backfill, temporary and permanent repaving, together with the inconvenience to the abutting business properties and, in general, the traveling public. In other words, the same negative conditions would be subject to this routing as that outlined in our report on the Main Street alternative.

(3) The topography along Livingston Avenue is quite different from Main Street, and either of two alternatives would have to be used to eliminate deep sewers near I-270. The first would be to continue the force main to or across I-270 and perhaps all the way to the Big Walnut Interceptor. This, of course, would be quite expensive and would not allow any flexibility in future planning. The second alternative would be to install a second pump station at the low point east of I-270 west of Brice Road. This is totally unrealistic due to power consumption and additional maintenance in a second pumping system. The City of Reynoldsburg has been in a concentrated effort to eliminate all existing pump stations, primarily due to the high cost of operation and maintenance and, of course, reliability factors.

(4) The area along S.R. 256 north of I-70 and south of Livingston Avenue could not be served by gravity for the existing or future developments. Cost of this additional expense should be included in any comparison contemplated.

(5) The area adjacent to Palmer Road and the Cobblestone Subdivision east of Graham Road would not be served by gravity and still another pump station would be required, which cost would have to be included in a comparison.

(6) This alternative would not eliminate existing plant discharge south of Tussing Road, where approximately 1,000 homes are under construction and scheduled for development in Fairfield County.

(7) There will still be extensive tunneling of I-270 with this route, even though there is not an interchange at Livingston Avenue.

In summary, the City of Reynoldsburg together with the City Engineer, who has been in business in this area for 51 years and City Engineer of Reynoldsburg for 18 years, are certainly more knowledeable of the existing features in this area, together with access to all records and the familiarity of the future plans of this City and the surrounding areas.

Mr. Luecht, upon on-site observation of the Main Street routing, certainly agreed with this office and our City Engineer that the Main Street routing was in error. We can only hope that detailed study; and, in our opinion, should not be less than a detailed study, will certainly point out that the Livingston Avenue force main routing would be a severe error in judgment.

Again, we should point out the error in the long term of installing a pump station system where a gravity route exists; from maintenance, energy consumption, operating costs and reliability. As pointed out above, it decreases the flexibility for future planning.

Very truly yours,

CITY OF REYNOLDSBURG, OHIO

Frank T. Baldy
Service Director

FTB:js

cc: The Honorable John Glenn
The Honorable Samuel Devine
The Honorable Tom Moody, Mayor, Columbus, Ohio
The Honorable Richard Daugherty, Mayor, Reynoldsburg, Ohio
Mr. Robert Parkinson, Director of Public Service, Columbus, Ohio
Mr. Dayton Robbins, Superintendent, Division of Sewerage and Drainage, Columbus, Ohio
Mr. Roger D. Willis, Division of Sewerage and Drainage, Columbus, Ohio
Mr. Jim Nottingham, Ohio E.P.A., Central District Office
Mr. Greg Smith, Ohio E.P.A., Planning Section
Malcolm Pirnie, Inc., Attention: Mr. Mike Macy
Evans, Mechwart, Hambleton & Tilton, Inc., Attention: A. W. Maier, P.E.

4.3 City of Reynoldsburg

4.3.1 Comment: We believe that several of the alternate routings for the Blacklick Creek-Reynoldsburg area did not consider a number of factors affecting costs.

Response: See revised Chapter III appended to this volume and Interceptor discussion in Volume I.

4.3.2 Comment: The Livingston Avenue force main routing would be a severe error in judgment.

Response: See revised Chapter III appended to this volume and Interceptor discussion in Volume I.

4.3.3 Comment: We should point out the error in the long term of installing a pump station system where a gravity route exists; from maintenance, energy consumption, operating costs and reliability factors. It also decreases the flexibility for future planning.

Response: See revised Chapter III appended to this volume and Interceptor discussion in Volume I.

4.4 Delaware County

4.4

Delaware County Sanitary Engineer

50 CHANNING STREET
DELAWARE, OHIO 43015
TELEPHONE 614-369-8761

GARY W. GILBERT, P.E.

April 7, 1978

U.S. Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

Attention: Planning Branch - EIS Preparation Section

Re: Comments: Draft EIS
Wastewater Treatment Facilities
for the Metropolitan Area
Columbus, Ohio.

Gentlemen:

We have reviewed the above referenced document and we have been unable to determine from that document the real need of the treatment portions of the system. Knowing what problems presently exist is adequate to justify in my mind the need for the system. However, someone not so closely related with the problems would have difficulty in assembling the scattered (throughout the document) data and information into a justifiable conclusion. We therefore suggest that a summary of present water quality problems and their extent be developed in the Final EIS. (4.4.1)

We have also found inconsistencies concerning statements in regard to planning areas, West Scioto Interceptor alternatives and Big Walnut Interceptor alternatives.

The statement on page III-4 and III-5 item (6) regarding the Sunbury-Galena area may mislead readers regarding the area to be studied by Sunbury, Galena, and Delaware County. The study area as officially designated (by Ohio E.P.A.) for the Sunbury-Galena and Delaware County area includes all of the Duncan Run drainage area to the divide between Duncan Run and Rocky Fork drainage areas, except for a small portion on the east side at Hoover reservoir between the mouth of Duncan Run and the Delaware-Franklin County line. Therefore, the Sunbury-Galena County planning area includes all of the area designated as (6) and a majority of the area within Delaware County noted as area (7). This needs to be well defined in the Final EIS in order to clarify those boundaries. (4.4.2)

We take exception to the statement in item (7) page III-5 that "Due to the physical layout of this ((Big Walnut Creek sub area)) and the following two sub areas (Rocky Fork and Blacklick Creek), a regionalization decision made for one must be implemented in all three." We have looked at the proposed alternative layouts and find no physical constraints that would support the above quoted statements. It appears to be a conclusion of the writer without adequate evaluation. (4.4.3)

Big Walnut Area

The alternative layout of interceptor sewers in alternatives A, B, D and Sub B on Figures III-8,9,11 and 12 respectively would appear to require extreme depths of cut in order to provide gravity sewer service to the Duncan Run drainage basin in Delaware County. Are these depths of cut reflected in the cost analysis, or are you assuming that the service to this Duncan Run area is by pump station force-main? (4.4.4)

The alternative layout of service areas in Alternate C, Figure III-10 would appear to provide more gravity service to all areas, and therefore be a more desirable configuration.

The statement that Alternative D is recommended because of flexibility in future decision making processes is commendable. However, we are unaware of the reasoning by which the statement "Ultimately, the total service option proposed in Alternative A will be implemented for Alternative D."(Page III-20) Why not Alternative C or one of the others? The Final EIS should address the reasoning behind the writers conclusory remark. Furthermore, that statement pre-judges the recommendations of the Sunbury-Galena, Delaware County facilities planning yet to be performed.

Again on page III-35 it is assumed that regionalization of the Sunbury-Galena, Delaware County area with Columbus has been determined. Not so! (4.4.5)

Scioto River Basin

The statement on page III-14 regarding the Delaware County EIS is at best misleading. The statement implies that the Delaware County EIS concluded that the upper reaches of the Scioto River within Delaware County would contribute flow to the City of Columbus sewer system. That was not the conclusion reached in the Delaware County EIS. The statement was: "The remainder of the Scioto Basin in the Delaware County Planning area may be served either by Columbus or by Delaware County. This will be determined through additional facilities planning performed by Delaware County.

We also question the overall evaluation in the EIS of the proposal submitted in the Facilities Plan. The planning area does not coincide with the Ohio E.P.A. approved boundary. (4.4.6)

Thank you for the opportunity to comment on the Draft EIS.

Yours truly,

GARY W. GILBERT, P.E.
DELAWARE COUNTY SANITARY ENGINEER

cc: Delaware County Commissioners
Tom Elliott - Regional Planning

4.4 Delaware County Sanitary Engineer

4.4.1 Comment: The presentation of water quality problems is scattered throughout the EIS and makes it difficult to see the justification for the proposed treatment portions of the system.

Response: Appendix B characterizes the Scioto River below Columbus. Chapter II discusses, in general, regional surface and groundwater quality problems.

4.4.2 Comment: Better definition needs to be given to the planning area boundaries covered by the Delaware County-Sunbury-Galena 201 program as opposed to the Columbus 201 plan and EIS.

Response: Please see response to Comment 4.1.3 .

4.4.3 Comment: We have looked at the proposed alternative layouts and find no "physical constraints" that would support the EIS statement on Page III-5, Item 7.

Response: "Physical constraints" as stated, was not written in the EIS or intended. The terms used were "physical layout: meaning the interdependency of total regionalization of the three subareas using only one interceptor as in Alternative C, three different interceptors, one for each area as in Alternative A or D or something in between as in Alternatives B or Sub B. Because of this interdependence or "physical layout" it was decided to evalute these three areas together, in order to obtain a true comparison of alternatives.

4.4.4 Comment: The alternative layout of interceptor sewers in Alternatives A, B, D and Sub B on Figures III-8, 9, 11, and 12 respectively would appear to require extreme depths of cut in order to provide gravity sewer service to the Duncan Run drainage basin in Delaware County. Are these depths of cut reflected in the cost analysis, or are you assuming that the service to this Duncan Run area is by pump station force-main?

Response: The cost analyses presented in the EIS are for the proposed interceptors and do reflect the topography of the route. The EIS cost analyses do not include any costs for subtrunks or collector systems for an area.

4.4.5 Comment: We are unaware of the reasoning by which the statement "Ultimately, the total service option proposed in Alternative A will be implemented for Alternative D." (Page III-20) The final EIS should address the reasoning behind the writers conclusory remark. Furthermore, that statement pre-judges the recommendations of the Sunbury-Galena, Delaware County facilities planning yet to be performed.

Again on page III-35 it is assumed that regionalization of the Sunbury-Galena, Delaware County area with Columbus has been determined. Not so!

Response: The statement mentioned above has been deleted to avoid any further confusion. In response to the comment concerning Page III-35 see response to comment 3.1.3.

4.4.6 Comment: We also question the overall evaluating in the EIS of the proposal submitted in the Facilities Plan. The planning area does not coincide with the Ohio E.P.A. approved boundary.

Response: Please see the response to Comment 4.1.3.

4.5 Fairfield County

4.5

FAIRFIELD COUNTY REGIONAL PLANNING COMMISSION
COURTHOUSE, LANCASTER, OHIO 43130

ENVIRONMENTAL PROTECTION AGENCY
RECEIVED
MAR 31 1978
PLANNING BRANCH—REGION V
FILE NO.

March 29, 1978

U. S. Environmental Protection Agency (4.5.1)
Region V
230 South Dearborn Street
Chicago, IL 60604
ATTN: Planning Branch - EIS Preparation Section

Dear Sirs:

This correspondence concerns our review of the recently released draft Environmental Impact Statement for Wastewater Treatment Facilities for the Metropolitan Area - Columbus, Ohio. Although the character of the complete Columbus system may impose future external effects upon the entire Fairfield County planning region, our comments are limited to the proposals made for the Blacklick Creek subarea (Section 3.2.5, pp. III-20 - III-35). The southern portion of this subarea contains a significant portion of Violet Township, Fairfield County. (see Map I).

The assumption upon which the accepted Alternative D was chosen was that the population within the subarea was not of major consequence, with the exception of Reynoldsburg (which is erroneously termed a "village", despite a present estimated population of almost 19,000).

> The present population within the subarea is estimated at 27,700. This is projected to increase to 30,300 by 1985 and 41,900 by the year 2000. The major center of population is the Village of Reynoldsburg, which is presently served by an overloaded contact stabilization treatment facility. (p. III-24).

The acceptance of this assumption renders credible the proposal in Alternative D - the serving of Reynoldsburg by a force main, but dependence in the subarea south of Reynoldsburg on individual package treatment facilities until "a time beyond the planning period".

The area in question, however, has experienced major population growth in the past, and, by all indications, will continue to do so. In 1970, there were less than 180 dwelling units in the area of Violet Township within the EPA designated boundary. In December, 1977, there were over 620 dwelling units in the area - an increase of 244%. At the present time, there are over 480 additional lots which are in the platting process. In addition, there are approximately 300 lots in the platting process which are outside the designated watershed boundary, but will nonetheless be served from a package treatment facility on the Blacklick Creek near Tussing Road. It is anticipated that all of these lots will be developed by the year 1985. Moreover, most of the land north of Refugee Road and west of S. R. 256 is owned by one developer, who has presented plans to local officials for developing the tract in PUD fashion, at densities in excess of what has been experienced in the Township until this time. Although it is not possible to predict at this time when development will occur, it is plausible to assume that some residential construction will occur on this tract prior to 1985.

According to the 1970 Census, the persons-per-dwelling-unit in Enumeration Districts 16B and 17 (which comprise the total area of Violet Township north of Refugee Road) was 3.23. If this factor is applied only to those lots in the platting process, a projected increase in population of 2520 for the Fairfield County portion of the Blacklick subarea is obtained. The EPA Planning Division, in the EIS, has projected that by 1985, the population of the entire subarea will increase by 2600 persons!

Map II illustrates present and proposed development in the Fairfield County portion of the subarea. In view of these population findings, it is felt that the EPA projection for the subarea should be reassessed. It is anticipated that such a reassessment will affect the viability of the selected alternative.

Respectfully submitted,

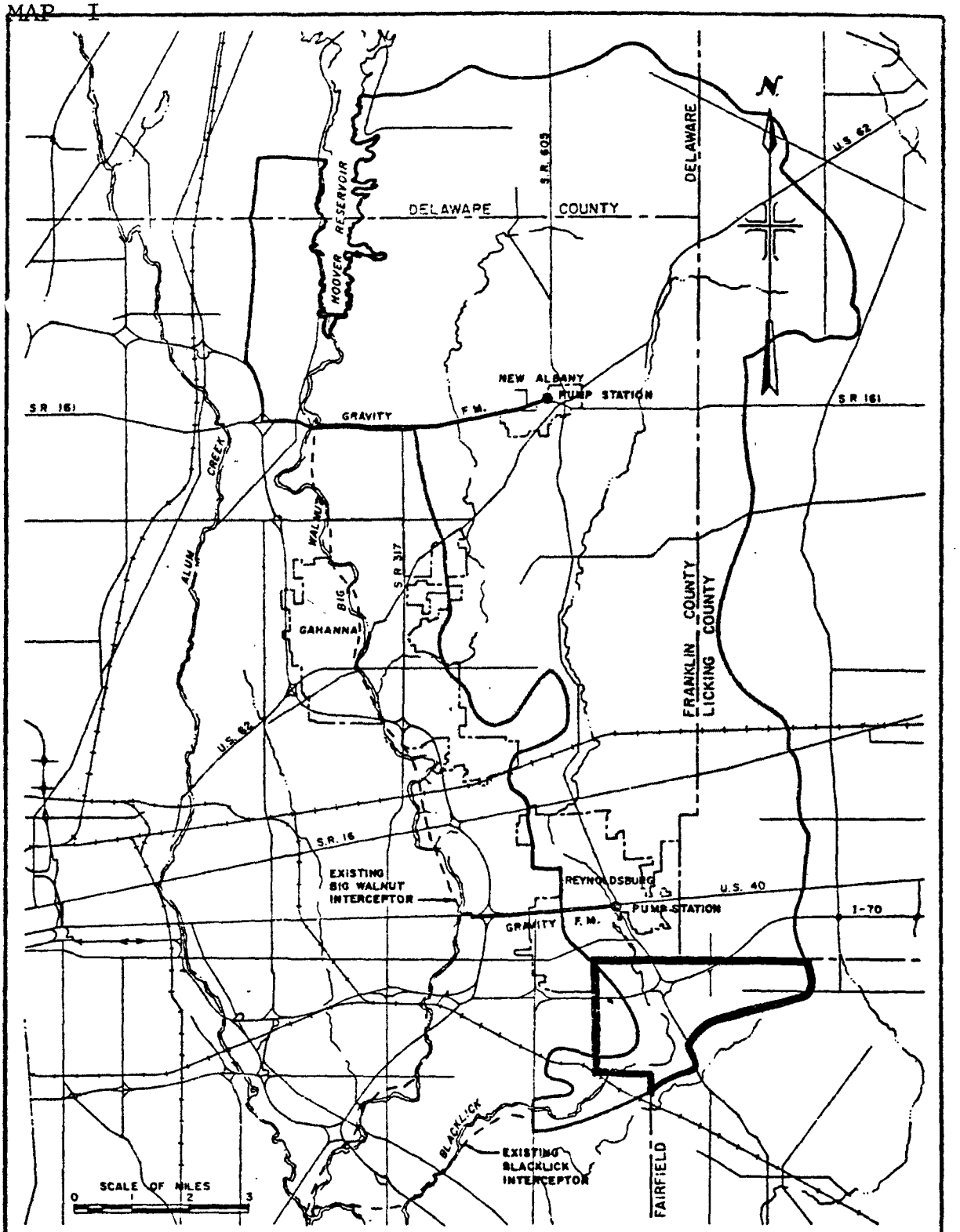
Philip N. Boyle, Director
Fairfield County Regional Planning Commission

PNB/mjm

Enclosures

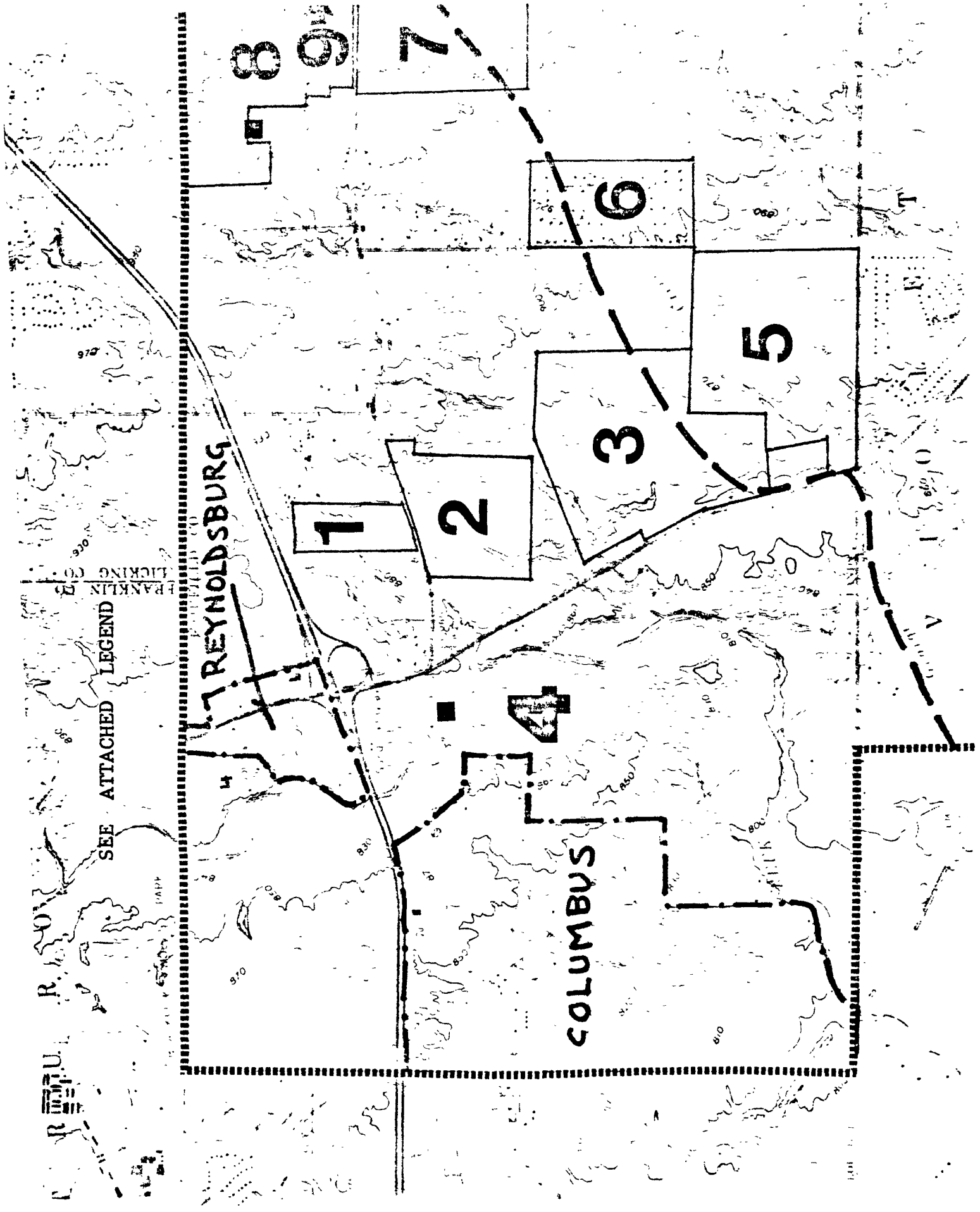
cc: Robert Parkinson
Fairfield County Commissioners

MAP I



MALCOLM PIRNIE, INC.	COLUMBUS METROPOLITAN AREA FACILITIES PLAN	BIG WALNUT CREEK SERVICE AREA ALTERNATE D	FIGURE III-11

DEFIANCE


1
2
3
4
5
6
7
8
9
REYNOLDSBURG
COLUMBUS
SEE ATTACHED LEGEND

LEGEND

■ existing sewage treatment facilities

1. Eastwood Village - 79 lots - in platting process.

2. Summerfield I & II - 163 units - platted and developed.

3. Summerfield of Hunter's Run - 404 lots - in platting process.

4. Hunter's Run - under one control: as yet unplatted, but zoned PUD. Some development predicted by 1985.

5. Woodsfield - 303 lots - in platting process - within service area of package plant on Tussing Road.

6. Eastchester - 70 dwelling units - developed in 1966-68. On site sewage disposal.

7. Chevington Woods - 160 dwelling units - developed in 1966-68. On site sewage disposal.

   Chevington Woods North - 226 dwelling units - developed in 1973-76.

9. New England Acres I - 73 dwelling units - developed in 1973-76. That portion of New England Acres within EPA boundary is on-site sewage disposal.

4.5 Fairfield County Regional Planning Commission

4.5.1 Comment: The assumption upon which the accepted Alternative D was chosen was that the population within the subarea was not of major consequence, with the exception of Reynoldsburg. The area in question, however, has experienced major population growth in the past, and, by all indications, will continue to do so... In view of these population findings, it is felt that the EPA projection for the subarea should be reassessed, as the reassessment could affect the viability of the selected alternative.

Response: The EIS did not mean to imply that the subarea population was of no major consequence. Certainly in an area that has a small population base, an increase of 2600 people over a five year period can be significant. Furthermore, consideration of several factors is necessary in order to assess the relevance of the population increases, recent and projected, to decisions regarding sewer system expansion. These factors include: household size, density, net development rate, and onsite system performance.

- Household size - From all indications, the population increases are primarily characterized by families rather than individuals and all adult households. The residential building which is or will be occurring to meet these household needs is predominantly single-family low density housing.

- Density - Development in the area is occurring at fairly low density. Thus the cost to sewer is very high resulting from the increased ratio of length of pipe to number of units served. Additionally local collection systems are not eligible for federal funding and must be financed entirely by the local jurisdiction.

- Net development rate - While a local jurisdiction may process subdivisions, the actual build out rate for all land subdivided or platted may be as low as 50 percent. However, few jurisdictions keep records in such

"retarded subdivisions" can be quantified and a net development rate expressed to give more precision to popultation projections. The extent to which subdivisions are not fully developed further increases the per unit cost for sewering.

On-Site system performance - A critical and often deciding factor is the extent of poor performance from existing onsite sewage disposal systems in an area. If the occurence of malfunctioning or failed systems is widespread and has been documented, then there may be strong justification to sewer. System repairs coupled with regular maintenance and improved regulation are frequently the cost-effective solution to the abatement of pollution from poor onsite system performance. If the soils in various areas are simply not suitable for onsite systems, then legal measures should be instituted to constrain any further development that will generate sewage and additional wastewater. The prevalence or proliferation of onsite systems should not be thought of as an automatic precondition for sewers.

All of the above factors were considered and played a part in the recommendations regarding the Blacklick-Reynoldsburg area.

4.6 Genoa Township

4.6

GENOA TOWNSHIP BOARD OF TRUSTEES
Delaware County, Ohio

April 6, 1978

RECEIVED
APR 10 1978
EPA REGION 5
OFFICE OF REGIONAL ADMINISTRATOR

Mr. Valdas V. Adamkus
Deputy Regional Administrator
U.S. Environmental Protection Agency
Region V
230 South Dearborn Street
Chicago, IL 60604

(4.6.1)

Re: Columbus, Ohio Facilities Plan
EPA-5-OH-FRANKLIN-COLUMBUS-WWTP & INT-77

Dear Mr. Adamkus:

I have reviewed the draft EIS for the Columbus Facilities Plan in respect to regionalization alternatives due to conflict between the Columbus Facilities Plan, delineated as area 6 on figure III-1, and the Sunbury-Galena-Delaware County Planning Area, which involves the greater portion of our township.

As you are aware, much time, money and effort has been, and will continue to be, invested by the citizens of Delaware County to properly solve wastewater collection and treatment problems throughout the more populated areas, particularly in southern Delaware County, where the problem is most severe.

Your approach to the problem of the conflict between the two entities has my general support, for the problems of Sunbury-Galena and the contiguous Delaware County area need a thorough, in depth study of the problems and alternative solutions particularly in light of PRM 77-8 and the subsequent directive from Region V dated October 18, 1977 discussing implementation.

The Columbus Facilities Plan does not contain an in depth study of this particular area, which is reasonable for Columbus, as it has many more pressing problems with which to contend with its collection systems and treatment processes.

Sunbury-Galena-Delaware County area also has pressing wastewater collection and treatment problems which need solutions now so that orderly planning may be accomplished throughout the area.

This area is preparing its own study, as it has the expertise available for Facilities Planning, and Delaware County and its Cities, Villages and Townships have overall planning goals for their urban, suburban and rural areas which are sufficiently different from Columbus/Franklin County that any planning, whether it Facilities Planning, or any other systems planning, for Delaware County and its subentities should not be done by the Columbus/Franklin County area.

Water/

I have also reviewed the Executive Summary, in particular pages 5-10, and wish to offer some discussion concerning several points from my viewpoint as a resident, a public official, and Civil Engineer who has been actively involved in preparing and commenting on Facilities Plans, since United States Environmental Protection Agency's inception.

In our particular area of Genoa Township, the conversion from rural to suburban has been occurring rapidly over the past seven years, even with restrictive zoning. This means that waterway contamination has increased due to the large increase of on-site disposal systems on one acre lots in soils that are unsuitable for on-site disposal. Also, the topography and surface drainage systems are poor, further contributing to the problem.

The statement "partial service to the Big Walnut Subarea may be necessary by 1985" (page 10) is incorrect, which causes me concern as all factors in the area strongly indicate conditions in the area must be addressed specifically now, not in 1985.

As part of the study of regionalization required for any facilities plan the Sunbury-Galena-Delaware County Facilities Plan will certainly address interconnection with the Columbus system. This locally prepared Facilities Plan would certainly be more realistic concerning such an interconnection should such a regionalization concept be feasible both from a cost-effective and an environmental standpoint.

Yours very truly,

P E Blayney

Patrick E. Blayney, P.E.
Genoa Township Trustee

PEB/alh

cc: Delaware County Commissioners
Robert Parkinson, Service Director, City of Columbus
Gary Gilbert, Delaware County Sanitary Engineer

4.6 Genoa Township, Delaware County

4.6.1 Comment: The statement "partial service to the Big Walnut Subarea may be necessary by 1985" is incorrect, which causes us concern as all factors in the area strongly indicate conditions in the area must be addressed specifically now, not in 1985.

Response: The analysis showed that the population density was insufficient to warrant the construction of major interceptors at this time. If existing onsite disposal systems are the source of pollution in the area, abatement approaches other than sewering could be implemented immediately or on an interim basis until sewer construction becomes cost-effective for the subarea.

4.7 Hamilton Township

Hamilton Township

23 COTTAGE - CHADEVILLE
BOX 425 - ROUTE 1
LOCKBOURNE, OHIO 43137

TRUSTEES
GARY L. HAHN
CLYDE A. CAMPBELL
~~GARY HETZ/ GRAHAM~~
D.E.Lytle, Sr.

CLERK
ALVETA EGBERT
491-3903

April 19, 1978

(4.7.1)

UNITED STATES
Environmental Protection Agency
Region V
230 South Dearborn St.
Chicago, Illinois 60604

Re: Wastewater Treatment
Columbus, Ohio

Attention: George R. Alexander, Jr.

Dear Sir:

The Board of Trustees of Hamilton Township appreciate the opportunity to get information to local persons relative to the above, as we all suffer much discomfort from the unbearable oder from the Columbus Southerly Sewage Treatment Plant.

We do not understand why the environmental protection agency would permit such a nuisance and deplorable conditions to continue as they have with the City of Columbus.

We would like to go on record asking that your agency do whatever is permissible and do this before the Environmental Impact Statement (EIS) is finished. The persons in this rural township should be able to cleaner, fresher, air and without impurities that they now have.

Any consideration or corrections in this matter will be greatly appreciated by this Board of Trustees.

HAMILTON TOWNSHIP TRUSTEES

4.7 Hamilton Township

4.7.1 Comment: We do not understand why the Environmental Protection Agency would permit such a nuisance and deplorable conditions to continue as they have with the City of Columbus.

Response: As the EIS demonstrates, the planning and construction of a complex sewage treatment facilities system is subject to considerable review by local, state, and federal governments, not only because of their respective financial investments in the system, but also because of their continuing responsibilities to regulate and operate the system under applicable laws. The planning process is also subject to public scrutiny and controversy which may result from judgments made in regard to engineering and planning aspects of the system. Consensus is needed before such major public projects can proceed, and reaching that consensus always takes longer than anticipated.

4.8 Mid-Ohio Health Planning Division

Mid Ohio Health Planning Federation
Health Systems Agency For Health Service Area Number 5

May 8, 1978

RECEIVED
MAY 11 1978
EPA REGION 5
OFFICE OF REGIONAL
ADMINISTRATOR

United States Environmental
Protection Agency
Region V
230 South Dearborn Street
Chicago, Illinois 60604

Attention: Planning Branch, EIS Preparation Section

Dear Sir/Madam:

With sincere appreciation for the deadline extensions that you have granted us, the Franklin County Environmental Health Subcommittee is proud to present its COMMENTS to you regarding your Draft Environmental Impact Statement of the Wastewater Treatment Facilities for the Metropolitan Area, Columbus, Ohio.

The Franklin County Environmental Health Subcommittee EIS Study Group met for many hours during April in its study of the Draft EIS. On May 4, 1978, the entire Subcommittee studied the Study Group's response and approved the COMMENTS attached in this letter. I wish to emphasize to you, that the comments provided here are from a true community group.

If you have any questions about our COMMENTS to your Draft EIS, feel free to contact Mr. Hugo Trux, IV., Mid-Ohio's Environmental Health Planner. He will either answer your questions or refer you to the appropriate person on the study group.

Thank you again for your assistance and cooperation.

Sincerely,

MID-OHIO HEALTH PLANNING FEDERATION

Edward F. Hutchins

Edward F. Hutchins, Chairperson
Franklin County Environmental Health Subcommittee

EFH:HRT/mjk

attachment

Comments on

DRAFT ENVIRONMENTAL IMPACT STATEMENT

for

WASTEWATER TREATMENT FACILITIES METROPOLITAN AREA, COLUMBUS, OHIO

by

Environmental Health Subcommittee
Franklin County Health Planning Advisory Committee
MID-OHIO HEALTH PLANNING FEDERATION
P.O. Box 2239 Columbus, Ohio 43216

Adopted: May 4, 1978

SUMMARY

The Draft EIS should state clearly that the preferred interceptor alternatives were selected so that they would not induce suburban sprawl and will protect unique and prime farmlands. In furtherance of this acknowledgment, USEPA should state unequivocally that it will use its authority under P.L. 92-500 to prevent the deterioration of water quality in the unsewered areas. The problems of community services and facilities, runoff, and atmospheric conditions need to be discussed from the bases of greater and more thorough quantification.

We are concerned that the EIS's proposed design for the Jackson Pike and Southerly Sewage Treatment Plants is not conservative, especially since these plants represent applications of technology for which we do not have substantial operating experience.

We are concerned that this non-conservative design will not permit the treatment plants to meet their effluent permits and that, in fact, they will violate their permits much of the time.

cc: Ohio Environmental Protection Agency, Mid Ohio Regional Planning Commission, City of Columbus, other Franklin County municipalities, and Anheuser-Busch Brewery, Inc.

COMMENTS

While the overall quality of the Draft EIS is fair, there are a number of inadequacies that we will comment upon. Our comments are divided into two parts, those dealing with the interceptor alternatives and those dealing with the treatment plants including water quality modeling.

I. INTERCEPTORS

(a) The initial weakness in this part of the Draft EIS's discussion is its failure to make clear which of the various alternatives were the preferred ones in the Facilities Plan. This denies the reviewer the opportunity to weigh the two preferred options, the City's and U.S. EPA's. (4.8.1)

(b) It is obvious to us from the study of the Draft EIS that U.S. EPA in its selection of interceptor alternatives is imposing land use controls on Columbus and the involved metropolitan areas without making the clear statement that it is doing so. We find this duplicitous. (4.8.2)

It is clear, with respect to these analyses of interceptor alternatives, that the Draft EIS is following U.S. EPA policy based on the July, 1974 study, *Interceptor Sewers and Suburban Sprawl: The Impact of Construction Grants on Residential Land Use*, prepared by Urban Systems Research and Engineering, Inc., for the President's Council on Environmental Quality (CEQ). That policy calls for planning interceptors so that they do not induce growth. However, the Draft EIS only implies this (its methodology follows that, in most instances, set forth in the study); consequently, the analyses suffer from the failure to state this policy explicitly. Fairness to the City calls for U.S. EPA to state that it considers the Facilities Plan's interceptor choices as sprawl-inducive so that Columbus' citizens and their officials know "the rules of the game" and can thus make their future plans for expenditures accordingly.

(c) Another policy implicit in the Draft EIS is CEQ's admonition to Federal agencies to act to protect unique and prime farmland when planning and funding projects. Again, we feel that the Draft EIS should state this policy explicitly, then follow through by giving the acreages and locations in each interceptor planning area of unique and/or prime farmland. (4.8.3)

(d) The Draft EIS in several instances cites the need for constraints on package plants and individual residential systems in those areas which will not be served by interceptors, but ducks responsibility for any control by saying control is a local matter. (See, for example, sections 7.2-7.2.1, pp VII-6 - VII 8.) This conveniently ignores U.S. EPA's authority to exercise veto action over state administration as set forth in P.L. 92-500; i.e., NPDES permits, 208 plans, 303 plans, 305 reports, waste load allocations, etc. We feel that U.S. EPA should, if it insists on pursuing the implicit policy stated in 1 (a) above, accept its responsibilities for insuring the proper administration of that policy and acknowledge its intention to carry them out. (4.8.4)

(e) Section 7.3.3 *"Community Facilities and Services"* suggests that there will be increased costs to various local governments in meeting the subject growth induced needs, but deals with the subject only in generalities. We feel that a best effort should be made to quantify these costs so that present taxpayers will be able to make a reasonable judgment of the interceptor benefits. (4.8.5)

(f) Section 7.4.1 states, in part, "However, a significant increase in development may lead to increased rates and volumes of runoff." and ". . .new development may possibly contaminate the water in the area's major potential aquifers." These are two serious problems and should have been discussed in greater detail and with quantification. What is "significant development?" Not only can aquifers be polluted, so can surface waters. What volumes can be expected and what would be their flood potentials; their effects on stream ecology? What kinds and quantities of pollutants can be projected? The recent and current literature is too large for this subject to be dismissed with speculation. (4.8.6)

(g) Section 7.4.2 discusses atmospheric characteristics under two headings: (1) air quality, (2) climate. We find these discussions inadequate from a data base, inconsistent in logic, and unjustifiably conclusory. The air quality section only discusses total suspended particulates (TSP) and ignores the other regulated pollutants, yet section 2.1.2 (2)'s discussion says that NO_x and Photochemical Oxidants levels must be limited to avoid exceeding state standards. In dealing with TSP, the Draft EIS notes that the data are based on two samples taken in 1976 which are then extrapolated to the year 1995 after "assuming" that there were no differences in TSP geometric means between 1975 and 1976. Faith, then, requires the reader to accept that by 1995 TSP geometric mean will be 86% of the standard. Having reached that shaky figure for only one air pollutant parameter, the Draft EIS says, in discussing climate, that ". . .population growth and development are not expected to result in a violation of ambient air quality standards. . ." then goes on to tax credulity further by adding likelihood to unfounded expectation in concluding, ". . .it is unlikely that growth will contribute to changes in the area's overall climate."

What is the definition of "overall climate?" As an example, January's precipitation could double and September's fall by half and, overall, the climate would not change, but the effects in those two months could be severe.

What are the correlations between regulated air pollutants and climate?

What correlations are there between non-regulated, artificially generated pollutants and climate?

What are the effects of artificial thermal components on climate?

There may be no information available to provide answers to these questions, or information may be inadequate to provide predictive answers. If so, the Draft EIS should state that it cannot answer the question: "What climatic changes will occur?" Current studies indicate important climatic changes are being caused by increased urbanization.

In predicting air quality for the year 2000, all parameters of regulated pollutants should be included, not just one. Assumptions upon which predictions are based should be explained. (4.8.7)

II. TREATMENT AND WATER QUALITY

(a) Data in Appendices I and K, indicate that if the brewery pretreatment is adopted, both Southerly and Jackson Pike will experience essentially the same hydraulic and organic loads, and must produce the same effluent quality. The authors of the EIS should explain why different treatment schemes are proposed for the two plants. (4.8.8)

(b) Within the treatment plants, virtually all processes are sized at the upper end of the allowable range of loadings (App. K) so that the design is not conservative. It is probable this design will not satisfy NPDES consistently, although a high quality effluent will be produced. (4.8.9)

Particular problems occur in the tank loadings which are all too high. (For examples, See Table 1.) The authors of the EIS apparently rely on sand filters to make up deficiencies in the settlers, but the loading on the filters (K-12: JP at 2.8 gpm/ft^2, S at 2.2 gpm/ft^2) is also high. (See R.L. Culp and G.L. Culp, "Advanced Water Treatment," Van Nostrand-Reinhold, p. 107.)

Table 1. Comparison of Settling Tank Loading

Settling Tank	EIS Loading gal/day/ft^2	"10 states" loading gal/day/ft^2
Primary	710 (S) 880 (JP)	600
Intermediate	1360 (JP)	1000
Final	1090 (JP)	800

(4.8.10)

(c) The Water Quality Modeling summarized in Appendix B is so grossly deficient as to be irrelevant to this EIS. Major technical errors include:

(1) Failure to verify the model.

(2) Use of an incorrect stream flow. The data at the Columbus guage includes the Jackson Pike effluent flow so that the stream flows used in the EIS actually double count the Jackson Pike effluent and lead to an erroneously high stream flow.

(3) Use of incorrect reaction rates. The reaction rates utilized in the EIS represent reaction rates found in small turbulent streams and are very much higher than reaction rates found in larger, sluggish streams like the Scioto River.

(4) Assumption of *simultaneous* exertion of nitrogenous and carbonaceous BOD. Laboratory and field data indicate that carbonaceous BOD is exerted *before*, and prior to, nitrogenous BOD.

(5) Incorrect Mathematical equations. The equations presented in the Appendix of the EIS are the integrated form of the Streeter-Phelps equations assuming constant value of K_1 and K_2, whereas the EIS clearly states they have variable values of K_1 and K_2.

(4.8.11)

4.8 Mid Ohio Health Planning Federation

4.8.1 Comment: One initial weakness of the draft EIS is its failure to make clear which of the various alternatives were the preferred ones in the Facilities Plan. This denies the reviewer the opportunity to weigh the two preferred options, the City's and U.S. EPA's.

Response: Alternatives are compared on Table III-11 in Volume III.

4.8.2 Comment: The EIS through its selection of interceptors is imposing land use controls on Columbus and the involved metropolitan areas without making the clear statement it is doing so.

Response: U.S. EPA, by law, can only fund the construction of interceptors to abate documented needs . As several of the interceptors proposed in the Facilities Plan would serve largely unpopulated areas, these interceptors cannot reasonably be funded with federal dollars. The City of Columbus and other metropolitan jurisdictions are free to fund the construction of these interceptors from local sources if so desired. The EIS in no way is imposing land use controls on the local jurisdictions.

4.8.3 Comment: The EIS should state the policy regarding prime and unique farm lands and follow through by giving acreages and locations in each interceptor planning area.

Response: It is not required under NEPA to duplicate within any draft EIS all of the federal policies which must be considered in analyzing environmental impacts of major federal actions. The SCS survey data of prime and unique farmlands for Franklin County had not been completed in form or detail for inclusion in this EIS.

4.8.4 Comment: The EIS in several instances cites the need for constraints on package plants and individual systems. U.S. EPA should accept its responsibilities for ensuring proper administration of such programs.

Response: The Clean Water Act now allows 201 funds to be used to construct and manage onsite systems which serve small residential units. U.S. EPA is also concerned with Ohio EPA's administration of the water program and has recently reached agreement on necessary program improvements and financial requirements. The regulation of onsite systems is a state and local responsibility.

4.8.5 Comment: We feel that a best effort should be made to quantify these costs (community services) so that present taxpayers will be able to make a reasonable judgment of the interceptor benefits.

Response: The effort required to quantify the costs of extending community services and facilities to new areas, essentially a fiscal impact study, is one which can and should be done by the local jurisdiction and incorporated into the decision making and capital budgeting processes. It is an effort that exceeds the resources made available to prepare the EIS. Given the limited resources on this particular project a "best guess" on costs for various services and facilities would not only be inappropriate for inclusion in the EIS, but rightly subject to criticism.

4.8.6 Comment: Increased rates and volumes of runoff resulting from development referenced in the EIS should be calculated and quantified for pollution effect.

Response: To calculate runoff from future development is a waste of time and resources unless it can be site specific and fairly specific assumptions regarding density, land planning, buildup and development practices and material employed, environmental controls, and landscaping can be determined. Such information may be more appropriately developed by local planning agencies and the 208 planning program.

4.8.7 Comment: The air quality and climatic impact discussions are inadequate.

Response: The discussion of air quality has been substantially modified. See Appendix FF for more detail.

4.8.8 Comment: Data in Appendices I and K, indicate that if the brewery pretreatment is adopted, both Southerly and Jackson Pike will experience essentially the same hydraulic and organic loads, and must produce the same effluent quality. The authors of the EIS should explain why different treatment schemes are proposed for the two plants.

Response: This comment has been addressed in one form or another in our responses to OEPA and the City of Columbus. In brief, we offer the following response:

(1) Reviewer is wrong in saying organic and hydraulic loads are "essentially the same". They are similar only in terms of total influent BOD mass and significantly different in terms of flow, suspended solids mass and form, and organic (soluble vs. particulate) load distribution.

(2) The reviewer's second point, "must produce the same effluent quality", is a given, and does not follow from his opening premise.

(3) Differences in treatment schemes can be attributed to flow considerations (used in designing solids-liquid separation system); form, mass, and concentration differences in suspended solids, organics and nitrogen (used in designing reactors); the clear identification of a dominant industrial waste influencing process design at one plant; and the existing inventory of treatment capability found at each plant.

4.8.9 Comment: Within the treatment plants, virtually all processes are sized at the upper end of the allowable range of loadings (App. K) so that the design is not conservative. It is probable this design will not satisfy NPDES consistently, although a high quality effluent will be produced.

Response: Please see applicable responses to the OEPA and the City of Columbus comments.

4.8.10 Comment: Particular problems occur in the tank loadings which are all too high. (For example, see Table 1.) The authors of the EIS apparently rely on sand filters to

make up deficiencies in the settlers, but the loading on the filters (K-12: JP at 2.8 gpm/ft^2, S at 2.2 gpm/ft^2) is also high. (See R. L. Culp and G. L. Culp, "Advanced Water Treatment," Van Nostrand-Reinhold, p. 107.)

Table 1. Comparison of Settling Tank Loading

Settling Tank	EIS Loading gal/day/ft^2	"10 states" gal/day/ft^2
Primary	710(S)	600
Intermediate	1360(JP)	1000
Final	1090(JP)	800

Response: The reviewer is incorrect in assuming that the suggested settler design is deficient because it doesn't agree with the ten State Standards (See previous responses to OEPA and the City of Columbus, particularly response 4.1.72, 4.1.73, and 4.1.74). We find nothing of substance on page 107 of Culp and Culp regarding the effluent filtration facility proposed for consideration in the draft EIS.

4.8.11 Comment: The Water Quality Modeling summarized in Appendix B is so grossly deficient as to be irrelevant to this EIS. Major technical errors include:

(1) Failure to verify the model.

(2) Use of an incorrect stream flow. The data at the Columbus gauge includes the Jackson Pike effluent flow so that the stream flows used in the EIS actually double count the Jackson Pike effluent and lead to an erroneously high stream flow.

(3) Use of incorrect reaction rates. The reaction rates utilized in the EIS represent reaction rates found in small turbulent streams and are very much higher than reaction rates found in larger, sluggish streams like the Scioto River.

(4) Assumption of simultaneous exertion of nitrogenous and carbonaceous BOD. Laboratory and field data indicate that carbonaceous BOD is exerted before, and prior to, nitrogenous BOD.

(5) Incorrect Mathematical equations. The equations presented in the Appendix of the EIS are the integrated form of the Streeter-Phelps equations assuming constant value of K_1 and K_2, whereas the EIS clearly state they have variable values of K_1 and K_2.

Response: Please see responses to similar comments made by the City of Columbus in Section 4.1 of this Chapter and responses to the OEPA in Chapter 3.

V. COMMENTS FROM PRIVATE CONCERNS AND INDIVIDUALS

5.1 Anheuser-Busch Inc.

5.1

Anheuser-Busch, Inc.

ST. LOUIS, MO., U.S.A. 63118

April 6, 1978

Mr. Gene Wojcik
Chief EIS Preparation Section
Planning Branch
U.S. Environmental Protection Agency
Region V
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Wojcik:

We are submitting these comments in response to your Office's Notice of Public Hearing, dated February 24, 1978, concerning public comment on the draft Environmental Impact Statement ("EIS") for Wastewater Treatment Facilities for the Metropolitan Area of Columbus, Ohio. I personally made an oral presentation and submitted a prepared statement for the record at the public hearing held in Columbus on March 30, 1978, a copy of which (the "Oral Statement") is enclosed and incorporated herein by reference. The comments in this letter are supplemental to those made by me at the public hearing, and we request that both statements be entered as part of the public record and receive due consideration from your Office prior to preparation and issuance of the Final Environmental Impact Statement.

First, we are seriously concerned about the safety and environmental consequences which could ensue from implementation of the pretreatment scenario recommended by the draft EIS (scenario 2, summarized at page 12 of the Executive Summary of the draft EIS), and by the failure of the draft EIS to evaluate these consequences. I described the unexplored safety and environmental issues associated with pretreatment scenario 2 in my Oral Statement at page 1. (5.1.1)

The principal, substantive conclusion of the draft EIS was that the industrial release of the Columbus Anheuser-Busch brewery "presented the opportunity to derive significant changes in the proposed project plan through implementation of an industrial pretreatment requirement. (page 12 of Executive Summary)." The legal basis by which the EPA purports to impose an "industrial pretreatment requirement" on the Columbus Anheuser-Busch brewery is not addressed in the draft EIS, which is not surprising because no legal basis exists. Anheuser-Busch discharges compatible wastes into the Southerly treatment works, which is not disputed by the

Keep America Beautiful

EIS. Applicable law does not require pretreatment of compatible wastes, and Anheuser-Busch strongly objects to any arbitrary attempt to impose an ad hoc pretreatment standard on one Anheuser-Busch plant. (5.1.2)

The basic legislation which establishes national policy and governs the federal regulatory framework in this subject area, the Federal Water Pollution Control Act of 1972, as amended, (the FWPCA"), requires the pretreatment of incompatible wastes, but not compatible wastes. The FWPCA reads in pertinent part at section 307(b):

> Pretreatment standards under this subsection . . . shall be established to prevent the discharge of any pollutant through treatment works . . . which are publicly owned, which pollutant interferes with, passes through, or otherwise is incompatible with such works.

In discussing the application of this section of the FWPCA, the House and Senate conferees expressly cited breweries as an example of an industry whose normal effluent was compatible with municipal waste treatment systems, making the pretreatment of such waste unnecessary:

> Pretreatment of biological waste that is compatible with treatment provided by publicly owned waste treatment plants into which such waste is introduced may not be necessary. Examples of such biological waste may be the normal effluent of a brewery and of food processing plants where the composition and proportion of such effluent is compatible with the municipal waste treatment system. In no event is it intended that pretreatment facilities be required for compatible wastes as a substitute for adequate municipal waste treatment works. Conference Report on Federal Water Pollution Control Act Amendments of 1972, S. Rep. No. 92-1236, 92nd Cong., 2d Sess., Sept. 28, 1972, p. 313.

Pursuant to its S 307(b) authority, the EPA issued pretreatment standards at 40 C.F.R. Part 128, which establishes three situations in which pretreatment of industrial wastes discharged into a publicly owned treatment works are required by law. Pretreatment is required for industrial waste which would cause a state or municipality to be in violation of the effluent limitations in a NPDES permit (S 128.110), for incompatible wastes (S 128.133), and for waste which is deemed to interfere with the operation of a treatment works (S 128.131). This regulation also states expressly, as a matter of federal policy, that pretreatment for removal of compatible pollutants is not required (S 128.132).

The draft EIS does not contend, nor could it sustain a contention, that the actual or anticipated discharge from the Columbus brewery falls within any of the three referenced wastewater discharge categories which require pretreatment. The brewery is not in violation of any state or local pretreatment ordinances pursuant to S 128.110. With respect to the second condition under which pretreatment is required, the brewery discharge is composed of pollutants which are specifically enumerated as "compatible pollutants" under S 128.121. Since the Southerly treatment works expansion alternatives in the Columbus Metropolitan Area Facilities Plan (the "Facilities Plan") have been designed to treat the anticipated effluent of the Anheuser-Busch brewery, by the definition of a compatible pollutant set forth in S 128.121, the wastes discharged from the brewery are compatible.

Nor does the draft EIS take the position that the Anheuser-Busch discharge falls within one or more of the four types of prohibited wastes set forth in S 128.131, which are deemed to interfere with the operation of a publicly owned treatment works, and which therefore require pretreatment whether or not they fall within the definition of compatible wastes. The four types of wastes which are deemed to interfere with the operation of a treatment works are:

(a) Wastes which create a fire or explosion hazard in the publicly owned treatment works.

(b) Wastes which will cause corrosive structural damage to treatment works . . .

(c) Solid or viscous wastes in amounts which would cause obstruction to the flow in sewers, or other interference with the proper operation of the publicly owned treatment works.

(d) Wastes at a flow rate and/or pollutant discharge rate which is excessive over relatively short time periods so that there is a treatment process upset and subsequent loss of treatment efficiency.

The draft EIS at page IV-3 makes the assertion that "the brewery waste impacts the Southerly wastewater treatment plant" for various reasons. It is clear that waste which "impacts" a treatment works falls substantially short of the legal threshold of "interference

with" a treatment works that triggers a federal pretreatment obligation. On the factual question of how and to what extent brewery waste "impacts" the treatment works, as long as Anheuser-Busch is performing within normal anticipated ranges, and can avoid accidental discharges, which admittedly could violate the "slug loading prescription of (d) above, Anheuser-Busch's discharge and flow rate generally are not of such short-term variability as to cause a problem under (d). Nor does the existing or anticipated Anheuser-Busch effluent cause a problem under (a), (b), or (c) above. On the other hand, if the EIS recommendation were adopted, there is the possibility, as discussed in the Oral Statement, of the production of methane gas in violation of (a); there is also the possibility that effluent suspended solids generated by the pretreatment of BOD could cause corrosive damage to, and accumulations in, the sewage collection system in violation of (b) and (c).

The EPA had another opportunity to review the question of federal pretreatment standards for brewery and other compatible wastes in the development of its "Guidelines for Pretreatment of Pollutants Introduced into Publicly Owned Treatment Works," October, 1973. Appendix D of the Guidelines sets forth all the information available to the EPA concerning wastewater characteristics for sixteen industrial groups. With respect to the Beverages Industry, (Annex 12), the EPA cites a study prepared for it by Aware, Inc. of Nashville, Tennessee entitled "Industrial Wastes Survey of the Malt Industry" (unpublished), from which the EPA drew the following conclusion:

> [Study] results suggest that in a well designed and well operated joint treatment works, the beverages industrial wastes are similar to domestic wastes, and that the ratio of industrial wastes to domestic wastes does not significantly influence the treatability characteristics of the combined waste.

We find no evidence in the draft EIS to suggest that the Facilities Plan contemplates other than a "well designed . . . joint treatment works" in which brewery wastes are similar to and compatible with domestic wastes. Absent a change in the applicable law, i.e., the federal pretreatment standards contained in 40 C.F.R. Part 128, there is no lawful basis for the EPA to impose an ad hoc pretreatment standard on Anheuser-Busch's Columbus brewery. If the EPA believes it has a basis for modifying federal pretreatment standards in 40 C.F.R. Part 128, it should do so in a manner which is procedurally fair and sufficient for a federal rulemaking, and which adopts and

applies a uniform standard for an entire industry class on a nationwide basis.

We also take issue with the raising of the pretreatment alternatives ab initio in the draft EIS. Under the statutory scheme and the EPA's implementing regulations and procedures thereunder, the appropriate mechanism for development and evaluation of pretreatment design alternatives is the Facilities Plan, and not the EIS, which by law and by practice is the mechanism established to assess the environmental impact of a metropolitan treatment works which is to receive federal funding. (5.1.3)

Congress gave primary responsibility in S 201(g) of the FWPCA to the construction grant applicant to develop a facility plan which included wastewater treatment alternatives that satisfied the analytical and informational requirements of S 201(g). EPA regulations (40 C.F.R. S 35.917) provide that the facility plan is the instrument for the development and the systematic evaluation of feasible treatment alternatives, including the cost-effectiveness of those alternatives (S 35.917-1). There is no finding in the draft EIS that the applicant failed to comply with the requirements levied by section 201 (g) or its implementing regulations at 40 C.F.R. S 35, which might serve as a justification for the EPA's disapproval in the draft EIS of the recommended treatment alternative of the Facilities Plan. Even if the EPA had made such a finding in the EIS, it would have been more appropriate under applicable law and under Congress' unambiguous delegation of this responsibility to the local level, for the EPA to have recommended to the City during the drafting and preliminary review process that it evaluate pretreatment alternatives in the Facilities Plan. There have been numerous points during the lengthy Step 1 construction grant process at which the EPA could have requested the City's evaluation of pretreatment alternatives in the context of the developing Facilities Plan.

The EPA has published two handbooks for use by construction grant applicants in the preparation of facility plans. These handbooks explain how to satisfy the requirements of applicable law, set forth the criteria by which the EPA will review and approve the facility plan, and describe in considerable detail the informational and analytical prerequisites of the plan. The handbooks are the EPA Handbook of Procedures, January 1977, (Chapter IV, Step 1 Grant Processing), and the EPA Guidelines for Preparing a Facility Plan, May 1975. The EPA has not alleged that the Facilities Plan is deficient in content, information, or format as prescribed by these handbooks. Indeed, if anything, these handbooks underscore that the proper place for consideration of the pretreatment alternatives is in the Facilities Plan, and that if the EIS pretreatment recommendations were simply transposed to the Facilities Plan, they

would not satisfy the EPA's own review criteria. The EPA in these handbooks insists upon evaluation of treatment alternatives on the basis of a number of criteria other than the cost-effectiveness criterion on which the EIS recommendation relies entirely. For example, section 10.7 of the Facility Plan Preparation Handbook advises construction grant applicants that the EPA will review their facility plans in light of eleven criteria, only one of which relates to cost-effectiveness, and that their plans will be considered to have met the requirements of the FWPCA only when it is specifically determined that these eleven criteria have been satisfied.

Thus there is no basis under the FWPCA, in its implementing regulations, or under the EPA's own procedural guidelines to take evaluation of pretreatment alternatives out of the context of the Facilities Plan and consider the issue in the first instance in the EIS. From another perspective, there is no basis under the enabling legislation pursuant to which the EPA issues this EIS for the original evaluation in the EIS of pretreatment alternatives on a cost-effectiveness rationale. Authority for the EPA to issue the EIS arises out of S 102(c) of the National Environmental Policy Act ("NEPA") and out of the regulations issued by the Council on Environmental Quality at 40 C.F.R. Part 1500. These two sources of authority are unambiguous in their delineation of the purpose, the scope and the specific content of an EIS, which is to assess the effects of major federal actions on the quality of the human environment and to explore alternative actions that will avoid or minimize adverse environmental impacts. The regulations make clear that the "alternatives" required to be evaluated by the EIS pursuant to S 102(c)(iii) of NEPA are not those from a cost-effectiveness standpoint, but alternatives with different environmental impacts, or, as stated in 40 C.F.R. S 1500.8(a)(4) a "rigorous exploration and objective evaluation of the environmental impacts of all reasonable alternative actions, particularly those that might enhance environmental quality or avoid some or all of the adverse environmental effects." (5.1.4)

Pursuant to the authority of NEPA and Part 1500, the EPA has promulgated its own regulations on EIS preparation at 40 C.F.R. S 6 which remain consistent with NEPA's statutory purpose and scheme. These regulations state at S 6.304:

> The EIS shall serve as a means for the responsible official and the public to assess the environmental impacts of a proposed EPA action.

Section 6.304 goes on to enumerate the content requirements for an EIS prepared by the EPA. It lists and describes seven major

categories of information and analysis of which an EIS should be comprised. All seven categories relate to environmental considerations; none of them as a category deals with cost-effectiveness questions. In light of this regulatory and procedural framework, it is difficult to ascertain on what legal basis the draft EIS proposes treatment alternatives justified solely in terms of purported cost-effectiveness, and without regard to their environmental impact.

Leaving aside for a moment the question of whether or not the EIS is an appropriate mechanism for raising and evaluating the pretreatment issue, the EIS in its discussion of the four pretreatment alternatives materially fails to comport with the EPA's own regulations and procedures for the preparation of environmental impact statements. The general analytical approach dictated by the EPA Manual for Preparation of Environmental Impact Statements, Chapter III B(2), calls for the evaluation of structural and non-structural subsystems, the screening of subsystem alternatives to combine compatible subsystems into system alternatives, and the selection of a preferred system on the basis of a detailed comparative analysis, the final step in which process, referred to as the "Final Detailed Systems Screening," is the point at which comparative costs are factored into the evaluation. Even at this stage, comparative costs are only one of four criteria for evaluation, the others being the system's contribution to water quality goals and objectives, operability, reliability and flexibility of each alternative, and significant environmental effects of each alternative. Once again, the EPA's own internal procedures serve to underscore the total absence of any environmental impact analysis of the proposed pretreatment alternative in the draft EIS. The materiality of the omission is evidenced by the substantial environmental concerns raised by the EIS's recommended pretreatment alternative which we reviewed in our Oral Statement (page 1).

In addition to the draft EIS's failure to assess the potential environmental hazards of their recommended pretreatment alternative, the cost-effectiveness analysis as well as the process design of the pretreatment facilities contain several unfounded assumptions and factual errors and reaches an erroneous conclusion as a result of these errors. These errors are discussed in detail in our Oral Statement at pages 4 and 5. The points discussed in our Oral Statement provided evidence to show that the capital costs at the Southerly Plant were underestimated when pretreatment was assumed at the brewery. In addition, the cost of the pretreatment plant at the brewery would be significantly greater than that reported in the Impact Statement. We are enclosing design and cost estimate

information submitted to us by McWhorter & Associates, Inc. of Savannah, Georgia, consulting engineers retained by Anheuser-Busch. This information reveals that the capital and operating costs which would be incurred by Anheuser-Busch as a result of the adoption of pretreatment scenario 2 as recommended by the draft EIS are seriously understated. An additional analysis is also attached to show the financial impact that the implementation of the recommended plan would have on Anheuser-Busch. This financial analysis reveals that the recommended plan at the present discharge level from the brewery would yield a return on investment to Anheuser-Busch of 1.97 percent and 2.63 percent under the expanded brewery assumptions. Further analysis of the recommended plan at the present loading condition reveals that if this plan were implemented, it would cause Anheuser-Busch to incur a present value loss of $ 2,828,330. In all probability, this would represent a very conservative estimate of the loss that Anheuser-Busch would incur since the analysis assumes that even though Anheuser-Busch would remove a large portion of the load from the Southerly Plant, the sewer use rates would remain unchanged. However, in reality, pretreatment by Anheuser-Busch would result in a significant loss of revenue to the City of Columbus and this loss of revenue would result in higher sewer use charges for the users of the system. This severe revenue drain on the City and the significant increase in sewer use charges to users of the Columbus system were not taken into account in the evaluation of the various scenarios in the draft EIS.

Another factor not included in the evaluation of the scenarios is the fact that the treatment of a combined brewery-municipal wastewater aids in the removal of phosphorus. The EIS acknowledges that brewery wastes help to remove phosphorus but in the evaluation of the scenarios, no additional cost was assumed at the Southerly Plant for this additional treatment requirement when pretreatment was assumed at the brewery. (5.1.5)

One of the major assumptions made in the draft EIS was that the treatment of the brewery waste at the Southerly Plant was the cause of the bulking sludge which currently hinders the operation of the plant. The draft EIS even assumed that if the brewery wastewater was pretreated, the need for further investigation of this problem would be eliminated. However, after extensive tests, the City of Columbus has stated that they do not feel that the bulking problem is caused by the treatment of brewery wastes. Their analysis has shown that their bulking problem is due to the presence of a blue-green algae and not from the presence of filamentous bacteria, such as Sphaerotilus Natans, or fungi which are usually associated with bulking related to the treatment of a carbohydrate waste. Therefore, we think the assumption made in the EIS that the brewery waste is the cause of the bulking problem is unfounded and also feel that the elimination of a pilot plant at the Southerly Plant to determine

cause of the bulking problem is unwise. (5.1.6)

In conclusion, let me reiterate the conclusions which we have previously enunciated in the Oral Statement. We are firmly committed to the development of a reasonably priced and environmentally sound wastewater treatment facility which will serve the needs of all residential and industrial users in the Columbus Metropolitan Area in compliance with all applicable local, state, and federal laws. We have worked closely with the City and with state and federal environmental officials in the development of the treatment alternatives considered in the Facilities Plan, and we believe that the proper focus for the draft EIS should be the environmental impact and cost-effectiveness of those treatment alternatives described in the Facilities Plan. We do not believe that the EIS has put forward convincing environmental or cost arguments to justify proposing new treatment alternatives in the draft EIS which it did not request appropriate local officials to evaluate in the context of the Facilities Plan. We can state with assurance that the pretreatment scenario recommended by the draft EIS will involve substantially increased costs to ourselves and to all other local users. We strongly object to the imposition on our Company of a pretreatment standard that is not required by applicable law or regulations and that it is not applied on a uniform basis to other industries similarly situated. In addition to the legal and procedural deficiencies in the draft EIS, we find its recommended alternative to be environmentally questionable and considerably more costly than the draft EIS suggests.

Please let us know if there is further information which we can provide.

Sincerely yours,

ANHEUSER-BUSCH, INC.

John L. Stein, Manager
Environmental Engineering Planning

att.

JLS:de

cc: Mr. Gordon Arbuckle
PATTON, BOGGS & Blow
1200 Seventeenth Street, NW
Washington, DC

FINANCIAL CONSIDERATIONS OF PROVIDING PRETREATMENT AT THE COLUMBUS BREWERY AS DEVELOPED IN THE COLUMBUS DRAFT EIS

	Scenario 2	
	60,000 #/day	100.000 #/day
1) Capital Costs		
Per McWhorter & Associates, Inc.	$6,916,000	$ 7,361,000
2) Operating Costs		
Per McWhorter & Associates, Inc.	$329,000/year	$386,000/year

3). Cost of Discharge to City Sewer System

A) Unit Costs

Flow	$0.817 per 1,000 gal
BOD	$0.109 per lb over 250 mg/l
SS	$0.078 per lb over 300 mg/l

B) Savings in Sewer Charges

a) Cost Under Scenario 1

Flow	$ 2,247 per day
BOD	$ 5,915 per day
SS	$ 633 per day
Total	$ 8,795 per day

b) Cost Under Scenario 2

Flow	$ 2,247 per day
BOD	$ 2,645 per day
SS	$ 2,193 per day
Total	$ 7,085 per day

c) Savings ($8,795 - $7,095) 365 days/year = $624,150 per year

C) Savings in Sewer Charges @ 100,000 #/day

a) Cost Under Scenario 1

Flow	$3,760 per day
BOD	$9,850 per day
SS	$1,050 per day
Total	$14,660 per day

b) Cost Under Scenario 2

Flow	$ 3,760 per day
BOD	$ 5,500 per day
SS	$ 3,400 per day
Total	$12,660 per day

c) Savings = ($14,660 - $12,660) 365 days/year = $730,000 per year

4) Yearly earnings from installation of pretreatment system. Assume both Sewer Use Charges and O & M Costs increase at 5% per year for 10 years; and then remain constant for next 10 years.

	60,000 #/day			10,000 #/day		
Year	Sewer Savings	O & M Costs	Earnings	Sewer Savings	O & M Costs	Earnings
1	$624,150	329,000	295,150	730,000	386,000	344,000
2	655,350	345,450	309,900	766,500	405,300	361,200
3	688,100	362,700	325,400	804,800	425,500	379,300
4	722,600	380,900	341,700	845,000	446,800	398,200
5	758,700	399,900	358,800	887,300	469,200	418,100
6	796,600	419,900	376,700	931,700	492,700	439,000
7	836,400	440,900	395,500	978,300	517,200	460,100
8	878,200	462,900	415,300	1,027,200	543,200	484,000
9	922,000	486,000	436,000	1,078,500	570,300	508,200
10	968,300	510,400	457,900	1,132,500	598,900	533,600
11 thru 20	968,300	510,400	457,900	1,132,500	598,900	533,600

5) Rate of Return Analysis

a) 60,000 #/day loading

Total investment = $6,916,000

Maximum economic life = 20 years

Effective tax rate = 50.0%

Sum of years digits depreciation

10 year depreciation with 10% investment tax credit

Year	Depreciation	Salvage	Earnings	Cash Flow	Earnings Rate
1	1,131,708	5,092,690	1,678,350	1,405,029	-6.05
2	1,018,538	4,074,152	309,900	664,219	-6.45
3	905,367	3,168,785	325,400	615,383	-6.64
4	792,196	2,376,589	341,700	566,948	-6.72
5	679,025	1,697,564	358,800	518,912	-6.73
6	565,855	1,131,709	376,700	471,277	-6.62
7	452,684	679,026	395,500	424,092	-6.38
8	339,513	339,514	415,300	377,406	-5.95
9	226,342	113,172	436,000	331,171	-5.30
10	113,171		457,900	285,536	-4.41
11	0	1	457,900	228,950	-3.38
12	0	1	457,900	228,950	-2.46
13	0	1	457,900	228,950	-1.64
14	0	1	457,900	228,950	-0.92
15	0	1	457,900	228,950	-0.29
16	0	1	457,900	228,950	0.29
17	0	1	457,900	228,950	0.78
18	0	1	457,900	228,950	1.22
19	0	1	457,900	228,950	1.62
20	0	1	457,900	228,950	1.97

DCFROI equals 1.97 percent for a 20 year life

b) 100,000 #/day loading

Total investment = $7,361,000

Year	Depreciation	Salvage	Earnings	Cash Flow	Earnings Rate
1	1,204,526	5,420.372	1,816,200	1,510,363	-5.85
2	1,084.074	4,336,298	361,200	722,637	-6.21
3	963,622	3,372,676	379,300	671,461	-6.36
4	843,169	2,529,507	398,200	620,684	-6.40
5	722,717	1,806,790	418,100	570,408	-6.35
6	602,264	1,204,526	439,000	520,632	-6.19
7	481,811	722,716	460,100	[illegible]	-5.88
8	361,359	361,358	484,000	[illegible]	-5.38
9	240,906	120,452	508,200	[illegible]	-4.67
10	120,453	-0	533,600	[illegible]	-3.74
11	0	-0	533,600	266,800	-2.68
12	0	-0	533,600	266,800	-1.75
13	0	-0	533,600	266,800	-0.93
14	0	-0	533,600	266,800	-0.21
15	0	-0	533,600	266,800	0.43
16	0	-0	533,600	266,800	0.99
17	0	-0	533,600	266,800	1.48
18	0	-0	533,600	266,800	1.91
19	0	-0	533,600	266,800	2.29
20	0	-0	533,600	266,800	2.63

DCFROI equals 2.63 percent for a 20 year life

6) Present value* estimate at 60,000 #/day loading

Year	Cash Flow	Present Factor	Present Value
1	1,405,029**	0.8929	[illegible]
2	664,219	0.7929	[illegible]
3	615,383	0.7118	[illegible]
4	566,948	0.6355	360,295
5	518,912	0.5674	294,430
6	471,277	0.5066	238,750
7	424,092	0.4523	191,816
8	377,406	0.4039	152,434
9	331,171	0.3606	119,420
10	285,536	0.3220	91,940
11	228,950	0.2875	65,820
12	228,950	0.2567	58,770
13	228,950	0.2292	52,475
14	228,950	0.2046	46,840
15	228,950	0.1827	41,830
16	228,950	0.1631	37,340
17	228,950	0.1456	33,335
18	228,950	0.1300	29,760
19	228,950	0.1161	26,580
20	228,950	0.1037	23,740

* Anheuser-Busch cost of capital assumed @ 12% Total = 4,087,670

** Includes 10% investment tax credit

Present Value Loss = $6,916,000 - 4,087,670 = $2,828,330

Appendix
TABLE 1
100,000 LBS/DAY SCENARIO 2
DESIGN CONCEPT

DESIGN WASTEWATER LOAD
- Hydraulic Flow
  - Normal Daily Flow at Full Production = 6.5 MGD
  - Maximum Daily Flow = 7.8 MGD
  - Peak Flow Rate = 9.8 MGD
- Biochemical Oxygen Demand
  - Mean BOD = 100,000 lbs/day
  - Standard Deviation/Mean (Jan - April 1977) = 0.34
  - Normal Maximum BOD = 100,000 ÷ 1.34 = 134,000 lbs/day
- Suspended Solids
  - Design Suspended Solids = 25,000 lbs/day

DESIGN EFFLUENT LIMITATIONS
- Hydraulic Flow
  - Limitation = no limit
- Biochemical Oxygen Demand
  - 30 Day Average Limitation = 60,000 lbs/day
- Suspended Solids
  - Limitation = no limit
- Nitrogen
  - Limitation = no limit
- Phosphorus
  - Limitation = no limit

RAW WASTE PUMPING STATION
- Peak Flow Rate = 9.8 MGD = 6,800 gpm
- Provide Four Pumps including One Standby
- Pump Capacity = 3,400 gpm each
- Pump Head Estimated at 40 feet TDH
- Pump Power = 50 HP

COARSE BAR SCREENS
- One Unit
- Manually Cleaned
- Bar Spacing = 2 inch clear opening
- Design Velocity at Average Flow = 2.0 fps
- Design Velocity at Peak Flow = 3.0 fps
- Inclined Angle from Horizontal = 30 degrees

METERING FLUME
- Metering Range
  - Minimum Flow = 600 gpm
  - Maximum Flow = 6,000 gpm

EQUALIZATION TANK

Equalization of Hydraulic and Waste Loads
Variable Storage Required = 100,000 gallons to eliminate flow peaks
Total Storage Capacity = Provide maximum without risk of septicity
Allowable Storage Time = 6 hours maximum without septicity
Total Storage Volume = 6.5 MGD x 6 hours = 1,625,000 gallons
Number Equalization Tanks = Two Units
Volume Each Tank = 812,500 gallons
Tank Size = 80 feet diameter x 21.5 feet SWD
Mixer = low speed top entry turbine
Mixer Pumping Rate = 6.5 MGD x 20 = 90,000 gpm minimum
Mixer Power = 20 HP
Minimum Water Depth for Mixer Operation
    Center Tank = 5.5 feet
    Side Wall = 0
Detention at Minimum Level with Normal Flow = 0.5 hours with two tanks
Detention at Maximum Level with Normal Flow = 6 hours with two tanks
Effluent Pumps = Two variable speed units
Pump Capacity = 6.5 MGD = 4,500 gpm each

FINE SCREENS

Equalized Flow = 4,500 gpm maximum
Type = Stationary Wedge Wire
Opening = 0.020 inches
Material = 316 SST
Length Screen Required = 4,500 gpm ÷ 100 gpm/ft = 45 ft
Provide 5 back to back 72 inch screens
Screen Length with one unit down = 48 feet
Provide Conveyors for Screenings
Discharge Screenings into Dumpsters
Haul Screenings to Sanitary Landfill
Screenings Quantity varies with brewery operation
Estimated Screenings
    Minimum day = 1 cubic yard
    Maximum day = 12 cubic yards (spent grain spill)
BOD Removal = none

NEUTRALIZATION TANK

Retention = 5 minutes at Average Flow
Volume = 4,500 gpm x 5 min = 22,500 gals
Mixer = low speed top entry turbine
Mixer Pumping Rate = 4,500 gpm x 5 = 22,000 gpm
Mixer Power = 2 HP
Provide Acid and Caustic Feed Capability
Provide 5,000 gals Storage for 95% H_2SO_4
Provide 5,000 gals Storage for 50% NaOH

NUTRIENT ADDITION

Nitrogen

Base Nitrogen Required on N/BOD removed ratio = 1/25
BOD Removed = 134,000 lbs/day - 50,000 lbs/day = 84,000 lbs/day
Nitrogen Required = 84,000 lbs/day x 1/25 = 3,360 lbs/day
Estimated Raw Waste Nitrogen = 560 lbs/day
Nitrogen Feed Required = 2,800 lbs/day
Provide Two Anhydrous Ammonia Storage Tanks
(one tank on line and one reserve)
Provide One 2,800 lbs/day Evaporator
Provide One 2,800 lbs/day Feeder
Feed Proportional to Monitored TOD Load

Phosphoric Acid

Base Phosphorus Required on P/BOD removed ratio = 1/125
Phosphorus Required = 84,000 lbs/day x 1/125 = 670 lbs/day
Estimated Raw Waste Phosphorus = 400 lbs/day
Feed Required = 270 lbs/day
Use H_3PO_4 @ 75%

$$\text{Feed Rate} = \frac{270}{32\% \times 75\% \times 8.34 \times 1.58} = 85 \text{ gpd}$$

Provide Storage for Tank Truck Load plus 50%
Provide 5,000 gals Storage
Feed Proportional to Monitored TOD Load

BIOLOGICAL TOWER

Design BOD_5 Loading = 100,000 lbs/day
Soluble BOD Removal Required = (80,000 - 35,000)/80,000 = 56%
Base Design on Following Formula:

$$Le/Li = e^{-KD/q^n}$$

Where Li - Influent BOD_5
Le = Settled Effluent BOD_5
K = Treatability Constant
D = Media Depth
q = Hydraulic Loading per Unit Area
n = Media Constant

n = 0.5 for BF Goodrich Vinyl Core Media

Actual operation of a biological tower system pretreating brewing waste at one brewery, a pilot tower operated at another brewery, and a series of pilot laboratory studies on brewing waste indicate that two stage filter performance predicted with a K_{20} value of 0.01 is achievable with reasonable reliability for influent BOD concentrations averaging 2,000 to 2,500 mg/l and removals of 40 to 60 percent based on settled effluent BOD.

Suspended solids generated on the biological towers are estimated at 50% of soluble BOD removal. The BOD_5 of suspended solids biomass generated on the biological tower systems are estimated to be 20% of BOD_5 removed.

K is temperature dependent and varies as follows:

$$K_T = K_{20}(1.035)^{T-20}$$

Estimated temperature extremes in the biological towers
Summer, All Stages = 27 degrees C
Winter, First Stage = 20 degrees C
Second Stage = 13 degrees C
Temperature corrected K values:

Summer $K = .01(1.035)^{27-20} = 0.013$
Winter K will change with each filter stage as heat loss reduces temp.
1st Stage K = .010
2nd Stage $K = .01(1.035)^{13-20} = 0.0079$

Height is limited by structural capacity of media
Maximum practical height = 32 feet
Provide three stage biological system
Make each stage same size for interchangeability
Assume K remains constant for each stage
Fraction BOD remaining after each stage = $(1 - 0.56)^{.5} = 0.66$
First Stage Design
Rearrange equation to calculate q and use average winter K to calculate media required.

$K_{avg} = (.010 + .0079)/2 = 0.889$

$$q = [-KD/\ln(Le/Li)]^{1/n}$$

$$q = (-.0089 \times 32/\ln .66)^2$$

$$q = 0.47 \text{ gpm/ft}^2$$

Area = Q/q = 6.5 MGD/0.47 gpm/sf = 9,604 ft^2

Diameter = $(9{,}604 \times 4/\pi)^{.5}$ = 110 feet

Media Volume = 110' Ø x 32 ft = 304,000 ft^3 each filter

Volume Loading

First Stage = 100,000 lbs BOD/304,000 ft^3 = 329 lbs BOD/1000 cf

Overall = 404 ÷ 2 stages = 164 BOD/1000 cf

Performance Each Stage - Winter Condition

First Stage Performance

$$Le/Li = e^{-.01} \times 32/.47^{.5} = 0.627$$

Second Stage Performance

$$Le/Li = e^{-.0079} \times 32/.47^{.5} = .692$$

Overall Performance

BOD Removed based on settled effluent sample

$$Le/Li = (Le/Li)_{1st\ stage} \times (Le/Li)_{2nd\ stage} \times (Le/Li)_{3rd\ stage}$$

Le/Li = 0.627 x 0.692 = 0.434 fraction remaining

Fraction Removed = 1.0 - 0.434 = 0.566

Soluble BOD Removed = 80,000 x .566 = 45,289 lbs/day

Suspended BOD Removed = 20,000 x est 21% = 4,200 lbs/day

BOD removed based on whole effluent sample

BOD Removed = 45,289 - 20% + 4,200 = 40,424 lbs/day

Recirculation

Raw Waste Hydraulic Loading:

Maximum day flow = 0.56 gpm/sf

Average day flow = 0.47 gpm/sf

Min. hydraulic Loading Required to provide adequate wetting = .75 gpm/sf

Desirable hydraulic loading to provide hydraulic sluffing of biomass under projected organic loading = 1.5 gpm/sf

Provide 2 recirculation pumps each stage for constant flow over filter capacity = 110 ft dia x .75 gpm/sf = 7,100 gpm

Head = $\pm$ 50 ft TDH

Ventilation

Max. air required when summer temperatures increase reaction rates

Assumed maximum tower temperature = 27 degrees F

First Stage BOD removal at 27 degrees F

$$Removal = 80{,}000\ (1 - e^{-.013} \times 32/.47^{.5}) = 36{,}392 \text{ lbs/day}$$

Oxygen required per lb BOD removed = 0.67 lbs

Total oxygen required = 36,392 x 0.67 = 24,382 lbs/day

Oxygen transfer efficiency = 2%

Percent Oxygen in air = 23% by weight

Density of 27 degrees C air = 0.0735 lbs/cf

Air flow required:

$$\frac{24{,}382 \text{ lbs } O_2/\text{day}}{2\% \times 23\% \times 0.0735 \text{ lbs } O_2/\text{cf Air}} = 50{,}000 \text{ cfm}$$

Provide 50% excess air capacity

Air capacity = 75,000 cfm/tower

Provide 2 blowers each tower

Blower capacity 37,500 cfm @ 1" WC

Neutralization - Biological Towers

Significant pH drop can occur on the biological towers requiring neutralization between stages.

Provide pH monitoring and control at recirculation wet well of second stage biological tower.

SPENT GRAIN PRESS LIQUOR STORAGE

Purpose = Provide waste source during production shutdown
Wastes Quantity = 3 days @ 15,000 lbs/day BOD
Concentration = 20,000 mg/l

$$\text{Storage Volume} = \frac{15{,}000 \text{ lbs/day} \times 3 \text{ days}}{20{,}000 \text{ mg/l} \times 8.34 \text{ lbs/gal}} = 270{,}000 \text{ gallons}$$

LAND AREA REQUIRED

Allow 50 feet from treatment units to property line
Minimum land requirement = 320 ft x 360 ft
Minimum Land Area = 2.6 acres
Maximum Building Height above Ground = 40 feet
Maximum Excavation below Ground = 20 feet

POWER REQUIREMENT

Connected Load = 800 KVA
Running Load = 600 KVA
Largest Motors = Four @ 125 HP

Appendix
TABLE 3
100,000 LBS/DAY SCENARIO 2
CONSTRUCTION COST BREAKDOWN

Raw Waste Pumping Station	
Site Work	$ 4,000
Structural	38,000
Mechanical	92,000
Force Main	105,000
	$239,000
Coarse Bar Screen	
Site Work	$ 1,700
Structural	5,700
Mechanical	1,600
	$ 9,000
Metering Flume	
Site Work	$ 1,700
Structural	5,500
Mechanical	1,800
	$ 9,000
Equalization Tank	
Site Work	$ 8,000
Structural	499,000
Equipment	48,000
Mechanical	31,000
Miscellaneous	25,000
	$611,000
Fine Screens	
Site Work	$ 1,000
Building	57,000
Equipment	86,000
Mechanical	26,000
Miscellaneous	10,000
	$179,000
Neutralization Tank	
Site Work	$ 1,000
Structural	25,000
Equipment	6,000
Mechanical	3,000
Miscellaneous	4,000
	$ 39,000
Biological Towers	
Site Work	$ 4,000
Structural - Concrete	982,000
Structural - Steel	18,000
Structural - Media Support	133,000
Media	1,674,000
Equipment	147,000
Mechanical	29,000
Miscellaneous	138,000
	$3,125,000

Construction Cost Breakdown - continued

Dome and Odor Control	
Structural	$252,000
Equipment	188,000
	$440,000
Control and Pumping Building	
Site Work	$ 8,000
Structure	210,000
Equipment	
Equalization Pumps	26,000
VFD	35,000
Recirculation Pumps	75,000
Mechanical	97,000
Miscellaneous	8,000
	$459,000
Chemical Storage	
Site Work	$ 1,000
Foundations	9,000
Steel Tanks, Two	28,000
FRP Tanks, Three	15,000
Mechanical	13,000
Miscellaneous	2,000
	$ 68,000
Spent Grain Liquor Storage Tank	
Tank FRP	$133,000
Foundation	15,000
Mechanical	18,000
	$166,000
Instrumentation and Control Systems	
Equipment	
Instrumentation Package	$ 34,000
Neutralization System	28,000
TOD	15,000
Samplers	10,000
Installation	43,000
	$130,000
Electrical	
Equipment	
Air Switch	$ 16,000
Transformer	24,000
MCC	40,000
Main Service	38,000
Motor Wiring	125,000
Building Electrical	25,000
Area Lighting and Miscellaneous	8,000
	$276,000

Site Work	
Grading	$ 12,000
Paving	26,000
Fencing	10,000
Landscaping	28,000
Walks	3,000
	$ 79,000
Yard Piping	
Process Piping	$140,000
Utilities	7,000
Drainage	8,000
	$155,000
Repiping Sanitary Sewage	
Sewers	$100,000
	$100,000

Appendix
TABLE 2
60,000 LBS/DAY SYSTEM
DESIGN CONDITIONS

DESIGN WASTEWATER LOAD
- Hydraulic Flow
  - Normal Daily Flow at Full Production
  - Maximum Daily Flow = 4.7 MGD
  - Peak Flow Rate = 5.9 MGD
- Biochemical Oxygen Demand
  - Mean BOD = 60,000 lbs/day
  - Standard Deviation/Mean (Jan - April 1977) = 0.34
  - Normal Maximum BOD = 60,000 ÷ 1.34 = 80,400 lbs/day
- Suspended Solids
  - Design Suspended Solids = 15,000 lbs/day

DESIGN EFFLUENT LIMITATIONS
- Hydraulic Flow
  - Limitation = no limit
- Biochemical Oxygen Demand
  - 30 Day Average Limitation = 30,000 lbs/day
- Suspended Solids
  - Limitation = no limit
- Nitrogen
  - Limitation = no limit
- Phosphorus
  - Limitation = no limit

RAW WASTE PUMPING STATION
- Peak Flow Rate = 5.9 MGD = 4,100 gpm
- Provide Three Pumps including One Standby
- Pump Capacity = 2,050 gpm each
- Pump Head Estimated at 40 feet TDH
- Pump Power = 30 HP

COARSE BAR SCREENS
- One Unit
- Manually Cleaned
- Bar Spacing = 2 inch clear opening
- Design Velocity at Average Flow = 2.0 fps
- Design Velocity at Peak Flow = 3.0 fps
- Inclined Angle from Horizontal = 30 degrees

METERING FLUME
- Metering Range
  - Minimum Flow = 400 gpm
  - Maximum Flow = 4,000 gpm

EQUALIZATION TANK

Equalization of Hydraulic and Waste Loads
Variable Storage Required = 100,000 gallons to eliminate flow peaks
Total Storage Capacity = Provide maximum without risk of septicity
Allowable Storage Time = 6 hours maximum without septicity
Total Storage Volume = 3.9 MGD x 6 hours = 975,000 gallons
Number Equalization Tanks = Two Units
Volume Each Tank = 487,500 gallons
Tank Size = 60 feet diameter x 23 feet SWD
Mixer = low speed top entry turbine
Mixer Pumping Rate = 3.9 MGD x 20 = 54,000 gpm minimum
Mixer Power = 15 HP
Minimum Water Depth for Mixer Operation
    Center Tank = 5.5 feet
    Side Wall = 0
Detention at Minimum Level with Normal Flow = 0.5 hours with two tanks
Detention at Maximum Level with Normal Flow = 6 hours with two tanks
Effluent Pumps = Two variable speed units
Pump Capacity = 4.7 MGD = 3,300 gpm each

FINE SCREENS

Equalized Flow = 3,300 gpm maximum
Type = Stationary Wedge Wire
Opening = 0.020 inches
Material = 316 SST
Length Screen Required = 3,300 gpm ÷ 100 gpm/ft = 33 ft
Provide 4 back to back 72 inch screens
Screen Length with one unit down = 36 feet
Provide Conveyors for Screenings
Discharge Screenings into Dumpsters
Haul Screenings to Sanitary Landfill
Screenings Quantity varies with brewery operation
Estimated Screenings
    Minimum day = 1 cubic yard
    Maximum day = 10 cubic yards (spent grain spill)
BOD Removal = none

NEUTRALIZATION TANK

Retention = 5 minutes at Average Flow
Volume = 2,700 gpm x 5 min = 13,000 gals
Mixer = low speed top entry turbine
Mixer Pumping Rate = 2,700 gpm x 10 = 27,000 gpm
Mixer Power = 2 HP
Provide Acid and Caustic Feed Capability
Provide 5,000 gals Storage for 95% H_2SO_4
Provide 5,000 gals Storage for 50% NaOH

NUTRIENT ADDITION

Nitrogen

Base Nitrogen Required on N/BOD removed ratio = 1/25
BOD Removed = 60,000 lbs/day - 30,000 lbs/day = 30,000 lbs/day
Nitrogen Required = 30,000 lbs/day x 1/25 = 1,200 lbs/day
Estimated Raw Waste Nitrogen = 400 lbs/day
Nitrogen Feed Required = 800 lbs/day
Provide Two Anhydrous Ammonia Storage Tanks
(one tank on line and one reserve)
Provide One 1,600 lbs/day Evaporator
Provide One 1,600 lbs/day Feeder
Feed Proportional to Monitored TOD Load

Phosphoric Acid

Base Phosphorus Required on P/BOD removed ratio = 1/125
Phosphorus Required = 30,000 lbs/day x 1/125 = 240 lbs/day
Estimated Raw Waste Phosphorus = 100 lbs/day
Feed Required = 140 lbs/day
Use H_3PO_4 @ 75%

$$\text{Feed Rate} = \frac{140}{32\% \times 75\% \times 8.34 \times 1.58} = 44 \text{ gpd}$$

Provide Storage for Tank Truck Load plus 50%
Provide 5,000 gals Storage
Feed Proportional to Monitored TOD Load

BIOLOGICAL TOWER

Design BOD_5 Loading = 60,000 lbs/day Total and 50,000 lbs/day Soluble
Soluble BOD Removal Required = (50,000 - 15,000)/50,000 = 70%
Base Design on Following Formula:

$$Le/Li = e^{-KD/q^n}$$

Where Li - Influent BOD_5
Le = Settled Effluent BOD_5
K = Treatability Constant
D = Media Depth
q = Hydraulic Loading per Unit Area
n = Media Constant

n = 0.5 for BF Goodrich Vinyl Core Media

Actual operation of a biological tower system pretreating brewing waste at one brewery, a pilot tower operated at another brewery, and a series of pilot laboratory studies on brewing waste indicate that two stage filter performance predicted with a K_{20} value of 0.01 is achievable with reasonable reliability for influent BOD concentrations averaging 2,000 to 2,500 mg/l and removals of 40 to 60 percent based on settled effluent BOD.

Suspended solids generated on the biological towers are estimated at 50% of soluble BOD removed. The BOD_5 of suspended solids biomass generated on the biological tower systems are estimated to be 20% of BOD_5 removed.

K is temperature dependent and varies as follows:

$$K_T = K_{20}(1.035)^{T-20}$$

Estimated temperature extremes in the biological towers
- Summer, All Stages = 27 degrees C
- Winter, First Stage = 20 degrees C
  - Second Stage = 13 degrees C
  - Third Stage = 8 degrees C

Temperature corrected K values:

Summer $K = .01(1.035)^{27-20} = 0.013$

Winter K will change with each filter stage as heat loss reduces temp.
- 1st Stage K = .010
- 2nd Stage $K = .01(1.035)^{13-20} = 0.0079$
- 3rd Stage $K = .01(1.035)^{8-20} = 0.0066$

Height is limited by structural capacity of media
- Maximum practical height = 32 feet

Provide three stage biological system
- Make each stage same size for interchangeability
- Assume K remains constant for each stage*
- Fraction BOD remaining after each stage = $(1 - 0.70)^{1/3} = 0.67$

First Stage Design
- Rearrange equation to calculate q and use average winter K to calculate media required.

$$K_{avg} = (.010 + .0079 + .0066)/3 = .0082$$

$$q = [-KD/\ln(Le/Li)]^{1/n}$$

$$q = (-.0082 \times 32/\ln .67)^2$$

$$q = 0.43 \text{ gpm/ft}^2$$

Area = Q/q = 3.9 MGD/.43 gpm/sf = 6,298 ft^2

Diameter = $(6{,}298 \times 4/\pi)^{.5}$ = 90 feet

Media Volume = 90' Ø x 32 ft = 200,000 ft^3 each filter

Volume Loading

First Stage = 60,000 lbs Total BOD/200,000 ft^3 = 300 lbs Total BOD/1000 cf

Overall = 300 ÷ 3 stages = 100 Total BOD/1000 cf

* K-rate was derived from 2 stage system performance with 40 to 60% removal. For this report, the K-rate is assumed to remain valid for 3-stage system at 70% removal. This assumption should be verified by pilot testing before proceeding with the project.

Performance Each Stage - Winter Condition

First Stage Performance

$$Le/Li = e^{-.01} \times 32/.43^{.5} = 0.614$$

Second Stage Performance

$$Le/Li = e^{-.0079} \times 32/.43^{.5} = .680$$

Third Stage Performance

$$Le/Li = e^{-.0066} \times 32/.43^{.5} = .725$$

Overall Performance

BOD Removed based on settled effluent sample

$Le/Li = (Le/Li)_{1st\ stage} \times (Le/Li)_{2nd\ stage} \times (Le/Li)_{3rd\ stage}$

$Le/Li = 0.614 \times 0.680 \times .725 = 0.303$ fraction remaining

Fraction Removed = 1.0 - .303 = .697

Soluble BOD Removed = 50,000 x .697 = 34,850 lbs/day

Suspended BOD Removed = 10,000 x est 21% = 2,100 lbs/day

BOD removed based on whole effluent sample

BOD Removed = 34,850 - 20% +2,100 = 29,980 lbs/day

Recirculation

Raw Waste Hydraulic Loading:

Maximum day flow = 0.52 gpm/sf

Average day flow = 0.43 gpm/sf

Min. hydraulic Loading Required to provide adequate wetting = .75 gpm/sf

Desirable hydraulic loading to provide hydraulic sluffing of biomass under projected organic loading = 1.5 gpm/sf

Provide 2 recirculation pumps each stage for constant flow over filter

capacity = 90 ft dia x .75 gpm/sf = 4,770 gpm

Head = $\pm$ 50 ft TDH

Ventilation

Max. air required when summer temperatures increase reaction rates

Assumed maximum tower temperature = 27 degrees F

First Stage BOD removal at 27 degrees F

$$\text{Removal} = 50{,}000\ (1 - e^{-.013} \times 32/.43^{.5}) = 23{,}487 \text{ lbs/day}$$

Oxygen required per lb BOD removed = 0.67 lbs

Total oxygen required = 23,487 x 0.67 = 15,736 lbs/day

Oxygen transfer efficiency = 2%

Percent Oxygen in air = 23% by weight

Density of 27 degrees C air = 0.0735 lbs/cf

Air flow required:

$$\frac{15{,}736 \text{ lbs } O_2/\text{day}}{2\% \times 23\% \times 0.0735 \text{ lbs } O_2/\text{cf Air}} = 32{,}300 \text{ cfm}$$

Provide 50% excess air capacity

Air capacity = 48,000 cfm/tower

Provide 2 blowers each tower

Blower capacity 24,000 cfm @ 1" WC

Neutralization - Biological Towers

Significant pH drop can occur on the biological towers requiring neutralization between stages.

Provide pH monitoring and control at recirculation wet well of second stage biological tower.

SPENT GRAIN PRESS LIQUOR STORAGE

Purpose = Provide waste source during production shutdown
Wastes Quantity = 3 days @ 9,000 lbs/day BOD
Concentration = 20,000 mg/l

$$\text{Storage Volume} = \frac{9{,}000 \text{ lbs/day} \times 3 \text{ days}}{20{,}000 \text{ mg/l} \times 8.34 \text{ lbs/gal}} = 160{,}000 \text{ gallons}$$

LAND AREA REQUIRED

Allow 50 feet from treatment units to property line
Minimum land requirement = 300 ft x 425 ft
Minimum Land Area = 2.2 acres
Maximum Building Height above Ground = 40 feet
Maximum Excavation below Ground = 20 feet

POWER REQUIREMENT

Connected Load = 600 KVA
Running Load = 450 KVA
Largest Motors = 75 HP

Appendix
TABLE 4
60,000 LBS/DAY SCENARIO 2
CONSTRUCTION COST BREAKDOWN

Raw Waste Pumping Station	
Site Work	$ 4,000
Structural	35,000
Mechanical	70,000
Force Main	105,000
	$214,000
Coarse Bar Screen	
Site Work	$ 1,700
Structural	4,900
Mechanical	1,400
	$ 8,000
Metering Flume	
Site Work	$ 1,700
Structural	5,500
Mechanical	1,800
	$ 9,000
Equalization Tank	
Site Work	$ 8,000
Structural	299,000
Equipment	29,000
Mechanical	19,000
Miscellaneous	17,000
	$372,000
Fine Screens	
Site Work	$ 1,000
Building	51,000
Equipment	69,000
Mechanical	21,000
Miscellaneous	10,000
	$152,000
Neutralization Tank	
Site Work	$ 1,000
Structural	21,000
Equipment	6,000
Mechanical	3,000
Miscellaneous	4,000
	$ 35,000
Biological Towers	
Site Work	$ 6,000
Structural - Concrete	979,000
Structural - Steel	18,000
Structural - Media Support	133,000
Media	1,666,000
Equipment	155,000
Mechanical	43,000
Miscellaneous	118,000
	$3,118,000

Construction Cost Breakdown - continued

Dome and Odor Control	
Structural	$231,000
Equipment	175,000
	$406,000
Control and Pumping Building	
Site Work	$ 8,000
Structure	225,000
Equipment	
Equalization Pumps	19,000
VFD	28,000
Recirculation Pumps	95,000
Mechanical	120,000
Miscellaneous	8,000
	$503,000
Chemical Storage	
Site Work	$ 1,000
Foundations	9,000
Steel Tanks, Two	28,000
FRP Tanks, Three	15,000
Mechanical	13,000
Miscellaneous	2,000
	$ 68,000
Spent Grain Liquor Storage Tank	
Tank FRP	$106,000
Foundation	12,000
Mechanical	18,000
	$136,000
Instrumentation and Control Systems	
Equipment	
Instrumentation Package	$ 34,000
Neutralization System	28,000
TOD	15,000
Samplers	10,000
Installation	43,000
	$130,000
Electrical	
Equipment	
Air Switch	$ 12,000
Transformer	18,000
MCC	34,000
Main Service	36,000
Motor Wiring	101,000
Building Electrical	25,000
Area Lighting and Miscellaneous	8,000
	$234,000

Construction Cost Breakdown - continued

Site Work	
Grading	$ 12,000
Paving	26,000
Fencing	11,000
Landscaping	28,000
Walks	3,000
	$ 80,000
Yard Piping	
Process Piping	$135,000
Utilities	7,000
Drainage	8,000
	$150,000
Repiping Sanitary Sewage	
Sewers	$100,000
	$100,000

60,000 LBS/DAY SCENARIO 2
ESTIMATED CONSTRUCTION COST
(Based on June 1977 Construction Cost)

Item	Cost
Raw Waste Pumping Station	$214,000
Coarse Bar Screen	$ 8,000
Metering Flume	9,000
Equalization Tank	372,000
Fine Screens	152,000
Neutralization Tank	35,000
Biological Towers	3,118,000
Dome and Odor Control	406,000
Control & Pumping Building	503,000
Chemical Storage Tanks	68,000
Spent Grain Liquor Storage Tank	136,000
Instrumentation & Control Systems	130,000
Electrical	234,000
Site Work	80,000
Yard Piping	150,000
Repiping Sanitary Sewers	100,000
Subtotal	$5,715,000
Construction Contingencies @ 10%	572,000
Estimated Fixed Price Construction Contract	6,287,000
Engineering & Administration @ 10%	629,000
Estimated Total Construction Cost	$ 6,916,000

(Estimated total construction cost does not include land cost or project contingencies and is based on unit sizes identified in the design concept)

100,000 LBS/DAY SCENARIO 2
ESTIMATED CONSTRUCTION COST
(Based on June 1977 Construction Cost)

Item	Cost
Raw Waste Pumping Station	$239,000
Coarse Bar Screen	$ 9,000
Metering Flume	9,000
Equalization Tank	611,000
Fine Screens	179,000
Neutralization Tank	39,000
Biological Towers	3,125,000
Dome and Odor Control	440,000
Control & Pumping Building	459,000
Chemical Storage Tanks	68,000
Spent Grain Liquor Storage Tank	166,000
Instrumentation & Control Systems	130,000
Electrical	276,000
Site Work	79,000
Yard Piping	155,000
Repiping Sanitary Sewers	100,000
Subtotal	$6,084,000
Construction Contingencies @ 10%	608,000
Estimated Fixed Price Construction Contract	6,692,000
Engineering & Administration @ 10%	669,000
Estimated Total Construction Cost	$ 7,361,000

(Estimated total construction cost does not include land cost or project contingencies and is based on unit sizes identified in the design concept)

Operating and Maintenance Cost

	100,000 lbs/day	60,000 lbs day
Labor 3.6 people @ 25,000	$ 90,000	$ 90,000
Chemicals and supplies	45,000	35,000
Power @ 3¢/KVA	158,000	118,000
Maintenance	93,000	86,000
	$ 386,000	$ 329,000

Anheuser-Busch, Inc.

ST. LOUIS, MO., U.S.A. 63118

May 15, 1978

Mr. Dale Luecht
Water Division
US EPA
Region V
230 S. Dearborn
Chicago, Ill. 60604

Dear Mr. Luecht:

Mr. George Walkenshaw of the City of Columbus has informed me that you and Mr. Sutfin of your office are interested in obtaining information on the potential hazards of discharging active biomass into a sanitary sewer system as discussed in our written comments to your office in reference to the Columbus Draft EIS. Although our written comments did not specify an exact case history relating to such a hazard, we were describing an incident that happened on July 14, 1973 in Allentown, Pa. This incident involved the death of two individuals who were apparently overcome by methane gas in an interceptor station while they were obtaining wastewater samples. Information regarding this incident is difficult to obtain but we have found an account of the incident as printed in a local newspaper. A copy of these articles are attached for your review.

A brewery wastewater pretreatment plant was discharging an active biomass into the sewer system upstream from the point where the individuals were killed. This pretreatment plant was very similar to the system that the Columbus Draft EIS recommended for installation by Anheuser-Busch to pretreat the wastewater from our Columbus Brewery.

Keep America Beautiful
Pitch In!

Because of the potential hazards of the pretreatment system recommended in the Columbus EIS, we believe the EPA should carefully reconsider the environmental impact of this recommendation. We are available to discuss this aspect of the Columbus EIS or any other aspect of the EIS with you at your convenience.

Very truly yours,

ANHEUSER-BUSCH, INC.

C E Briscoe Jr.

C. E. Briscoe, Jr.
Environmental Engineer

CEB: de

cc: Mr. Charles Sutfin
Planning Division
US EPA - Region V
230 S. Dearborn
Chicago, Illinois 60604

Mr. George Walkenshaw
City of Columbus
Division of Sewerage & Drainage
90 West Broad Street
Room 406 - City Hall
Columbus, Ohio 43215

CALL JUL 15 1973

At Interceptor Plant In Allentown System

By STAN SCHAFFER

DEATHS

Two youths died when they were apparently overcome by sewage fumes and a third person was seriously injured in a rescue attempt at a sewer interceptor station yesterday morning along the Little Lehigh Creek in southwest Allentown.

The dead were identified as Wayne A. Nagle, 17, a son of Mr. and Mrs. Robert A. Nagle of New Tripoli R.1, and Thomas R. English, 20, a son of Mr. and Mrs. Richard B. English of Coplay R.1.

John S. Nevins Jr., 35, of Allentown R.2, a city water department employe, was injured and apparently overcome by the gas when he attempted to rescue the two youths. The Nevins residence is about 100 yards east of the station.

Nevins was admitted to the intensive care unit at Allentown Hospital, where his condition was reported critical.

Fireman Admitted

An Allentown fireman, Michael Grim, 26, was also admitted to Allentown Hospital. He was reported in good condition. He reportedly became fatigued and exhausted while trying to rescue Nevins.

Charles Alley, 19, of 235 N. 8th St., Allentown, discovered the bodies at the bottom of a pit in the station when he reported there for work at 8 a.m. Alley ran to the Nevins residence for help.

The dead men as well as Alley were employed by the Kelly Labor Division, 201 N. 7th St., Allentown, for the Lehigh County Authority (LCA). John F. Bliss of 1050 W. Juniata St., Allentown, Kelly manager, was called to the scene to identify the workers.

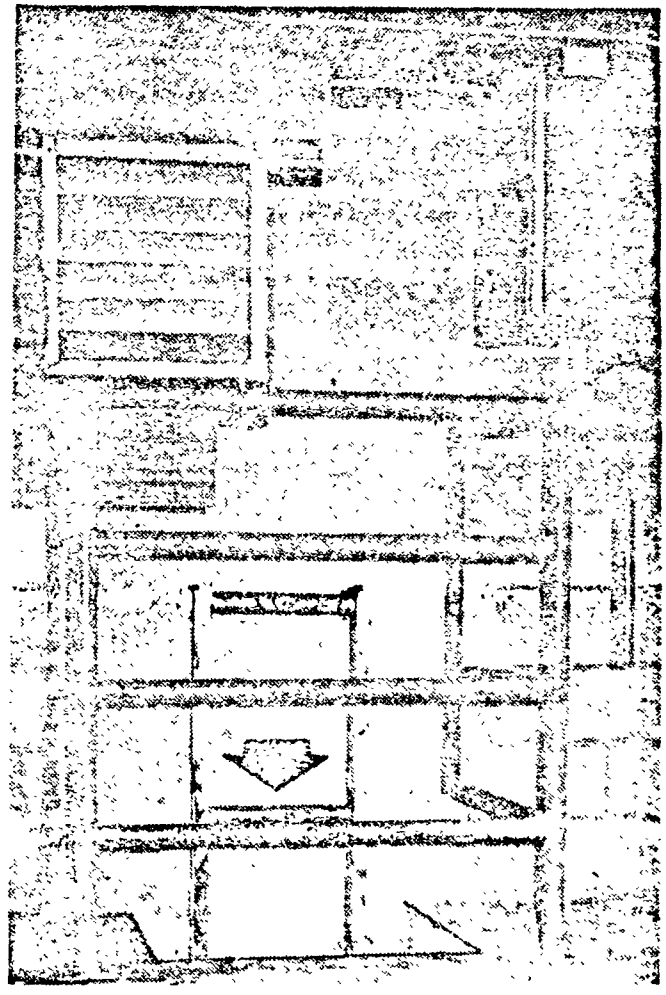
Conducting the investigation for Allentown police are Lt. Burkhardt Zorn and Detective Sgt. Ronald L. Neimeyer.

Neimeyer said the men were pronounced dead at the scene at approximately 8:30 a.m. by Dr. B.F. Kotanchick of Emmaus R.1.

Autopsy Performed

Lehigh County Coroner Robert C. Weir, who made a preliminary examination of the bodies at the scene, ordered an autopsy. Weir later reported that both men died of asphyxiation. The bodies were taken to Allentown Hospital.

Chester S. Dutton of Macungie R.2, chairman of the LCA, said at the scene he had "no statement to make at the present time. We're presently trying to assemble the facts."



SUMP ENTRANCE — A sign at the entrace to the sump pit cautions workers not to climb down the ladder unless the blower has been operating. A heavy odor of sewer gas was noticeable in the immediate area.

portable cooler.

The station is located in the northeast quadrant where Keystone Avenue crosses over the creek at Keck's Bridge. The interceptor station handles the sewage that comes from the western portion of the county into Allentown, police said.

Neimeyer and Zorn theorized, from the position of the bodies, that English was overcome when he went to assist Nagle. English was working the midnight to 8 a.m. shift, while Nagle was on the 4-12 shift.

Lying Face Down

Nagle's body was lying face down in the sewage. English was believed to have been in a crouched position near the base of a steel ladder that descends into the pit estimated to be approximately 14 feet deep.

Police said it was Alley's second day on the job and he subsequently went into shock.

After discovering the bodies, police said, Alley ran to the Nevins residence (the old Fink farm), about 100 yards east of the station. There he awakened Nevins and his family. Nevins called Emmaus police. Then he went to the brick pumping and metering station with Alley. Police received the call at 8:14 a.m.

It was noted that the sewage gas is made up of methane. The gas is created from the decaying material and is colorless, odorless and flammable.

Alley told police Nevins went into the pit, grabbed an arm of one of the victims, fell and cut his head before being overcome.

Called Office

Neimeyer said English's father became concerned when his son didn't come home from work and called the Kelly office. The Nagle youth had told his parents he was going to be staying with a friend, police said.

A key to the station door was found jammed in the lock, but police tried the lock and said it worked from both sides. Police said the key had been jammed in the door from the day before.

Firemen from Allentown and Emmaus responded to the emergency call.

Grim, who has been with the city fire department for about a year, was wearing an air pack when he entered the pit. His alarm bell, signaling that only a few minutes of air remained in the tank, went off while he was attempting to get Nevins out.

cont'd.

Inhaled Gas

By the time he got out of the building, he had inhaled some of the sewer gas and was fatigued and exhausted, said Mel Keyser, Allentown fire department shift deputy.

Assisting in the rescue with Grim were District Deputy Chief Dale Werkheiser of the Allentown Fire Department and Emmaus Fire Chief Robert R. Reiss.

Helping to pull the bodies out with a rope, one at a time, were Keyser and Allentown Fireman Harold Newhard.

Reiss, who was the first on the scene with an air pack, said he couldn't get Nevins up by himself because of his size. He described him as being a big man, weighing about 250 pounds.

"He was unconscious. I couldn't do it alone," Reiss said.

Others Assist

He was then assisted by Grim. Both firemen then went into the pit to get Nevins out. They were aided by Assistant Emmaus Fire Chief John Shafer, assistant foreman Terry Oswald and firemen Gary Fritch and Kenneth Kemmer.

Firemen had difficulty pulling Nevins through the top of the hole, located at floor level in the building, because it's only about 2½ feet square.

Keyser said that Nevins was unconscious when they brought him out. "Another minute or two and he would have been dead," Keyser said. He said the injured man was mumbling something before he became unconscious. Firemen put a resuscitator on Nevins before they got him out, Keyser said.

There is a sign posted at the entrance to the pit which states: "Never enter the sump pit unless the blower has been operating for at least five minutes." It is believed that the blower was in operation at the time of the accident.

Thomas English

Born in Allentown, English was a graduate of Parkland High School and attended Moravian College for two years.

He had been employed as an Apple Hill ski lift operator and in the Cedar Brook Nursing Home.

He was a member of Faith United Church of Christ, Allentown.

Surviving besides his parents are a brother James at home, two sisters, Elizabeth, wife of Jeffery J. Hewit of Chester, N.J., and Alice, wife of Barry Kisner of Royersford, Montgomery County, and his maternal grandmother, Mrs. Alerta Remaley of Allentown.

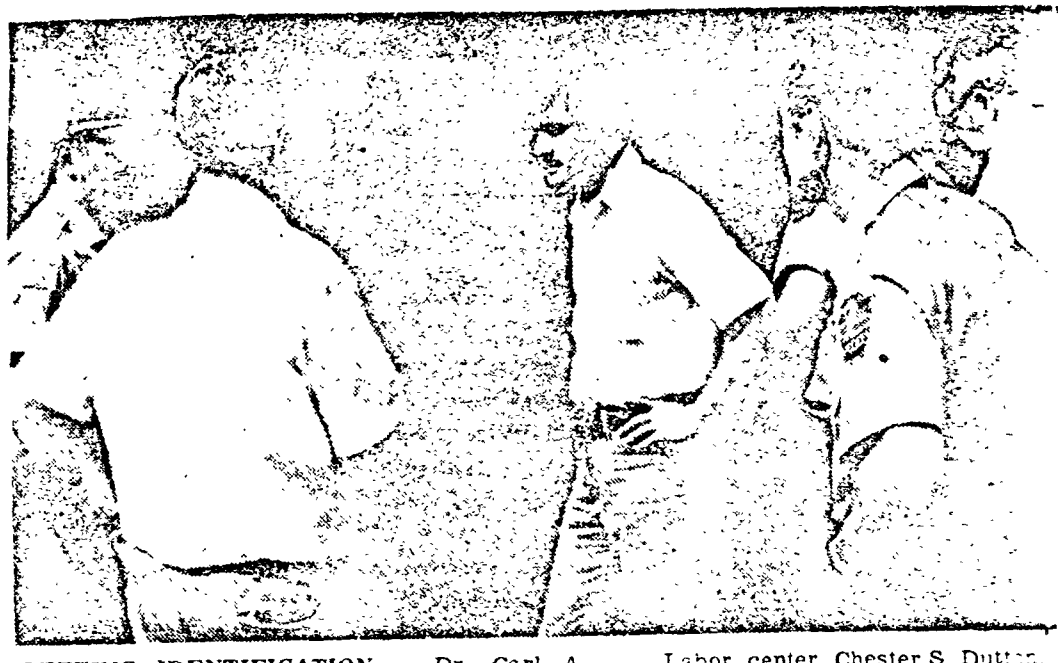
Wayne Nagle

Nagle was a son of Robert A. and Gloria M. (Yeager) Nagle. His father is director of the Lehigh County Area Vocational-Technical School.

The youth was born in Allentown and was a 1973 graduate of Freedom High School. He was a member of First Presbyterian Church, Bethlehem.

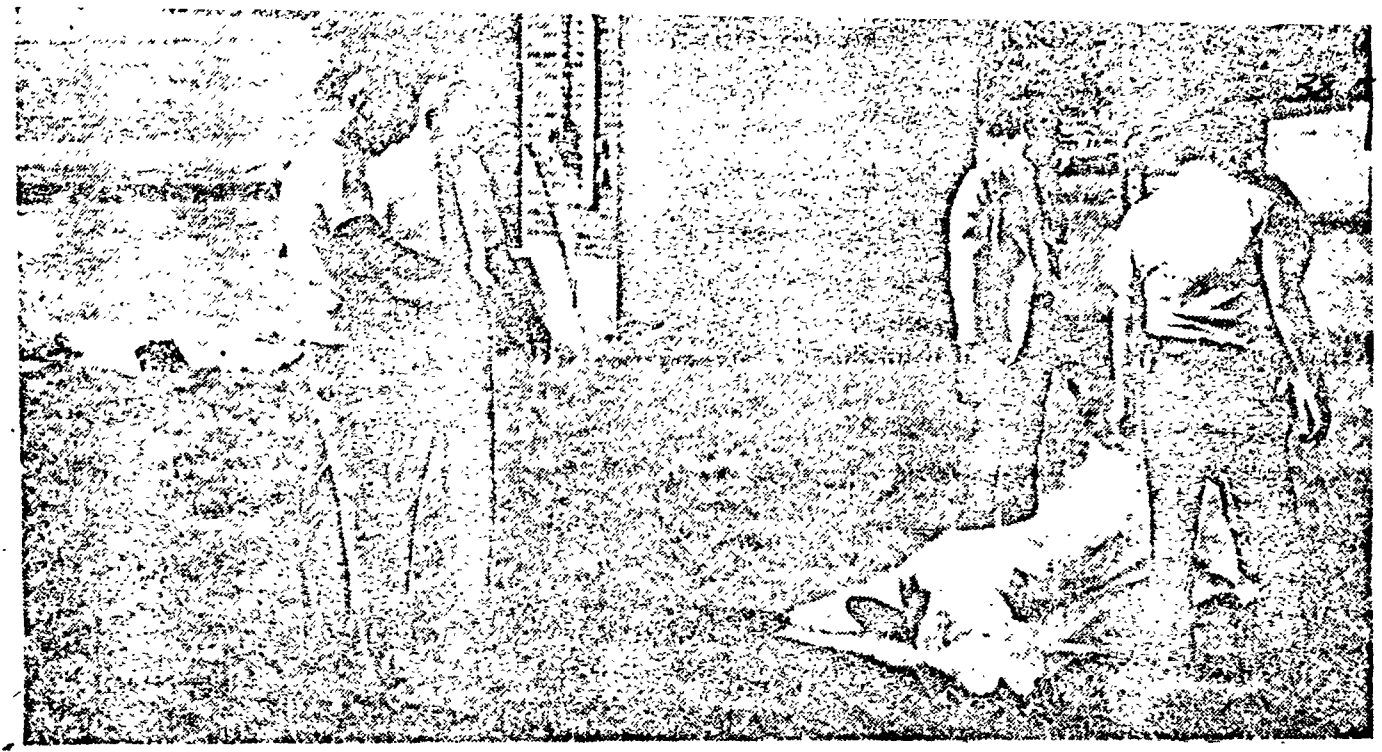
Surviving in addition to his parents are three brothers, Keith, Scott and Mark, all at home; his paternal grandparents, Mr. and Mrs. Charles Nagle, and his maternal grandparents, Mr. and Mrs. Wilbur Yeager Sr., all of Allentown.

A memorial service will be held in First Presbyterian Church, Bethlehem, at the convenience of the family. There will be no calling hours. The J. S. Burkholder Funeral Home is in charge of arrangements.



GETTING IDENTIFICATION — Dr. Carl A. Warmkessel, executive director of the authority, back to camera, talks with John Bliss of Kelly Labor, center. Chester S. Dutton, man, is on the far right. Standi town police on the right is Coron

continued



FATAL ACCIDENT — Lehigh County Coroner Robert C. Weir (second from left) checks scene of accident fatal to two workers at sewage interceptor plant in Southwest Allentown yesterday. Allentown Detective Ronald Niemeyer (with clipboard) assisted in the investigation. Body of one victim is in foreground, the other in back near the plant.

Effluent at Death Scene May Have Exceeded Limits

CALL JAN 16 1973

Testing was under way at the sewage station in Southwest Allentown when two youths were found dead Saturday to determine whether the effluent content met requirements, it was reported last night.

The victims, Wayne A. Nagle, 17, of New Tripoli R.1 and Thomas R. English, 20, of Coplay R.1, were participating in the sampling on behalf of the Lehigh County Authority (LCA).

The metering station, near where Keystone Avenue crosses the Little Lehigh River at Keck's Bridge, measures the amount of sewage entering the Allentown system from Western Lehigh County.

"There is an agreement between the authority and the City of Allentown that the quality of the effluent be within limits," said Paul F. Kunkle, administrative assistant of A.L. Wiesenberger Associates, Allentown. Wiesenberger is the consulting engineer for the authority.

"There's a possibility the limits might be exceeded, and that's why there was testing," he said.

The extracting of specimens from a pit in the sewage station began Thursday, according to Kunkle.

Nagle and English were employed by Kelly Labor of Allentown. The LCA had hired the youths.

A third Kelly Labor youth, Charles Alley, 19, of 235 N. 8th St., Allentown, discovered the bodies of his two associates when he arrived for work at the interceptor station about 8 a.m. Saturday.

Alley ran to the nearby home of John S. Nevins Jr., 35, Allentown R.2, for assistance.

Nevin, who descended into the pit in a rescue attempt, also was overcome. He was in critical condition last night in Allentown Hospital.

Robert Jordan, LCA solicitor, said "LCA's own men were checking for a couple of days" before the three took over.

He said he believes English, who worked a midnight-8 a.m. shift, began the rotation of Kelly Labor personnel Friday morning.

Alley's shift was 8 a.m.-4 p.m. and Nagle's 4 p.m.-midnight.

They were to climb down to the pit every half-hour to remove a specified quantity of sewage and to deposit it in a cooled container.

Both Jordan and Kunkel said they believe Nagle apparently was overcome about midnight Friday.

Their theory is based on the volume of samples taken and on a graph recording the amount of sewage flow through the interceptor.

Kunkel said the graph, on the main floor of the station, showed a drastic fluctuation about midnight. A float tank in the pit area, which is wired to the graph, may have been bumped about this time, he said.

English, who arrived at work at midnight Friday, was overcome when he went to Nagle's assistance, police said.

Cont'd

Jordan said he knew of no regulations that would have required that the youths wear protective masks or clothing when they went into the pit.

But he said that he "insisted" yesterday that men venturing into the pit wear air packs. And another worker equipped with a safety line will remain on the main floor of the station when another employe is below, Jordan said.

The sampling of the effluent resumed yesterday, he said, from a surface manhole near the station.

The precise circumstances leading to the youth's deaths remained unknown yesterday.

Coroner Rules In Woman's Death

CALL JUL 25 1973

The death of an Upper Black Eddy woman was ruled a suicide yesterday by Dr. Stanley Goodwin, Bucks County coroner.

Dr. Goodwin made the ruling after an autopsy was performed yesterday morning on Mary E. Sollner, 20.

Miss Sillner was discovered hanging in the attic of her River Road residence about 5 p.m. Monday.

Child's Body Is Found In Monroe

CALL JUL 25 1973

The badly decomposed body of a child believed to be 2-4 years old was found last night in a secluded area along Cherry Lane in Analomink, Stroud Township.

Coroner Daniel G. Warner of Monroe County said the body had been in the heavy brush for an unknown period of time.

He said it will be not known until an autopsy is performed today what may have caused the child's death.

MISC

Warner said the body was found by a man who was looking over his property line along Cherry Lane about 7:30 p.m.

Stroud Township police and state police at Stroudsburg are investigating.

July 14 Accident

Diving Injuries Are Fatal To Catasauqua Youth, 17

Death: misc.

CALL JUL 24 1973

DOUGLAS A. HODERMAN

Douglas A. Hoderman, 17, of 848 Bethlehem Road, Catasauqua, died Monday in Allentown Hospital of injuries received July 14 in a diving accident at a private lake near Blue Heron, Pike County.

Lehigh County Coroner Robert C. Weir attributed death to severe spinal and head injuries. The youth was pulled from Little Mud Pond after apparently striking his head on a submerged log or rock.

Hoderman was a student at the Catasauqua Area Senior High School, where he would have entered his junior year in the fall.

Born in Allentown, he was a son of Andrew and Jean P. (DeWalt) Hoderman.

He was a member of Christ UCC, Shoenersville.

Surviving besides his parents are a sister Jacqueline D., at home, and the paternal grandparents, Mr. and Mrs. John Hoderman of Allentown.

Services will be at 1:30 p.m. Thursday in the Thomas A. Burkholder Funeral Home, 3rd and Walnut streets, Catasauqua. Calling hours will be 7-8:30 p.m. Wednesday.

Agencies Push Probe Into Deaths of Pair

CALL JUL 25 1973

misc.

Investigations are continuing into the cause of the deaths of two young men at a Lehigh County Authority sewage station in Southwest Allentown July 14.

Dr. Carl Warmkessel, authority executive director, said it may take two weeks until the cause is known.

He said the authority is awaiting an analysis of the sewage as well as a final autopsy report.

Wayne A. Nagle, 17, of New Tripoli R.1, and Thomas R. English, 20, of Coplay R.1, were killed in the sewage station — apparently by sewer fumes.

Tests of the sewage are under way to determine whether the effluent content was excessibe or met requirements.

The two young men were engaged in taking samples to determine the amount of sewage entering the Allentown system from Western Lehigh County. They were employed by Kelly Services of Allentown in behalf of the authority.

John S. Nevins Jr., 35, of Allentown R.2, who attempted to rescue the two at the station, was listed in serious condition in Allentown Hospital last night. A city water department employe, Nevins was overcome by fumes in the rescue attempt.

Warmkessel said Nagle and English did not wear protective masks when they entered the pit at the metering station.

"It had always been standard practice not to," he added. "We often sampled under the same conditions, the same way."

Warmkessel pointed out that after the incident "we put in very stringent safety rules so that it will never happen again."

He said the sampling program ceased last Wednesday. He noted that it was a temporary project conducted as part of a study of a consulting engineering firm to remedy problems at the authority's pretreatment plant near Trexlertown. The firm is Malcolm Pirnie Inc. of White Plains.

Warmkessel also said he expects it will take two more weeks until the authority gets the reports on the analysis of the sewage at the metering station and the final autopsy.

When the reports are made, he explained, the authority will issue a statement "as to what the cause of death was."

He added that the authority is "extremely upset" by the whole matter.

Warmkessel said the U.S. Fidelity & Guaranty Insurance Co. is investigating the deaths in behalf of the authority; representatives of the State Bureau of Occupational and Industrial Safety, in behalf of the Kelly service, and the state attorney general's office also had an investigator checking the samples.

No reports have been made by any of the investigators, Warmkessel declared.

Palmer Township supervisors yesterday adopted a resolution setting safety standards for township employes working in sewer manholes and authorized spending up to $500 for a device to measure oxygen and other gases in sewer lines. The supervisors did not say what prompted their actions.

Joseph Plans No Charges In 2 Sewer-Station Deaths

CALL NOV 13 1973

Lehigh County Dist. Atty. George J. Joseph said yesterday no criminal charges will be filed by his office against anyone in the July 14 deaths of two young men doing sewage testing work for the Lehigh County Authority (LCA).

The incident also resulted in serious injury to John S. Nevins, a City of Allentown employe who lives near the scene of a sewage-metering station along the Little Lehigh Creek near Keck's Bridge in Salisbury Township where the tragedy happened. Nevins tried to rescue Wayne A. Nagle, 17, of New Tripoli R. 1 and Thomas R. English, 20, of Coplay R. 1, the two workers who died.

Joseph stated that after an independent investigation by his office, which included a review of findings by Allentown police, that the evidence does not support the filing of charges, such as manslaughter, against anyone.

"There is no basis in the facts as we know them for allegations of criminal negligence," the district attorney said.

He said he has so informed the State Department of Environmental Resources by letter to Atty. William M. Eichbaum, DER general counsel and deputy secretary.

DER charged the county authority with violating four safety regulations in its investigation of the double fatality.

The complaints were filed in late August before Justice of the Peace William H. Burdette of Salisbury Township by Frank C. Sentz Jr., industrial hygienist working out of DER's Reading office.

Each of the counts carries a maximum fine of $50. Violating a DER rule is a summary offense. All of the charges involve Chapter 201 of DER's rules and regulations covering occupational health and safety.

A DER spokesman said those regulations specify precautions that must be taken whenever workmen enter confined spaces such as the sump of the county's sewage-metering station.

Nagle and English were employes of Kelly Labor Division of Allentown, a temporary manpower supplier, which had assigned the young men to LCA to collect data for one of the authority's technical studies related to recent sewerage problems.

The two victims were apparently overcome by fumes in the sump area of the metering station.

The results of detailed toxicological tests to determine the medical cause in the death of Nagle and English have not been officially announced to date by Lehigh County Coroner Robert Weir.

Mrs. Weir said last night the completed autopsy reports arrived within the past few days but her husband has not had a chance to examine them and will not be available for comment until later today.

Burdette said yesterday he is still awaiting word from DER for a new hearing date since those scheduled earlier were continued at the state's request.

State offices were closed yesterday because of the Armistice Day or Veteran's Day holiday.

But Atty. Robert H. Jordan of Allentown, solicitor to the county authority, has filed a petition to quash the complaints of safety violations by DER. The petition was filed in Lehigh County Court and was scheduled for hearing court Oct. 30. DER asked for a continuance, Jordan said, and he did not oppose a new hearing date of Nov. 27 because he agreed the state had not had adequate time to review his petition.

Ironically, the petition charges DER has violated the constitutional rights of the defendant in not engaging in timely, effective prosecution.

In layman's terms the state is accused of dragging its feet to the prejudice of the defense.

In the meantime if a hearing on the DER charges is scheduled, Jordan said as authority solicitor he will be there

Conduct Code Observed in Student Death

CALL DEC 5 1973

There were no violations of Lehigh University's student code of conduct in events surrounding the accidental death of a sophomore fraternity brother this fall, a university report finds.

The report, given Monday to the Lehigh Forum by Preston Parr, vice president-student affairs, calls on all students, however, to "see the issues clearly and take corrective action to sensitize ourselves and future generations of Lehigh people in the hope of avoiding further tragedies of this kind."

Parr said he has asked several deans and living-group councils "to establish educational programs that will deal more effectively with the problems of possible dangerous behavior in the student community."

The university's findings concurred with those of the Northampton County district attorney's office about incidents among fraternity brothers that led to the death of Mitch Fishkin of Flemington R.2, N.J., on Sept. 13. As a result of "jousting" and "immature judgment," Fishkin apparently jumped from a car, driven by a fraternity brother, and struck his head on the roadway on South Mountain Drive above the Lehigh campus.

"But," said Parr, "that does not begin to dispose of the matter, for an accident that resulted in a student's death arose in a context of student behavior that must be of grave and continuing concern to all of us."

Parr is hopeful the deans and student councils will find a way to remind students each year that when they are involved in horseplay, the consequences can be serious.

"I have also asked the deans to re-examine the code with a view toward possible recommendations to the discipline committee and the faculty for amendments," his report said.

"Insofar as can deal with the possible excess of otherwise-normal student behavior, they should be clear, realistic and carry sanctions appropriate to the serious ills they seek to remedy.

"All of us have a moral responsibility to bring to bear our best thought in devising corrective actions that will be effective."

5.1 Anheuser-Busch, Inc.

Anheuser-Busch, Inc. submitted several written statements with comments regarding the draft EIS in addition to giving verbal testimony at the public hearing. As their comments concern highly controversial aspects of the proposed wastewater treatment system, responses are provided to both the written submissions as well as the verbal testimony. The verbal testimony has not been reprinted in this volume, rather it is contained in the official transcript. However, the comments numbered 5.1.7 through 5.1.16 have been taken from points made in the verbal testimony of Mr. John L. Stein, Manager, Environmental Engineering Planning for Anheuser-Busch, Inc., St. Louis, Missouri.

5.1.1 Comment: We are seriously concerned about the safety and environmental consequences which could ensue from implementation of the pretreatment scenario (recommended by the EIS) and the failure of the draft EIS to evaluate these consequence.

Response: Please see additional analysis regarding safety questions which have been addressed by Energy and Environmental Analysis incorporated independent analysis. Appendix AA.

5.1.2 Comment: The legal basis by which the EPA purports to impose an "industrial pretreatment requirement" on the Columbus Anheuser-Busch brewery is not addressed in the draft EIS, which is not surprising, because no legal basis exists.

Response: Please see the response to comment 4.1.52 and Volume I Chapter 3.

5.1.3 Comment: The appropriate mechanism for development and evaluation of pretreatment design alternatives is the Facilities Plan, and not the EIS.

Response: The EIS does not propose to require a specific pretreatment design be implemented but uses a typical design in the analysis in order to evaluate alternative system removal efficiencies and costs.

5.1.4 Comment: Cost-effectiveness cannot be the only criterion used for selection of a treatment alternative according to U.S. EPA's own regulations and guidelines. Fully ten other criteria must be considered and satisfied.

Response: Cost-effectiveness includes other factors such as environmental and socioeconomic impacts.

5.1.5 Comment: The cost-effectiveness analysis as well as the process design of the pretreatment facilities contain several unfounded assumptions and factual errors, and reaches an erroneous conclusion as a result of these errors. These errors relate primarily to capital cost estimates used both for the brewery and for Southerly. Analyses enclosed detail the costs Anheuser-Busch would be expected to incur if pretreatment scenario 2 were implemented.

Response The preliminary design and cost estimate, as prepared by McWhorter and Associates of Savannah and enclosed by the brewery suggests that the EIS efforts have seriously understated the capital and operating costs of Scenario 2 for the brewery. To address this comment we will highlight the design differences and, where applicable, note questionable or inconsistent concepts. The following is directed to that end:

The brewery's design flow is higher than that used in the EIS

BOD_5 Release	Average Day Flow, mgd EIS	Brewery
60,000 lbs/day	3	3.9
100,000 lbs/day	3	6.5

(These differences should increase the cost of any facilities prior to the trickling filter.)

The brewery uses a three stage design with intermediate pumping and an overall BOD_5 loading of about 100 pounds/100 CF.day; the overall BOD_5 removal efficiences were estimated as follows:

Total effluent basis = 50 to 55%

Soluble effluent basis = 55 to 60%

Note: Corrections were made during this review in the 100,000 lbs/day alternative to reflect failure to use all three stages.

The EIS used a single stage design with an overall BOD_5 loading of about 180 pounds/1,000 CF.day; the overall BOD_5 removal efficiencies were estimated as follows:

Total effluent basis = 40 to 45%

Soluble effluent basis = 67%

(These differences should increase the cost of the filters as well as add a new recirculation pumping cost, which we note is not included for all three stages.)

The design equation used by the consultant is given and defined below:

$$Le/Li = e^{-KD/q^n}$$

Where Li = Influent BOD_5
Le = Settled Effluent BOD_5
K = Treatability Constant
D = Media Depth
q = Hydraulic Loading per Unit Area
n = Media Constant
n = 0.5 for BF Goodrich Vinyl Core Media

Here, the key is that the consultant applies this equation only to the soluble fraction (influent and effluent) through all three stages, even though its theoretical applicability is in terms of total influent and settled effluent. If used in its normal manner for the consultant's design, the predicted overall BOD_5 removal efficiency after settling would be nearly 70 percent. Further, since this equation is based upon

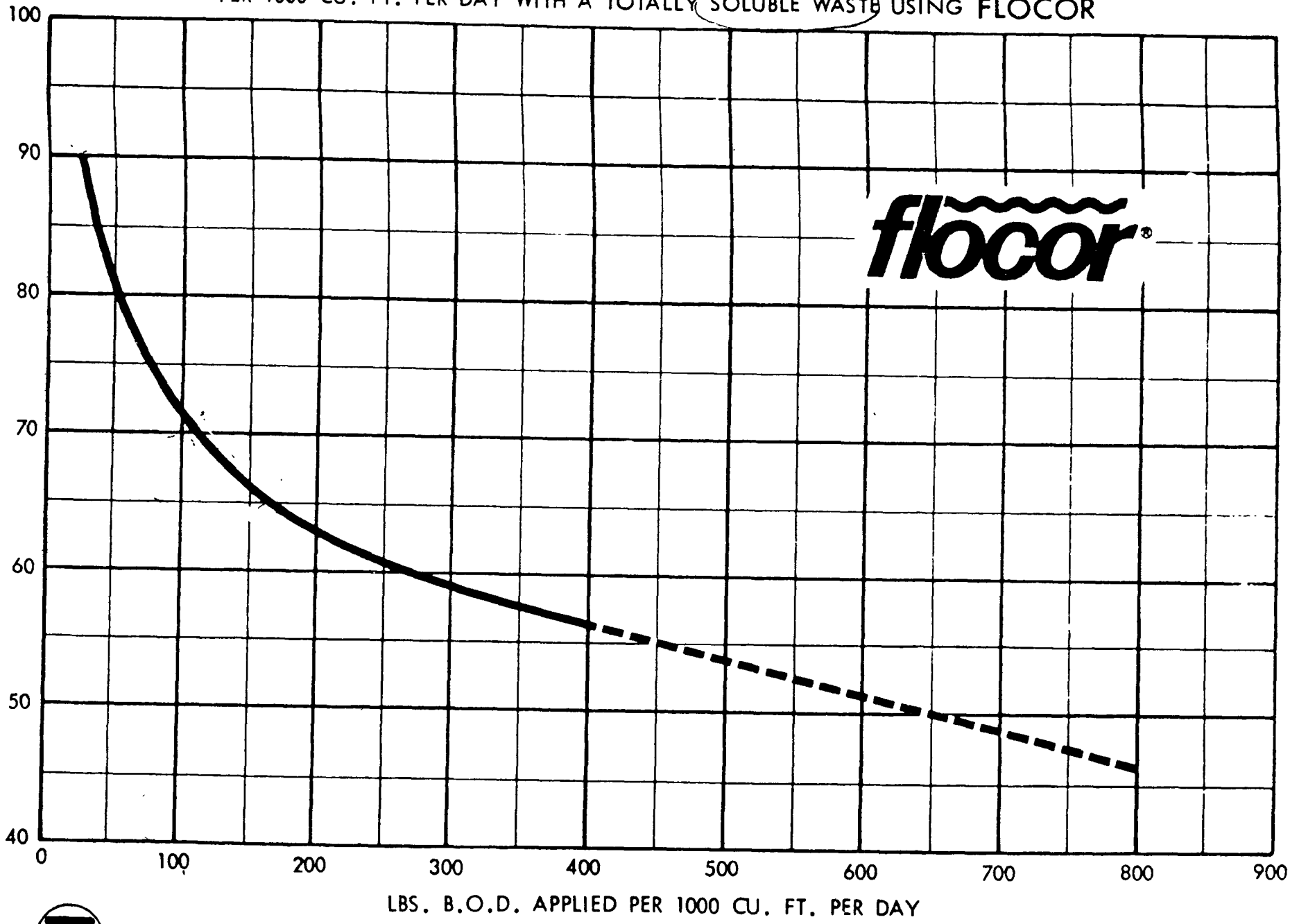
a settled effluent BOD_5, which contains some particulate BOD_5, it is obvious that on a "total BOD_5 in minus a soluble BOD_5 out" basis, the BOD_5 removal efficiency must be greater than 70 percent. We have problems with this equation and its derivation, since there is no way to define the impact or unknown credit achieved through solids-liquid separation. Thus, when using this equation and interpreting published data, it is important to qualify it by the sedimentation system which follows the trickling filter.

This is not to claim that the technique used in the Draft EIS is any better (see the attached Flocor curve, which we used in conjunction with the assumptions defined in our letter of March 29, 1978), but only to point out that the Consultant's use of the equation is clearly inconsistent with its intended use and that precise conclusions are thereby questionable. Indeed, it further suggests that if the consultant would have used the equation as it was intended, he would have predicted an overall BOD_5 removal efficiency on a soluble effluent basis in excess of 70 percent, as compared to the 67 percent efficiency used in the EIS.

The next question is, "Did the consultant err in any other assumptions?" Although this cannot be answered conclusively, some study of the treatability constant used is warranted. Originally, the brewery's consultant took this constant as 0.01, and subsequently adjusted it downward to 0.0082 to reflect winter conditions through all three stages (Note here, the EIS cited performance is only for average annual conditions while the consultant's performance is for winter conditions.). In reviewing a publication by McWhorter on a brewery waste design (1), we note from the information given that he may have used a treatability constant of 0.016 in the past with the same equation, as shown below:

(1) McWhorter, T.R. and Zielinski, R.J., "Waste Treatment for the Pabst Brewery at Perry, Georgia". 26th Annual Purdue Waste Conference (May, 1971).

PLOT OF PERCENT B.O.D. REMOVAL VERSUS LOAD IN LBS. B.O.D. APPLIED PER 1000 CU. FT. PER DAY WITH A TOTALLY SOLUBLE WASTE USING FLOCOR



ETHYL CORPORATION
ENVIRONMENTAL CONTROL DIVISION

FIGURE 2

Removal efficiency = 45% for a BOD_5 loading of 300 lbs./1000 CF.day

Q = 1.3 mgd

Two filters @ 41 SF diameter and 22 feet of depth

(Superficial hydraulic load =

$$\frac{1,300,000(4)}{1,440(41)^2(2)(\pi)} = 0.34 \text{ gpm/SF}$$

$$0.55 = e^{-22K/(0.34)^{0.5}}; \quad K = 0.16$$

We also not from page 11 of this same publication, that McWhorther states:

> "In the design a 45% BOD removal was allowed for the filters. Normally a much higher removal would be expected for a soluble carbohydrate waste of this nature, however, the extreme variations of BOD loading and pH were expected to adversely affect the filter efficiency."

We do not understand this new conservatism, especially since it is our understanding that the Columbus brewery was to restrict its maximum daily BOD_5 release to no more than 25 percent over the average day value and the pH swings are fairly easy to control. It is interesting to note that if the treatability constant of 0.016 is used in the Columbus situation with the Consultant's equation, the predicted overall treatment efficiency now goes to nearly 90 percent (adjusting this constant for winter temperature influences yields an overall BOD_5 removal efficiency of about 82 percent). Conversely, resubstitution of this treatability yields the following hydraulic loading rate to the first stage filter, as shown below:

No temperature adjustment, K = 0.016

$$q = (-.016 \times 32/\ln.67)^2 = 1.6 \text{ gpm/SF}$$

With temperature adjustment, K = 0.0123

$$q = (-.0123 \times 32/\ln.67)^2 = 1.0 \text{ gpm/SF}$$

These hydraulic loading rates to a three stage system yield an overall BOD_5 loading rate of 370 and 310 lbs of BOD_5 per 1000 cf.day at 1.6 and 1.0 gpm/SE, respectively. These values are well in excess of the 180 lbs/100 cf.day BOD_5 loadings used in the EIS.

The preceeding discussion, even with the assumption that the equation is valid for the manner that it was used, suggests that the brewery's consultant may be somewhat conservative in his definition of system needs.

The consultant's cost estimates are summarized in Table 1. As can be seen, the 60,000 lb./day condition is only 6% cheaper in first cost and 15% cheaper in operating costs than the 100,000 lb/day option. It can also be noted that in seven instances the 60,000 lb./day condition has the same or higher facility costs. The seven areas amount to some 70 percent of the entire cost prior to the introduction of any contingency or administration and engineering costs. Superficially, one would not expect such a lack of influent load sensitivity, especially in terms of biological towers and the control and pumping building. As shown in Table 2, the detailed breakout for the biological towers and the control and pumping systems also shows that either one or both of the conditions was improperly designed or costed.

Although the preceding raises questions of credability in the brewery's statements concerning the content of the EIS, the proposed designs and costs show little disagreement with those found in the EIS, as shown in the following comparison:

TABLE 1

SCENARIO 2
ESTIMATED CONSTRUCTION AND OPERATING COSTS
(Based on June 1977 Construction Cost)

Item	Q, BOD_5	6.5 mgd 100,000 lbs/day	3.9 mgd 60,000 lbs/day	*
Raw Waste Pumping Station		$ 239,000	$ 214,000	0.90
Coarse Bar Screen		9,000	8,000	0.89
Metering Flume		9,000	9,000	1.00
Equalization Tank		611,000	372,000	0.61
Fine Screens		179,000	152,000	0.85
Neutralization Tank		39,000	35,000	0.90
Biological Towers		3,125,000	3,118,000	1.00
Dome and Odor Control		440,000	406,000	0.92
Control & Pumping Building		459,000	503,000	1.10
Chemical Storage Tanks		68,000	68,000	1.00
Spent Grain Liquor Storage Tank		166,000	136,000	0.82
Instrumentation & Control Systems		130,000	130,000	1.00
Electrical		276,000	234,000	0.85
Site Work		79,000	80,000	1.01
Yard Piping		155,000	150,000	0.97
Repiping Sanitary Sewers		100,000	100,000	1.00
Subtotal		$6,084,000	$5,715,000	0.94
Construction and Contingencies @ 10%		608,000	572,000	
Estimated Fixed Price Construction Contract		6,692,000	6,287,000	
Engineering & Administration @ 10%		669,000	629,000	
Estimated Total Construction Cost		$7,361,000	$6,916,000	0.94

(Estimated total construction does not include land cost or project contingencies and is based on unit sizes indentified in the design concept.)

TABLE 1 - (Continued)

Operating and Maintenance Cost

	100,000 lbs/day	60,000 lbs/day	*
Labor 3.6 people @ 25,000	$ 68,000	$ 68,000	1.00
Chemicals and supplies @ 1.5	30,000	23,000	0.78
Power @ 3[/KVA @ 1.2	79,000	56,500	0.74
Maintenance @ 1.25	74,000	69,000	0.92
	$ 251,000	$ 329,000	0.85

* $\frac{\text{60,000 Lb./day}}{\text{100,000 Lb./day}}$

TABLE 2

DETAILED COST BREAKDOWN OF BIOLOGICAL TOWERS AND CONTROL AND PUMPING BUILDING

	BOD_5 Lbs/Day	
	100,000	60,000
Biological Towers		
Site Work	$ 4,000	$ 6,000
Structural -		
Concrete	982,000	979,000
Steel	18,000	18,000
Media Support	133,000	133,000
Media	1,674,000	1,666,000
Equipment	147,000	155,000
Mechanical	29,000	43,000
Miscellaneous	138,000	118,000
	$3,125,000	$3,118,000
Control and Pumping Building		
Site Work	$ 8,000	$ 8,000
Structure	210,000	225,000
Equipment		
Equalization Pumps	26,000	19,000
VFD	35,000	28,000
Recirculation Pumps	75,000	95,000
Mechanical	97,000	120,000
Miscellaneous	8,000	8,000
	$ 459,000	$ 503,000

A similar conclusion appears to apply for the overall capital cost estimate.

BOD_5, lbs/day	100,000		60,000	
	1977	1974/1975	1977	1974/1975
Capital Costs - Million $ (divide by 1.25)	7.4	5.9	6.9	5.5
Operating Cost - $1,000/yr.				
Labor (divide by 1.33)	90	68	90	68
Chemicals (divide by 1.5)	45	30	35	23
Power (divide by 2)	158	79	118	56
Maintenance (divide by 1.25)	93	74	86	69
	386	251	329	216
Present Worth Equivalent, Million $		8		7
Present Worth with Southerly, Million $		111		104
EIS Statement for Scenario 2 Present Worth with Southerly, Million $		110		102
(% Difference)		<1		<2

From the above, it can be concluded that there is no difference in the relative ranking of each scenario if the values suggested by the brewery are used in Table IV-2 of the EIS.

5.1.6 Comment: The City of Columbus has stated that they do not feel that the bulking problem is caused by the treatment of brewery wastes. Their analysis has shown that their bulking problem is due to the presence of a blue-green algae and not from the presence of filamentous bacteria. The assumption made in the EIS about the bulking problem is unfounded.

Response: Please see Appendix AA for a detailed discussion of the bulking problem.

5.1.7 Comment: The Impact Statement assumed the cost of additional facilities at Southerly under the expanded Brewery condition to be $66.4 million. However, in developing their cost of additional facilities at Southerly under present loading conditions from the Brewery, the same cost was assumed. Although the load to the Southerly plant decreased by approximately 16 percent, no reduction in cost was assumed.

Response: The EIS did not assume the $66.4 million cost for additional facilities at Southerly; it was taken directly from the Facilities Plan. The Facilities Plan did not directly address the brewery or its load.

As explained in Appendix I, the EIS review of the Facilities Plan's influent characteristics with a 60,000 lb/day BOD_5 load from the brewery indicated that the concentration values were adequately stated but that on a mass basis, the higher flows of the Facilities Plan resulted in about 30 percent more BOD_5 and SS. Changing the brewery's BOD_5 load to 100,000 lb/day gave agreement with the Facilities Plan's BOD_5 mass but maintained the previously cited differences in SS mass and flow. The review of the Facilities Plan for Southerly suggested that some facilities might have to be expanded, while others could be reduced or eliminated (see Table I-20).

In recognition of the potential arguability of some of the EIS recommendations for first cost savings as well as additional capital improvement expenditures, it was decided to develop Table IV-2 by considering the cost changes only associated with the brewery and its various load and pretreatment options. This decision primarily impacts the trickling filter. Whether or not the brewery releases a nonpretreated load of 60,000 lb/day or 100,000 lb/day causes a trickling filter loading difference of about 15 or 25 percent on a total or soluble BOD_5 basis. At these loading rates we would expect a 5 percent change in the soluble BOD removal efficiency of the trickling filter. In our view, this change is insignificant, and we left the sizing of the trickling filters unchanged. Alternately, we could have started from the 100,000 lb/day BOD_5 brewery discharge condition, which most closely approximates the influent BOD_5 mass found in the facilities plan, and reduced the trickling filter's sizing in strict proportion to the applied soluble BOD_5. A 25 percent reduction in the filter sizing would have resulted in a 15 to 25 percent savings in the $3.0 million cost of the trickling filter or about $0.4 to $0.8 million. This savings, associated with the 60,000 lb/day BOD_5 release from the brewery is about 1 percent of the cost of the Facilities Plan and, in our view, too insignificant to include in Table IV-2.

5.1.8 Comment: Under Scenario 2, and an expanded Brewery condition, the cost at Southerly was estimated to be $48.1 million. The total load to the Southerly Plant under this alternative was assumed to be 205,000 pounds BOD per day, and 205,000 pounds of suspended solids per day. Under the present Brewery condition and Scenario 1, the load at Southerly was assumed to be 205,000 pounds of BOD per day and 165,000 pounds of suspended solids per day; the cost of the facilities at the Southerly Plant was estimated at $66.9 million. Therefore, it was assumed in the cost analysis that it would cost $18.3 million more to construct a facility that would handle the same amount of BOD but only 80 percent of the suspended solids load. This assumption was based at least partly on the fact that the Impact Statement assumed that if pretreatment were implemented at Anheuser-Busch the biological filters at the Southerly Plant could be eliminated. Anheuser-Busch agrees with Ohio EPA and the City of Columbus that this is an erroneous statement.

Response: As shown in Table IV-1, Scenario 2 results in 16 percent less total BOD_5, 36 percent less soluble BOD_5, and 17 percent more suspended solids, in comparison to Scenario 1. The reviewer has confused the 60,000 lb./day BOD_5 brewery load of Scenario 1 with the 100,000 lb./day BOD_5 brewery load of Scenario 2.

5.1.9 Comment: The original Facility Plan estimated the operating cost of the Southerly Plant to be $5.5 million per year if the Southerly Plant accepted the total load from the expanded Brewery. However, the EIS assumed that if the Brewery was operated at the present size, the operating cost would only be reduced by $100,000 per year. This means that although the load to the Southerly Plant would be approximately 16 percent less, the operating cost would only be reduced by approximately 1.8 percent.

Response: The reviewer is correct in his interpretation. Personnel and chemical costs would show no significant change, the power savings by eliminating the pumping for the trickling filter and some solids handling systems would be fractionally compensated for by the additional aeration horsepower requirement of the activated sludge system, a slight maintenance savings will be derived via the eliminated unit processes.

5.1.10 Comment: The EIS made no mention of the reduction of performance of the trickling filter under cold weather conditions. In many installations, it has been found that the performance of the trickling filter can be reduced by as much as 60 percent under cold weather conditions similar to those present in the Columbus area. This error caused the facility requirements of the Southerly Plant to be underestimated when pretreatment is assumed at the Brewery.

Response: Why is trickling filter failure more likely at the brewery than at Southerly? Especially (in contrast to present practice) with the brewery providing equalization and neutralization facilities under the EIS analysis.

5.1.11 Comment: The EIS made no mention of the fact that the trickling filter is frequently subject to treatment upsets. Under such an upset condition, the efficiency of the trickling filter could be reduced to zero for an extended period of time. The EIS does not address the fact that, under such an upset condition, the Southerly Plant would be accepting the entire untreated effluent from the Brewery which would cause a severe shock load on the Southerly treatment system. This error caused the facility requirements at the Southerly Plant to be underestimated when pretreatment is assumed at the Brewery. However, it should be noted that if the trickling filter was installed at the Southerly Plant for treatment of combined brewery and municipal wastewater, it would significantly reduce the chance of upset.

Response: Data should be provided to support the contention. Please see previous responses to comments on pretreatment design and Appendix AA.

5.1.12 Comment: In addition to assuming that the trickling filter would continously operate at a prescribed performance level, the EIS also assumed that the solids produced from the trickling filter could be removed in the primary clarifier at the Southerly Plant. However, experience has shown that when the trickling filter is operated in a pretreatment mode, a very low efficiency is obtained from conventional sedimentation. This error has caused the facilities requirement at the Southerly Plant to be underestimated when pretreatment is assumed at the Brewery.

Response: The proposed sedimentation tank has a design surface overflow rate of 500 to 600 gpd/SF and an assumed effluent suspended solids of 100 to 200 mg/l due to poor settling characteristics. We do not believe this to be optimistic or impossible to achieve. The reviewer makes the mistake of blindly looking at percentage numbers; he is reminded that an activated sludge system with 2,000 mg/l MLSS will routinely achieve a suspended solids removal efficiency of 98 to in excess of 99 percent.

5.1.13 Comment: Under Scenario 3, the EIS assumed approximately 95 percent efficiency of the conventional settling basin at the Brewery for removing the suspended solids produced from the trickling filter. However, as noted above, this is impossible to obtain under actual operating conditions. This error has caused the facility requirement at the Southerly Plant to be underestimated when pretreatment is assumed at the Brewery.

Response: Please see previous responses to comments on pretreatment design.

5.1.14 Comment: In the estimation of costs for the pretreatment facility, the EIS did not include the cost of odor control equipment. Based on experience in other locations, it would be impossible to operate a pretreatment facility in a residential area similar to that around the Brewery unless extensive odor control was provided. This omission resulted in a severe underestimation of the cost of the pretreatment facility at the Brewery.

Response: The estimates did include a cost credit for odor control, see EIS Table IV-1 and Appendix AA.

5.1.15 Comment: The EIS assumed that a considerable savings in capital and operating costs could be realized at the Southerly Plant if flow equalization is provided at the Anheuser-Busch Brewery ahead of the proposed pretreatment facility. The EIS assumed that if the equalization tanks were "of sufficient capacity and operated in a manner that will cause the Brewery's ultimate pollutant release to conform to the reverse image of the normal domestic pattern of wastewater generation. Operation in this manner, i.e., release of two-thirds of the pollutant

load in the 6:00 p.m. to 6:00 a.m. time period, will dampen the pollutant mass peaks experienced at the Southerly treatment works and yield a more stable operation." On the surface, this recommendation appears to have a great deal of merit. However, several factors need to be considered. In order to design a system to release two-thirds of the Brewery wastes in a 12-hour period, it would be necessary to design the system one of two ways. The subsequent analysis in the EIS goes on to state that the equalization of wastes at the Brewery would reduce the peak energy requirements at the Southerly Plant and allow the Southerly Plant to treat the Brewery wastes at night when the electrical rates were assumed to be lower. However, since the travel time in sewer system from the Brewery to the Southerly Plant is approximately 12 to 14 hours, this would cause Anheuser-Busch to treat its wastewater during the peak energy demand period. Therefore, any power cost savings realized at the Southerly Plant would be offset by increased power costs at the Brewery.

Response: Flow equalization benefits all scenarios. For the 60,000 lb./day BOD_5 brewery release under Scenario 2, using the brewery's cost values, a 30 percent increase in the equalization tank would cost no more than $110,000 (1.6% of the total estimated cost) and effluent equalization of storage tank would cost no more than $372,000 (5.4% of the total estimated cost) - Conclusion: not significant, odor control can be achieved if it is a design goal. Potential alternative, go to Scenario 3, which is within 10 percent of the total present worth of Scenario 2.

As to power charges, we recognize the problem but it is incumbent upon the EIS to point out potential mechanisms for operating savings for a public facility. It appears that equalization is far easier to achieve at the brewery than at Southerly. We might also point out that there seems to be some confusion regarding the travel time in the sewer. In attempting to discredit the power savings of the EIS, the brewery cites a time of 12 hours. However, in their comments regarding septicity, the City of Columbus assigns a 23 hour travel time from the Brewery to Southerly.

5.1.16 Comment: According to some of the foremost authorities on brewery waste treatment, experience with the pretreatment of brewery wastes with a trickling filter has not been proven to eliminate a bulking sludge problem if one does exist. For these reasons we believe that it would be extremely unwise to delete the pilot treatment plant program at the Southerly Plant.

Response: The reviewer should identify the foremost authorities by name and association before creditability can be attached to this statement and so the context of their remarks can be delineated.

5.2 Columbus Industrial Association

5.2

COLUMBUS INDUSTRIAL ASSOCIATION

1515 WEST LANE AVENUE • COLUMBUS, OHIO 43221 • TELEPHONE 486-6741

April 13, 1978

(5.2.1-5.2.4)

Planning Branch - EIS Preparation Section
U. S. Environmental Protection Agency, Region V
230 South Dearborn Street
Chicago, IL 60604

Dear Sirs:

Our Association has reviewed the EIS respecting "Wastewater Treatment Facilities for the Metropolitan Area of Columbus, Ohio" and the comments of our Association members present at the Public Hearing on March 30.

Here is the position of our Association, adopted by our Board of Directors at their Board Meeting on April 12, 1978, respecting this Draft EIS.

We have very serious reservations respecting the legality and advisability of EPA requiring pretreatment of compatible wastes. This requirement seems to be contrary to the Water Pollution Control Act.

The EIS does not appear to contain adverse comment respecting the Facilities Plan developed by the City of Columbus and for which approval has been sought. Consequently, the promotion of alternate methodology is puzzling.

The EIS does not address the environmental impacts of either the City's Facilities Plan or the alternate methodology proposed by EPA. Should not environmental impacts be the main theme of an EIS?

It is very disturbing to find that the EIS apparently was prepared without seeking any input from or cooperation with appropriate personnel in the City of Columbus. Assuming that one of the principal goals of EPA is to benefit the general welfare by seeking appropriate participation in the planning process, we cannot comprehend the reason for this glaring omission.

We find disturbing indeed the recommendations in the EIS implying federal control of municipal area geographic and economic growth by dictating sewer location and specifications. We feel strongly that our municipal area must be granted the widest latitude possible to determine its own future growth characteristics.

(Continued . . . . .)

We recommend that EPA accept the City of Columbus' Facilities Plan and give EPA's approval to implement that plan without further delay.

Sincerely,

COLUMBUS INDUSTRIAL ASSOCIATION

Newton A. Brokaw
Executive Director

pmp

cc: Senator John Glenn
Senator Howard Metzenbaum
Representative Sam Devine
Representative Chalmers Wylie
Mayor Tom Moody
Public Service Director Robert C. Parkinson
EPA, Washington, DC

5.2 Columbus Industrial Association

5.2.1 Comment: We have serious reservations respecting the legality and advisability of U.S. EPA requiring pretreatment of compatible wastes. This requirement seems to be contrary to the water pollution control act.

Response: Please see response to Comment 4.1.52 and Volume I Chapter 3.

5.2.2 Comment: The EIS does not address the environmental impacts of either the City's Facilities Plan or the alternate methodology proposed by U.S. EPA.

Response: The discussion of environmental impacts has been expanded in several areas, particularly in regard to air quality, sludge disposal and pretreatment alternatives. See Volume I and Appendices Volume II.

5.2.3 Comment: The EIS apparently was prepared without seeking our input from or cooperation with appropriate personnel in the City of Columbus.

Response: During the preparation of the EIS, numerous meetings were held with City personnel. The staff from the Division of Sewage conducted tours through the existing treatment facilities and provided considerable information and assistance to the authors of the EIS.

5.2.4 Comment: Our municipal area must be granted the widest latitude possible to determine its own future characteristics. Federal control of municipal area geographic and economic growth by dictating sewer location and specifications is a disturbing implication in the EIS.

Response: The U.S. Environmental Protection Agency is not out to block community growth. Our policy is to ensure that facilities are built with adequate reserve capacity and to preclude the funding of excess reserve capacity. The large backlog of needs for wastewater treatment facilities across the United States means that EPA must allocate its resources primarily to correct existing pollution problems.

The draft EIS for Columbus found that most gravity sewers would be cost-effective if designed to flow half full when serving the year 2000 projected population. Such a design is equivalent to providing sewer capacity for about forty years. We believe this provides ample flexibility for growth in the Columbus area.

5.3 Development Committee for Greater Columbus

5.3

DEVELOPMENT COMMITTEE FOR GREATER COLUMBUS
TWO HUNDRED EAST TOWN STREET COLUMBUS, OHIO 43215 614/221-7871

April 25, 1978

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Ralph R. Widner

Mr. Valdas V. Adamkus
Deputy Regional Administrator, Region V
United States Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

Attn: Mr. Gene Wojcik
EIS Preparation Section
Planning Branch

Re: Draft Environmental Impact Statement for Wastewater Treatment Facilities for the Metropolitan Area of Columbus, Ohio

Dear Sir:

This organization has since its inception been deeply involved in capital improvement programs in Franklin County and, of course, the Sewer Program is one that has been extremely important to the growth of our area.

Our Water Management Committee has recommended to our Steering Committee and received its approval to submit a position statement on the above document.

A copy of our comments is enclosed. We would appreciate having it made a part of the official public hearing record.

Sincerely,

W. J. Cremean
Executive Director

WJC/lb
Encls.

RECEIVED
APR 27 1978
EPA REGION 5
OFFICE OF REGIONAL ADMINISTRATOR

ENVIRONMENTAL IMPACT STATEMENT
ON
WASTEWATER TREATMENT FACILITIES
FOR THE
METROPOLITAN AREA OF COLUMBUS

Comments By

DEVELOPMENT COMMITTEE FOR GREATER COLUMBUS

April 25, 1978

Statement on the Draft Environmental Impact Statement

Development Committee for Greater Columbus

The Development Committee for Greater Columbus is a privately sponsored, non-governmental funded organization, which was formed in 1957 to encourage and promote sound planning of programs which would best serve people of this area. We have consulted with individuals and agencies of civic and governmental bodies to prepare master plans for the anticipated long range needs of Franklin County's future residents, also helping work out problems which had to be resolved in order that those programs could be implemented. Enclosed is some material which better illustrates our activities and programs.

Since our very inception the Water Management Committee has been one of the most involved and active parts of DCGC. Its members included numerous professional persons in engineering, planning, economics, conservation, real estate and many other fields. Over the last 20 years we have devoted thousands of man-hours to review and analysis of the Sanitary Sewer program in all its aspects.

It might be repetitive for us to discuss the technical issues in the EIS since tney have been thoroughly analyzed by experts in the public agencies involved in the Facilities Plan development and other interested organizations so we will not discuss many of them even though we have strong feelings. But some of them do have a direct and tremendous impact on major decisions so we feel justified in taking a very firm position on some of the most important basic issues.

POPULATION PROJECTIONS

Population projections have been questioned. Historically, our rate of

growth and population distribution have never followed the pattern of other urban areas in Ohio and certainly they never conformed to national averages. Due to an aggressive annexation program plus the City of Columbus contracting with all other municipalities to provide water and sewer service the growth pattern is flexible and has been healthy in spite of some urban sprawl.

This issue has been a matter of extensive discussion in the past several months. Representatives of Mid-Ohio Regional Planning Commission, City of Columbus Department of Development, Columbus Area Chamber of Commerce, Ohio State University, Battelle Memorial Institute, Ohio Department of Transportation, Ohio Department of Development and DCGC have participated in analyses of all available data to determine projected trends in population growth rates and distribution. Certainly conclusions by the personnel with great expertise in these organizations who work with this type of study all the time, should have more validity than figures developed by persons unfamiliar with the area (and who we assume must be using national average figures for urban areas). (5.3.1)

DESIGN CONCEPT

The concept of using force mains instead of a gravity system violates the principle on which our entire program has been developed. Several projects were constructed in the past years for the express purpose of eliminating such sections which were constant operational problems and created very objectionable odor conditions at the pumping stations. The Columbus system, which is planned for ultimately serving the entire Franklin County

area, has always been based on being with gravity flow. Introduction of force mains is considered retrogressive and the results totally unacceptable. Force mains will create operating problems, nuisance from odors and are considered hazardous to public health. Their permanent energy demand requirements are cause for concern because of electrical power system reliability and the concept is in direct violation of President Carter's philosophy for energy conservation.

We suspect that one reason for the EIS recommending force mains to serve pockets of land not now adequately served by a public sewerage system, coupled with elimination (or indefinite postponement) of several major trunk lines, is effort by EPA to restrict or completely control growth. We submit this is an erroneous conclusion and is an impossible means of accomplishing their suspected objective. Delimiting areas to be served by adequate public systems will not result in all new growth only taking place there. From years of actual experience we know that new private and commercial buildings will be constructed on lots with their own private system, or else a package plant will be constructed by a developer under County or Public Utilities Commission permit, to enable development to proceed. Cost of water and sewer, although always one of the first considerations, is not a major determining factor on whether land is to be developed or not.

We reemphasize, however, that growth areas can not be narrowly and specifically defined. Therefore, if we expect to continue planning and develo ing a good sewer system to serve the entire area (which has been the goal

from its Master Plan stage in 1953) restrictions and limitations resulting from the EIS recommendations would result in an inadequate, fragmented set of private or package systems throughout the county - a condition which should not be permitted, could not be tolerated and one which we are continually working to eliminate.

A second reason for the recommendations apparently is to reduce cost of the program since original cost estimates have been exceeded. Mostly this increase has been due to the delays caused by Federal agencies impounding appropriated funds and the extensive, complicated frustrating federal approval process. In view of the fact that inadequate systems or facilities could result in heavy fines levied on the local community which operates the system it seems more proper to develop the system on accepted, safe criteria and concept. (5.3.2)

DESIGN CRITERIA

Obviously, a substantial part of the theoretical cost savings is a major reduction in design criteria.

The EIS Interceptor Alternatives is based on population projections for a 20 year design period with the sewer flowing half full. This has no direct relationship with design of the interceptor sewers on an ultimate population basis (the design used by the City of Columbus) since there is nothing to prevent population projections in the next 20 years from triping, quadrupling,or more,leaving the original installation substantially undersized. We have experienced some major problems where the density of area when it developed exceeded the estimated load and corrective action

was expensive and involved extensive damage in built up areas. The Environmental Impact of a parallel relief interceptor that will then be needed would be much more severe than those where the original interceptor was properly sized initially. Very frankly, we do not feel that designing for only 20 years is worth taking the risk. The design of trunk sewers and interceptors used by the City of Columbus has proven so successful in the past in providing adequate service the City would be ill advised to depart from their present criteria. (5.3.3)

ANHEUSER-BUSCH BREWERY

At the least you can say our people were shocked to discover that pretreatment, using a trickling filter process, was recommended to handle effluent at the Anheuser-Busch brewery north of S.R. 161. Certain conclusions from reviewing that item were quite disturbing.

1. It appeared obvious that application of a trickling filter recommendation for these conditions had not been tested out in sufficient detail to provide convincing documentation that it would accomplish its objective. Only one such identical purpose installation is known and it has not proven to be capable of meeting all the anticipated results EPA has assumed. Therefore, it does not seem logical or justified to install it here, then try to make it work.

2. The economic conclusions based on this recommendation are seriously questioned when the figures show in one

instance that for the Southerly Sewage Treatment Plant it would cost $18.3 million more to construct a facility that would handle the same amount of BOD but only 80% of the suspended solids load from the brewery by eliminating trickling filters at the plant. In another instance, in discussing brewery load at present volume with a pre-treatment process there, the EIS indicated a possible $10.4 million dollar reduction in Facility Plan solid handling equipment, and only a $4.2 million dollar reduction in solid handling equipment if the brewery load were expanded.

3. If the theoretical and unproven assumptions about performance of trickling filters at the brewery failed it would lead to catastrophic conditions at the brewery, in the sewer lines and at the sewage treatment plant. This is certainly not a good place to experiment.

4. If the City is unable to force Anheuser-Busch to install trickling filters we are at an impasse and we understand they will violently resist such a plan. If the filters were installed, and if they did not meet the theoretical design concept objectives, the City would be faced with a horrendous problem of correcting the situation (which the Federal government

would probably refuse to participate in) and an unbearable fine (we are informed could be as much as $20,000 per day). The thought is frightening unless the Federal government assumes the full responsibility for the decision.

Basically, the thought of trying to introduce such an unproven installation in the middle of a highly developed, heavily populated section of ou area is frightening and seems diametrically opposed to the concept of cor cern for environmental impact. Our conclusion is overwhelming objection to this recommendation by EPA. Such a concept should have been a part of a Facilities Plan Study of Alternatives rather than an Environmental Impact Statement. (5.3.4)

TREATMENT PLANTS

Most of the disagreements between the draft EIS and the Columbus Facilit Plan for the wastewater treatment plants fall into four major areas:

1. Pretreatment of brewery wastes and accompanying reductions of influent loads and required facilities at the Southerly Plant;

2. Reduced influent loads at the Jackson Pike Plant;"

3. Criteria used for design of individual treatment units; and,

4. The environmental compatibility of additional sludge reduction incinerators.

1. Brewery Pretreatment

The EIS calculates that brewery pretreatment will eliminate a large portion of the solids handling facilities and the entire first stage biological treatment section at the Southerly Plant. This economic analysis would appear to be inaccurate. First, pretreatment and discharge to Southerly should generate the same quantity of solids in the system as complete treatment at Southerly. Therefore, brewery pretreatment cannot take credit for elimination of any solids handling and disposal facilities at the Southerly Plant. Second, the proposed brewery pretreatment scenario only reduces the brewery fraction of the total influent BOD_5 load to Southerly from approximately 30% to 20%. This reduced brewery load will still be a significant percentage of the total influent load. We fail to understand how a 10% reduction in total BOD_5 can negate the need for the first stage section when the EIS recommends a two stage system at the Jackson Pike Plant to meet an identical effluent standard.

2. Jackson Pike Plant Influent Loads

The EIS methodology for the determination of influent wastewater characteristics appears to be significantly in error and results in reduced treatment and disposal facilities at the plant. According to the City of Columbus comments, the error was introduced as a result of an assumption of heat-treatment recycle strengths.

The EIS should re-evaluate this assumption and adjust the recommendations accordingly. If the influent strength cannot be accurately determined,

the methodology and assumptions used should be on the conservative side to insure adequate facilities to meet the stringent effluent limits imposed.

3. Treatment Unit Design Criteria

With the exception of the first stage biological treatment at the Southerly Plant and what to do with the in-plant recycles, the EIS agrees with the Facilities Plan selection of the treatment processes to be utilized at both plants. However, the EIS has taken the liberty to redesign individual unit processes using criteria that results in a significant scale-down of facilities.

Many of the members of the DCGC are engineering consultants with considerable experience in the wastewater treatment field. Their experience would indicate that these design criteria are not in conformance with recognized engineering practice. A review of the City of Columbus and Ohio EPA comments supports this viewpoint. In addition, both the OEPA and the City of Columbus hase stated that many of the design criteria are not approvable by the regulatory agencies and they both have suggested, and we concur, that facilities designed on this basis will not meet the strict effluent limitations imposed on the plants and will result in serious adverse environmental impacts.

We would agree with the City of Columbus that the design of treatment plants of this magnitude cannot deviate from normal practice unless sufficient data supported by adequate in-plant pilot testing is available on which to base such a design. We further agree that utilizatior

of unconventional design criteria and unproven technology is inappropriate during the Facilities Plan and EIS planning process.

Concerning recycles, the EIS should re-evaluate its recommendations. Utilization of unproven technology should be eliminated and facilities should be provided for treatment of the entire recycle flow. We would suggest that recycle treatment is more important and more significant than the pretreatment of a compatible industrial waste.

4. Sludge Incinerators

One of the major reasons used by USEPA to justify preparation of the EIS was to determine if additional sludge incineration facilities should be constructed at the City's two treatment plants. The City has had plans for such construction since 1970 at Southerly and 1974 at Jackson Pike, and first requested Federal funding approximately four years ago. The Development Committee has agreed and still agrees with the City and its consultants that incineration is the preferable alternative for the Columbus Metropolitan Area. Review of the EIS indicates that the consultants who assisted in its preparation also agree with the City's recommendations for incineration. Considering the present situation at both plants, we find it irresponsible that the EIS has not yet resolved this most critical issue. We believe that incineration is presently the most viable and reliable method available for Columbus, and that USEPA must immediately resolve the air quality issue so that additional facilities can be approved.

Summary

We find many inconsistencies in the EIS and there are basic issues on which we wholly disagree with the EPA recommended alternatives.

The Facilities Plan prepared by the City of Columbus represents what the Development Committee for Greater Columbus is firmly convinced represents a most logical, well supported, adequate and cost effective plan.

Alternatives suggested by EPA are not acceptable and we strongly support the City's plan. We urge its approval by EPA.

(5.3.5)

5.3 Development Committee For Greater Columbus

5.3.1 Comment: Certainly conclusions regarding population projections by personnel with great expertise should have more validity than figures developed by persons unfamiliar with the area (and who we assume must be using national average figures for urban areas).

Response: The authors of the EIS worked closely with local planners and demographers regarding the population projections. National average figures for urban areas were not utilized in any manner.

5.3.2 Comment: The concept of using force mains instead of a gravity system violates the principle on which our entire program has been developed. Force mains present operational problems, odors at the pump stations, and is an effort by U.S. EPA to restrict or completely control growth.

Response: Please see responses related to this issue (4.1.19, 24, 27, 5.2.4, and others).

5.3.3 Comment: The EIS Interceptor Alternatives is based on population projections for a 20 year design period with the sewer flowing half full. This has no direct relationship with design of the interceptor sewers on an ultimate population basis (the design used by the City of Columbus) since there is nothing to prevent population projections in the next 20 years from tripling, quadrupling, or more, leaving the original installation substantially undersized.

Response: Please see the response to Comment 4.1.19.

5.3.4 Comment: At the least you can say our people were shocked to discover that pretreatment, using a trickling filter process, was recommended to handle effluent at the Anheuser-Busch brewery north of S.R. 161. Certain conclusions from reviewing that item were quite disturbing.

Response: The points raised by the Development Committee for Greater Columbus regarding pretreatment of the brewery waste have already been covered in responses to comments made by Anheuser-Busch and the City of Columbus. See also Volume I Chapter 3.

5.3.5 Comment: Most of the disagreements between the draft EIS and the Columbus Facilities Plan for the wastewater treatment plants fall into four major areas:

1. Pretreatment of brewery wastes and accompying reductions of influent loads and required facilities at the Southerly Plant;

2. Reduced influent loads at the Jackson Pike Plant;

3. Criteria used for design of individual treatment units; and,

4. The environmental compatibility of additional sludge reduction incinerators.

The Facilities Plan prepared by the City of Columbus represents what the Development Committee for Greater Columbus is firmly convinced represents a most logical, well supported, adequate and cost effective plan. Alternatives suggested by EPA are not acceptable and we strongly support the City's plan.

Response: The specific points raised within the four areas of disagreement have already been discussed in previous responses to comments made by Anheuser-Busch, the City of Columbus, and Ohio EPA and our findings are summarized in Volume I.

APPENDIX AA

EVALUATION OF THE WASTEWATER TREATMENT PROCESSES PROPOSED FOR COLUMBUS, OHIO IN THE DRAFT EIS

ENERGY AND ENVIRONMENTAL ANALYSIS, INC.

EVALUATION OF THE WASTEWATER TREATMENT PROCESSES PROPOSED FOR COLUMBUS, OHIO IN THE DRAFT EIS

by
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July 21, 1978

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TABLE OF CONTENTS

		Page
Section I	Introduction and Purpose	1
Section II	Technical Assessment of Proposed Southerly Scenarios.	3
	A. Background	3
	B. Assessment of the Need for Brewery Waste Flow Control	4
	C. Evaluation of Potential Fungus Problems.	5
	D. Evaluation of Potential Filamentous Growth Problems.	7
	E. Assessment of Proposed Pretreatment Systems	11
	F. Assessment of Solids Handling Needs.	13
Section III	Technical Assessment of the Proposed Jackson Pike System.	15
Section IV	Evaluation of Environmental Issues	17
	A. Evaluation of Potential Odor at Proposed Pretreatment Site.	17
	B. Evaluation of Potential Odor and Corrosion in the Sewers Resulting from the Proposed Brewery Pretreatment. . . .	18
	C. Evaluation of Increased Sewer Explosion Risk Resulting from the Proposed Brewery Pretreatment.	19
Section V	Evaluation of the Findings on the Cost-Effectiveness Analysis	20

TABLE OF CONTENTS (Continued)

		Page
Section VI	Findings and Recommendations	24
Appendix A	Calculations	26-
Appendix B	Bibliography	39

SECTION I

INTRODUCTION AND PURPOSE

The "Draft Environmental Impact Statement-Wastewater Treatment Facilities for Metropolitan Area-Columbus, Ohio" dated February, 1978 evaluated four potential treatment scenarios to find the most cost-effective and environmentally sound approach to meet the required NPDES effluent limitations for the Southerly plant. In addition, the Draft EIS evaluated one scenario for the Jackson Pike plant. The four scenarios for the Southerly plant involved ever-increasing degrees of pretreatment of brewery waste from no pretreatment to separate treatment. These scenarios are:

1. Brewery wastes without pretreatment as recommended by the "Cost-Effective Analysis-Columbus Metropolitan Area Facilities Plan".

2. Pretreatment of the brewery waste to a point that the soluble oxygen demand is largely removed (a roughing filter at Anheuser-Busch).

3. Pretreatment of the brewery waste to remove and handle the majority of the oxygen demand and suspended solids.

4. Total brewery waste treatment to levels equivalent to Southerly NPDES effluent restrictions (separate municipal and industrial waste treatment).

Primary treatment, intermediate roughing trickling filters, activated sludge and filtration without industrial pretreatment was the system recommended for both the Jackson Pike treatment plant and Southerly treatment plant in the facilities plan. In

the facilities plan, five alternative systems were evaluated for each plant, none of which involved pretreatment of brewery wastes. The last three scenarios above were not evaluated in the facilities plan's cost-effectiveness analysis.

The purpose of this report is (1) to assess the suitability and reliability of the four proposed scenarios for the Southerly plant and the one for the Jackson Pike plant; (2) to evaluate the environmental issues of the proposed treatment scenarios; and (3) to evaluate the impact of these findings on the cost-effectiveness analysis.

This report uses engineering and microbiological principles to evaluate the proposed systems. The calculations of biological buildup, sludge production and effluent quality have been based on meeting the NPDES requirements stated in the Draft EIS, and the assumptions and methodology are consistantly applied to all the Southerly scenarios and the Jackson Pike scenario. The calculations reflect the necessity to nitrify the ammonia nitrogen to 1 mg/l (30-day average)/1.5 mg/l (7-day average) for the period July-October and 2.5 mg/l (30-day average)/5.0 mg/l (7-day average) for the period November-December.

SECTION II

TECHNICAL ASSESSMENT OF PROPOSED SOUTHERLY SCENARIOS

A. Background

Brewery waste from the Anheuser-Busch plant is presently discharged to Columbus, Ohio's Southerly treatment facilities. The BOD_5 load of the brewery waste was estimated to be between 99,000 to 107,000 lb/day in 1976. This is 55 percent to 59 percent of the 180,000 lb/day total BOD_5 load received at the plant (per DEIS page I-31). Now the BOD_5 load to the treatment plant is to average 60,000 lb/day with daily maximums of 75,000 lb/day. However, the brewery waste flow is estimated to be only about 3 MGD of 60 MGD flow at the plant. The brewery waste is highly concentrated (approximately 4000 mg/l of BOD_5), is highly soluble BOD_5, and is low in nutrients (nitrogen and phosphorus). It is unlike domestic or non-brewery wastewater, which has a lower concentration of BOD_5 (around 200 mg/l) and a higher proportion of suspended or colloidal BOD_5 as well as a surplus of the nutrients (nitrogen and phosphorus) needed for bacterial growth. Because of the brewery waste, peak BOD_5 concentrations reach 1000 mg/l at Southerly (per DEIS, p. A-28).

The brewery waste contains high concentrations of soluble carbohydrate waste. This type of waste can induce growth of fungus or filamentous growth. If either of these types of growth become prevalent or dominant in an activated sludge system, a bulking sludge can result. Bulking results in poor settling in clarification and the activated sludge can overflow the weirs. This results in an effluent with high suspended solids and BOD_5 levels. Also, the settled sludge is less concentrated and often more difficult to process.

Therefore, the joint treatment of brewery wastes and domestic non-brewery wastes must be designed and operated differently than a plant treating strict domestic wastes.

B. Assessment of the Need for Brewery Waste Flow Control

If BOD_5 levels of 1000 mg/l are received at an activated sludge plant, conventional activated sludge aeration equipment cannot easily maintain desired dissolved oxygen levels in the aeration tanks. Also, most conventional trickling filters cannot maintain aerobic conditions under these conditions. Septic conditions and odor can result from these shock loadings of BOD_5.

First, the rate of discharge of brewery waste should be managed to prevent BOD_5 loading in excess of 400 to 600 mg/l. This is common to all scenarios. Schroeder and Tchobanoglous have recently found that BOD_5 of 500 to 600 mg/l may cause the mass transfer rate of oxygen to become limiting in a plastic media trickling filter (JWPCF, 48, pp. 1275-1276). Similarly, in activated sludge, shock BOD_5 loadings require increased aeration, especially with a high biodegradable waste such as brewery waste. Increased aeration equipment needs to be provided. However, increased aeration and agitation of the activated sludge may result in shearing of the bacterial floc particles and result in poor settling. Therefore, the rate of release should be managed to insure that BOD_5 concentrations at the plant remain less than 400 to 600 mg/l to prevent treatment process upset and/or loss of plant efficiency.

If the non-brewery waste contains approximately 200 mg/l BOD_5, the brewery waste must be contributing up to approximately 800 mg/l BOD_5 to cause the 1000 mg/l BOD_5 measured at Southerly. If the maximum load on the secondary process is to be limited

to 600 mg/l or less of BOD_5, then the brewery waste contribution must be approximately 400 mg/l or less when averaged over the total flow to the Southerly plant. Thus, for Scenario #1, the maximum untreated brewery waste discharge rate must be reduced to about half of the existing rate to prevent shock loadings. Under the brewery waste load assumptions stated in the DEIS, the proposed flow neutralization tanks have a maximum pumping capacity of 9.4 MGD for the 60,000 lb/day of BOD_5 assumption and 13.0 MGD for the 100,000 lb/day BOD_5 assumption and result in the waste being discharged at a minimum of a 10-hour and a 12-hour period, respectively. For an 85 MGD plant at Southerly, at a 60,000 lb/day BOD_5 load rate over 10 hours, excess BOD_5 is not expected unless the flow to Southerly is less than 43.2 MGD. At 100,000 lb/day BOD_5 load rate over 13 hours, excess BOD_5 is not expected unless the flow to Southerly is less than 55.3 MGD.

In the period prior to this, the pumps' capacity could be estimated and limited as below:

$$\left[\frac{(\text{Daily } BOD_5 \text{ of Brewery}) \text{ \#/day}}{\dfrac{\left[(\text{Daily Brewery Volume}) \text{ MG}\right]}{(\text{Pump Rate}) \text{ MGD}}} \cdot \frac{1}{\left[8.34 \times (600-200)\right]}\right] \leq \begin{array}{l}\text{minimum hourly flow} \\ \text{(in) MGD at} \\ \text{Southerly}\end{array}$$

C. Evaluation of Potential Fungus Problems

The generic formula for aerobic bacterial cells can be expressed as $C_5H_7O_2N$. Nitrogen is 12.4 percent by weight of the bacterial mass. Also, the phosphorus level is approximately 20 percent of the nitrogen level or 2.5 percent by weight of the bacterial mass. Based on secondary biomass production figures (approximate) which I calculated for Southerly in the

Table 1

Comparison of Nutrient Requirements and Nutrient Availability of Proposed Scenerios (1995-2000) at Southerly (at 60,000 lb/day brewery waste)

	Biological Mass Produced	Nitrogen Required	Nitrogen Available	Phosphorus Required	Phosphorus Available
Scenario #1	105,993 lb/day	13,143 lb/day	23,000 lb/day	2629 lb/day	6,300 lb/day
Scenario #2	56,558 lb/day	7013 lb/day	23,000 lb/day	1403 lb/day	6,300 lb/day
Scenario #3	53,518 lb/day	6636 lb/day	23,000 lb/day	1327 lb/day	6,300 lb/day
Pretreatment or Separate Brewery Facility for Scenario #2, 3, & #4	17,500 lb/day	2170 lb/day	1200 lb/day	434 lb/day	240 lb/day

period 1995-2000 for the 60,000 lb/day of brewery waste, the Southerly plant should not have a fungus problem as shown in Table 1 for any scenarios. However, the brewery pretreatment facility in Scenarios #2, #3, and #4 may get into a fungus problem unless the nitrogen and phosphorus additions are double those levels of the McWhorter and Associates design.

D. Evaluation of Potential Filamentous Growth Problems

Filamentous growth (wire-like bacterial growth) of one type or another has a metabolic advantage in soluble wastes because of their high surface area to volume ratio compared to zooqloeal mass growth (ball shaped clusters of bacteria). Also this high surface area to volume characteristic gives filamentous growth the metabolic advantage in activated sludge systems with low dissolved oxygen. Filamentous bacteria are more competitive in utilizing the scarce oxygen for metabolism. Also, if filamentous bacteria occur in the influent in activated sludge unit, they can seed, thereby encouraging filamentous growth.

Filamentous growth does presently exist at Southerly. This growth has been identified morphologically (visually) as a blue-green algae phormidium or schizothrix (per Sykes; Drouet; and Taft) in the activated sludge. Anheuser-Busch, Inc. believes that its waste could not be the cause of a blue-green growth. Sykes work, however, shows that the filamentous growth believed to be blue-green algae does respond to brewery wastes. Anheuser-Busch, Inc. would have a point if the filamentous growth was algae. However, after review of Sykes results and of Southerly data, I believe the filamentous growth is a filamentous photo-synthetic bacteria. These organisms can be very much like non-photosynthetic bacteria except they use photosynthetic energy for metabolism instead of chemisynthetic energy. Photosynthetic bacteria can grow anaerobically and can metabolize H_2S or organic

residues. Unlike algae, once exposed to the light, they can proceed with metabolism in the dark. In an aeration basin with a dissolved oxygen level of a few tenths of a milligram per liter, as observed at Southerly, these photosynthetic filamentous bacteria could easily thrive on H_2S and soluble organic residue from the brewery waste. This further explains why Sykes was unable to culture what he thought to be blue-green algae on "Chu No. 10 medium" for blue-green algae. His culture efforts were successful when sewage extract, soil extract, and acetic acid were used with Bold's Busal medium. This observation is consistent with my theory that the filamentous organism is probably a photosynthetic bacteria. Also, Sykes observed that the filamentous organisms did not thrive in high dissolved oxygen. Again conventional bacteria would metabolically overtake photosynthetic bacteria, in a case where dissolved oxygen is not limited.

Eliminating the confusion about blue-green algae, and, assuming that all the activated sludge systems can maintain adequate dissolved oxygen levels, I calculated the amount of suspended or colloidal BOD_5 vs. the soluble BOD_5 and the amount of normal colloidal suspended solids vs. the amount of potentially filamentous solids that could seed the activated sludge. These calculations were used to determine which systems would be subject to filamentous problems.

Trickling filters tend normally to have filamentous type growth and high soluble organic levels further encourage this tendency. Also, high loading rates and little control of ventilation results in poor dissolved oxygen profiles in the trickling filter slime. Further, the colloidal organic matter could also become contaminated with filamentous growth.

As shown in Table 2, Scenario #1 could have between 48.5 and 100 percent of the solids seed from biological growth

created from metabolism of soluble organics in the roughing filter as filamentous growth. Thus, this system is highly susceptible to filamentous growth.

As seen in Table 2, the mixed liquor (MLSS) in the second stage activated sludge process in Scenario #1 is more diluted and would favor filamentous organisms. Also, total waste sludge solids are low in comparison to the incoming filamentous organisms. Filamentous organisms are less likely to be purged from the system. Scenarios #2 and #3, though having higher percentages of soluble BOD_5, have much lower potential for filamentous seed, higher average mixed liquors, and larger total waste activated sludge quantities.

It is my opinion that at Southerly, Scenario #1 would be subject to troublesome filamentous growth and Scenarios #2, #3, and #4 would not. Also, Scenario #1 is similar to existing conditions. The Southerly plant has operated without detrimental filamentous growth, as in February and March of 1976, and has operated with severe filamentous growth in other months. The major change from existing conditions is the aeration equipment that would be able to maintain higher dissolved oxygen levels. The changes are marginal and no design safety factor exists. Also, nitrification did not occur when filamentous growth was in control. Thus, increased aeration may help improve operation, but will not improve the system's reliability as much as in Scenarios #2, #3, or #4. Also, the existing Southerly plant should be able to meet secondary treatment criteria as defined by EPA by implementing any one of the pretreatment systems invisioned for Scenario #2, #3, or #4.

Nitrification of the ammonia nitrogen is needed to comply with the NPDES requirements stated in the Draft EIS. The ammonia nitrogen must be reduced to 1.0 mg/l (30-day average)/1.5 mg/l

Table 2

Analysis of Potential Filamentous Growth (1995-2000)
for Scenarios #1, #2, #3, and #4 at Southerly
(at 60,000 lb/day brewery waste)

	Total BOD_5 Demand Applied to Activated Sludge System	Soluble BOD_5 Applied	% Soluble BOD_5	Total Seed Solids	Potentially Filamentous Seed	% Potentially Filamentous	Total Waste Activated Sludge Solids	Potentially Filamentous to Waste-Activated Sludge Ratio	Ave. MLSS Contraction
Scenario #1	53,600 lb/day	20,000 lb/day	37.3%	28,350 lb/day	13,750 lb/day to 28,350 lb/day	48.5% to 100%	38,332 lb/day	0.36 to 0.74	2209 mg/l
Scenario #2	115,800 lb/day	65,000 lb/day	56%	76,300 lb/day	7,000 lb/day to 11,500 lb/day	9.2% to 15.1%	63,647 lb/day	0.09 to 0.15	3669 mg/l
Scenario #3	108,060 lb/day	65,000 lb/day	60%	70,450 lb/day	1376 lb/day to 2260 lb/day	2.0% to 3.2%	60,607 lb/day	0.02 to 0.03	3493 mg/l
Scenario #4	144,800 lb/day	100,000 lb/day	69%	70,800 lb/day	0	0%	75,635 lb/day	0.0	4360 mg/l
Existing Conditions	184,896 to 136,896	156,160 to 108,190	84% (with thermal conditioning return flow) 79% (without thermal conditioning return flow)						

(7-day average) for the period July-October and 2.5 mg/l (30-day average)/5.0 mg/l (7-day average) for the period November-December. For the period January-June no requirements exist. To achieve the required level of nitrification, the sludge age (or sludge retention time [SRT]) must be high (at least an SRT of 12.5 days). This requirement can make an activated sludge system susceptible to filamentous growth because, 1) there is an added demand for oxygen for the nitrifying bacteria which may prevent maintenance of high dissolved oxygen in aeration, and 2) high SRT sludges are subject to filamentous growth and you cannot waste out the filamentous growth quickly to purge it from the system without loss of the slower growing nitrifying bacteria.

E. Assessment of Proposed Pretreatment System

The performance of a roughing filter without clarification is difficult to predict. However, since some estimates can be made, the 70 percent removal of soluble BOD_5 is a reasonable prediction at 100 lbs $BOD_5/1000\ ft^3$ loading rate. This is consistent with Havens and Emerson's use of Fluor data and the equation used by McWhorter and Associates. It is difficult to predict solids generation or the BOD_5 level of the solids. However, at these high loading rates there is little chance for endogenous respiration or solids stabilization. Rather soluble BOD_5 will simply be converted to bacterial and fungal solids. Using McCarty's equation:

$$\frac{\Delta M}{\Delta t} = a \frac{\Delta F}{\Delta t} \quad 1 - \frac{0.8b\ (SRT)}{1+b\ \ (SRT)}$$

$$\frac{\Delta M}{\Delta t} = \text{volatile solids produced/day}$$

$a = 0.46$ (per McCarty)

b = specific maintenance rate
$= 0.18\ (1.047)^{T-28}$ in ^{o}C

SRT = solids retention time or equivalent

$$\frac{\Delta F}{\Delta t} = BOD_5/day \times \frac{BOD_U}{0.68\ BOD_5}$$

Assuming 20°C and a low SRT (above wash out, say 3-4 days), the solids generated from the 35,000 lb soluble BOD_5/day removal is approximately equal to 50 percent of the soluble BOD_5 removed or 17,500 lb/day of solids generated. This level, assumed by McWhorter and Associates, is reasonable.

However, the assumption by McWhorter and Associates, Inc. that the BOD_5 level of the suspended solids is equal to 20 percent of the BOD removal is unreasonably low. Suspended solids generated in low SRT systems are approximately equal to BOD_5. Also, some of the suspended BOD_5 may be captured and metabolized. I used an estimate of 50 percent capture of suspended solids and a 50 percent BOD_5 reduction of those solids. McWhorter estimated that 29,980 lb/day of BOD_5 is removed (34,850 lb/day for soluble BOD_5 less 6,970 lb/day for BOD_5 of generated solids, plus 2100 lb/day of BOD_5). I estimated that 20,000 lb/day of BOD_5 would be removed (35,000 lb/day for soluble BOD_5 less 17,500 lb/day for BOD_5 of generated solids, plus 2500 lb/day for removal of suspended BOD_5).

Of the two design concepts, the McWhorter and Associates, Inc. is more conservative than that of Havens and Emerson, both in trickling filter loading (100 lb BOD_5 $1000/ft^3$ vs. 180 lb BOD_5 1000 ft^3) and assumed flow (3.9 MGD vs. 3.0 MGD). McWhorter's design uses three stages, which will have fewer short-circuiting problems, a better ventilation system, which gives better control of aeration. Cutting corners on the pretreatment design could

result in less efficient removals and odor. The more conservative design by McWhorter is a useful approach to serve as a basis for the upper limit of pretreatment cost.

F. Assessment of Solids Handling Needs

My calculations for Scenario #1 indicate that there will be less sludge than estimated in the Draft EIS as shown in Table 3. Also, I estimate slightly greater quantities of primary sludge and significantly lower production of secondary solids.

For a 60,000 lb/day brewery waste load, Scenario #2 has 17 percent less solids than Scenario #1, and Scenario #3 has 26 percent less solids than Scenario #1.

The question is whether any further reduction in solids handling can result at Southerly as a result of this reduction. The Draft EIS for Scenario #1 assumes the use of existing secondary digesters as thickeners and use of existing thermal conditioning units. No saving can be gained in these areas for Scenarios #2 or #3 because no new facilities will be eliminated. However, opportunity exists to reduce centrifugation and incineration capacity at Southerly for Scenario #2 and Scenario #3. One centrifuge can be eliminated for Scenario #2, and possibly two for Scenario #3 at a 60,000 lb/day brewery waste load assumption. Also, at the lower brewery loading, one incinerator could be dropped in capacity from 200 wet tons/day to 170 wet tons/day for Scenario #2, and two incinerators could be dropped in capacity from 200 wet tons/day to 170 wet tons/day for Scenario #2, and two incinerators could be dropped in capacity from 200 wet tons/day to 170 wet tons/day for Scenario #3.

Table 3

Comparison of Sludge Quantities
for Scenarios at Southerly (1995-2000)
(at 60,000 lb/day brewery waste)

	Total Primary Sludge	Trickling Filter Sludge		Estimated Waste Sludge		Phosphorus Removal Sludge		Total Secondary Sludge	Total Sludge
Scenario #1 Draft EIS (PI-2)	99,100 lb/day	-		-		-		178,500 lb/day	277,600 lb/day
Scenario #1 (calculated)	106,200 lb/day	74,750	+	31,243	+	23,800	=	129,793 lb/day	235,993 lb/day
Scenario #2 (calculated)	114,450 lb/day	0	+	56,558	+	23,800	=	80,358 lb/day	194,808 lb/day
Scenario #3 (calculated)	100,500 lb/day	0	+	53,518	+	23,800	=	77,318 lb/day	177,818 lb/day

SECTION III

TECHNICAL ASSESSMENT OF THE PROPOSED JACKSON PIKE SYSTEM

The main issue at Jackson Pike is to determine if the intermediate trickling filter and intermediate clarifier are needed. Facilities with and without intermediate trickling filter systems at Jackson Pike can be designed to reliably meet NPDES requirements as stated in the Draft EIS. The use of the intermediate trickling filter system would result in a lower BOD_5 loading to the existing system. This would allow the system to operate at a lower mixed liquor suspended solids level. The overall solids production could, however, be decreased if the intermediate trickling filter system is eleminated and the aeration tanks and final clarifiers expanded in their place.

With the intermediate trickling filter system, my calculations indicate that the average mixed liquor needs to be 2185 mg/l based on 25.9 million gallons of aeration, or 1797 mg/l based on 31.5 million gallons of aeration. The Draft EIS references both sizes. Using the same tankage, without this intermediate system, the existing mixed liquor would have to be 4090 mg/l based on 25.9 million gallons of aeration, or 3364 mg/l based on 31.5 million gallons of aeration. This increase in solids may require an expanded activated sludge system with more blower capacity, aeration tankage, and clarifier surface area. An increase of 5-10 MG of aeration capacity and a 50 percent increase in clarifier overflow rate may be desirable.

The secondary sludge production would increase with the intermediate trickling filter system. My calculations show that the secondary sludge, which is the most difficult to handle, would be increased to 87,108 lb/day with the intermediate trickling filter from 61,529 lb/day without the intermediate trickling

filter, approximately 40 percent more. The total sludge would be approximately 11 percent more with sludge productions of 257,108 lb/day with the intermediate trickling filter and 231,529 lb/day without it.

Therefore, if the advantages of a lower sludge production are more desirable, then the other factors such as the increased cost of construction and operation of aeration equipment and tankage and of additional clarification, then elimination of the intermediate trickling filter has merit. This is based on the proposed loading stated in the Draft EIS and the fact that no new major wastes high in soluble BOD are to be received in the future.

SECTION IV

EVALUATION OF ENVIRONMENTAL ISSUES

A. Evaluation of Potential Odor at Proposed Brewery Pretreatment Site

The BOD_5 levels of the brewery waste vary widely and average approximately 4000 mg/l. If a plastic media roughing filter is used, excessive odor is highly likely due to H_2S. Theoretically, Schroeder and Tchobanoglous determined the limits of oxygen transfer on plastic media trickling filters. They concluded, "When the BOD concentrations in excess of 500 to 600 mg/l are applied (to a plastic media trickling filter), the mass transfer rate of oxygen may become limiting. The probability of odor production will also increase under these conditions." Also, Bell and Tsumpes report experience in the operation of the Sewer District No. 2 plant in Jacksonville, Florida, which receives almost entirely brewery wastes from a similar Anheuser-Busch, Inc. plant that has odor problems. The Jacksonville plant does not control pH. With an uncontrolled pH, this practical experience substantiates the Schroeder and Tchobanoglous determinations. The odor will probably be predominantly hydrogen sulfide which, if the pH is increased to a pH of 8, can be mitigated.

Covering of the trickling filter as proposed by McWhorter and Associates, Inc. is a necessity. Also, ozonation of vented air and pH adjustment to pH 8 are recommended to mitigate the odor problem. Experience in Jacksonville shows the necessity for use of corrosion-resistant material in the trickling filter distribution system, the dome, and wall construction. The cause of this corrosion is probably the bacterial oxidation of hydrogen sulfide to sulfuric acid. The bacteria, thiobacillus, are aerobic and metabolize the hydrogen sulfide in condensed moisture to sulfuric acid. The acid, in turn, corrodes the materials.

Elevation of the pH to 8 forces most of the hydrogen sulfide gas into soluble ions (HS^- or S=). Since the proposed plant has neutralization facilities, pH levels can be elevated with extra chemical addition.

B. Evaluation of Potential Odor and Corrosion in the Sewers Resulting from Proposed Brewery Pretreatment

Hydrogen sulfide is biologically produced in sewers when oxygen and nitrate are unavailable as electron acceptors. The sulfate in the water serves as the electron acceptor for certain bacteria and hydrogen sulfide is produced.. The bacteria, desulfavibrio desulfuricans, dehydrogenate organic compounds. However, the roughing filter converts easily dehydrogenated soluble organics into bacteria or fungus solids, these solids contain more complex molecules. Thus, the roughing filter will not have any worse odor than the existing conditions and some mitigation of hydrogen sulfide production in the sewers may result. If adjustment to the pH is made in the roughing filters, further alleviation of existing odors is likely.

Corrosion results if condensed moisture builds up on the top of the sewer, and thiobacilli grow and metabolize the hydrogen sulfide gas to sulfuric acid. Since there will be no more or even less hydrogen sulfide gas, corrosion will also be no more and perhaps even less than current conditions. It is desirable to surge the line periodically to wash out or prevent any buildup of thiobacillus-laden moisture on the top of the sewer. Some flow variation in the intermediate discharge sewers for the Anheuser-Busch plant can be beneficial in this matter. Surging of immediate discharge sewers for the Anheuser-Busch plant should not be done with high strength wastes as this surge of high strength waste may result in shock loadings to Southerly.

C. Evaluation of Increased Explosion Risk Resulting from Proposed Brewery Pretreatment

There should be no increase in the explosion risk over existing conditions with the implementation of pretreatment. The pretreatment may even mitigate any explosion risk that may exist. Methane-producing bacteria can only produce methane from acetic acid, propionic acid and/or other highly soluble volatile acids. These volatile acids or their precursor forms in the brewery waste are also the most likely forms of soluble BOD_5 to be converted into bacterial cells in the pretreatment system. Therefore, there is less substrate for such organism to metabolize. The produced bacterial cells would have to die and then be metabolized anaerobically to volatile acid forms before methane production can occur.

Also, methane bacteria are slow growing and extremely sensitive to low pH, oxygen, and heavy metals such as copper. To get methane production, long periods of stagnant conditions are needed. First, the bacteria must convert the soluble or solid substance to volatile acids and then the bacteria producing the methane need to be free from pH change, oxygen and heavy metals. Such conditions are rare in sewers, especially those with small diameters. Most sewers are designed to flush out solids with a specific gravity of 2.7. The solids produced in the pretreatment unit will have a specific gravity of 1.002 to 1.005.

The Allentown case submitted by Anhueser-Busch, Inc. to prove methane gas occurrence in a similar situation is irrelavent. The two deaths were from asphyxiation. This merely proved that the sewer system had no oxygen in it. This is the norm in sewers. No proof or evidence of methane gas is presented.

SECTION V

EVALUATION OF THE FINDINGS ON THE COST-EFFECTIVENESS ANALYSIS

The cost for the pretreatment of brewery waste should be based on McWhorter and Associates, Inc. figures. The numbers should reflect the following changes. The chemical cost should be double for additional nutrient and pH control. The power cost should increase roughly 15% for ozone (exact ozone need uncertain). The capital cost could increase up to 15% for ozone equipment and corrosion resistant materials.

The 1974/1975 operating cost would be adjusted as below:

	100,000 #/day		60,000 #/day	
	McWhorter	Adjusted	McWhorter	Adjusted
Labor	$68,000	$68,000	$68,000	$68,000
Chemicals	30,000	60,000	23,000	46,000
Power	79,000	91,000	56,000	64,400
Maintenance	74,000	74,000	69,000	69,000
	$251,000/ year	$293,000/ year	$216,000/ year	$247,400/ year
Used in Draft EIS		$300,000/ year		$200,000/ year
Adjust Scenario #2		-0-		$50,000

The 1974/1975 capital cost would be as below:

100,000 lb/day		60,000 lb/day	
McWhorter	Adjusted	McWhorter	Adjusted
$5.9 million	$6.8 million	$5.5 million	$6.3 million
Used in Draft EIS	$4.2 million		$2.9 million
Adjust Scenario #2, #3, & #4	$2.6 million		$3.4 million

My technical analysis shows that solids handling costs in Scenario #2 and #3 should be reduced. The solids handling reductions have been accounted for in Table 4 (p. 13 of the Draft EIS) for Scenarios #2 and #3. Perhaps for Scenario #3, an additional $1.0 million savings in capital cost are possible from the elimination of an additional centrifuge and reduction of incineration capacity.

Appendix K of Draft EIS "Design Quantities and Unit Process Sizing for the Recommended Treatment Facilities" was reviewed for other items that may impact the cost-effectiveness analysis. The review is summarized in Table 4. If the intermediate trickling filter and intermediate clarifiers are eliminated at Jackson Pike and replaced with increased activated sludge aeration capacity and increased final clarification, it was assumed in this report that the cost of the eliminated systems and the cost of the added facilities were roughly equal.

As can be seen in Table 5, after all the above adjustments were made, the relative order of the four Scenarios in the Draft EIS is the same. However, the differences in cost-effectiveness are smaller.

TABLE 4

COMMENTS ON APPENDIX F OF DRAFT EIS
"DESIGN QUANTITIES AND UNIT PROCESS SIZING FOR THE
RECOMMENDED TREATMENT FACILITIES"

	Southerly	Jackson Pike with Intermediate Trickling Filter System	Jackson Pike Without Intermediate Trickling Filter System	Remarks
Pretreatment & Primary Sedimentation	OK as stated	OK as stated	OK as stated	None
First Stage Biological Treatment	Elimination of roughing filter is OK as stated.	OK as stated	Additional elimination of roughing filter is possible.	Sludge savings at Jackson Pike is a benefit; however, a larger activated sludge system is needed.
Second Stage Biological Treatment	OK as stated	OK as stated	5-10 MG of aeration capacity may be desirable.	In lieu of roughing filter, additional aeration capacity could be beneficial.
Secondary Clarification	OK as stated	OK as stated	50% increase in secondary clarification may be desirable.	In lieu of intermediate clarification, additional final clarification could be beneficial.
Final Effluent Filtration	OK as stated	OK as stated	OK as stated	None

TABLE 5

COST COMPARISON OF ALTERNATE BREWERY WASTE TREATMENT SCENARIOS[1]
(Millions of Dollars, 1974/1975 Basis)

	Scenarios							
	100,000 lb/day raw Brewery Load				60,000 lb/day raw Brewery Load			
	1	2	3	4	1	2	3	4
I. Capital Cost Estimate - $								
Brewery	0	6.8	14.0	33.4	0 0	6.3	10.7	23.7
Southerly	66.4	48.1	41.9	41.9 (1)	66.4	41.9	40.9	41.9
Total	66.4	54.9	55.9	75.3	66.4	48.2	51.6	65.6
II. Operating Cost Estimate - $/Year								
Brewery	0	0.3	0.9	1.3	0	0.25	0.5	0.8
Southerly	5.5	5.4	5.3	5.4	5.4	5.4	5.3	5.3
Total	5.5	5.7	6.2	6.6	5.4	4.65	5.8	6.1
III. Present Worth Equivalent Estimate - $								
Total	120	113	119	141	119	106	111	127

(1) Draft IES p. 13, Table 4 as adjusted.

SECTION VI

FINDINGS AND RECOMMENDATIONS

1. Scenario #2, #3, and #4 for Southerly should operate reliably to comply with the NPDES requirements stated in the Draft EIS.
2. Scenario #1 for Southerly could have filamentous growth problems that jeopardize reliable operations and compliance with the NPDES requirements stated in the Draft EIS.
3. At Southerly, pretreatment of brewery waste should reduce the sludge quantities from 235,993 lb/day for Scenario #1 to 194,808 for Scenario #2 and to 177,818 for Scenario #3.
4. Brewery waste pretreatment is subject to hydrogen sulfide production, which should be controlled by covering the units, adjusting pH upwards, and perhaps ozone treatment of vented air.
5. Odors and risk of sewer explosions will be mitigated, not created, by pretreatment of brewery waste.
6. The regulation of brewery waste discharge rate is needed and can be simply handled by limiting the capacity of discharge pumps from the equalization tanks at the brewery as calculated using the formula on page 5 of this report.
7. The above findings do not affect the cost-effective ranking of Scenarios at Southerly, but the difference in present worth is somewhat less than that in the Draft EIS.
8. Pretreatment of brewery waste should permit the existing Southerly plant to meet secondary treatment standards as defined by EPA.

9. At Jackson Pike, the use of the intermediate trickling filter (instead of an activated sludge system) increases the secondary sludge by 40 percent, from 61,529 lb/day to 87,108 lb/day and increases the overall sludge by 11 percent, from 231,529 lb/day to 257,108 lb/day.

10. Barring overriding institutional or implementation constraints, Scenario #2 at Southerly is technically and cost-effectively preferable.

11. If Scenario #1 at Southerly is chosen, pilot plant studies are needed for Scenario #1 to determine exact design and operational parameters required for reliable compliance with the NPDES limits.

APPENDIX A

BASIS FOR CALCULATIONS

A. Influent Load

Non-Brewery Wastes for 1995-2000

SS-Draft EIS p. IV-5 for Southerly
p. I-34 for Jackson Pike

Suspended BOD_5 p. I-35 for Southerly

Soluble BOD_5 p. I-34 for Jackson Pike

Brewery Waste for 1995-2000

SS-
Suspended BOD_5 Draft EIS p. I-35
Soluble BOD_5

Sludge Handling for 1995-2000

Estimated assuming treatment of thermal conditioning and other recycle streams.

Existing Conditions at Southerly p. I-31

B. Pretreatment of Brewery Waste

Scenario #2 Effluent

Use • $Le/_{Li} = 3^{-KD}/qn$ @ SRT equivalent of 3-4 days

• BOD_5 of produced biomass = SS

SS = 0.50 soluble BOD_5-removed + 0.75 initial suspended solids

BOD_5 = 0.30 soluble BOD_5 + 0.75 initial suspended BOD_5 + 0.75 soluble BOD_5 removed

Scenario #3 Effluent

As above with 80% SS removal in clarification.

C. Primary Effluent

SS = 0.4 suspended solids

BOD_5 = 0.4 suspended BOD_5 + 1.0 soluble BOD_5
(60% removal in primary clarification)

D. Intermediate Trickling Filter Effluent

Use • $Le/_{Li} = e^{-KD}/qn$ @ SRT equivalent of 3-4 days

• BOD_5 of produced biomass = SS

SS = 0.73 (1-0 suspended solids + 0.5 soluble BOD removed)
(based on 40 mg/l SS in clarified effluent)

BOD_5 = 0.75 suspended BOD_5 + 0.20 soluble BOD_5

E. Activated Sludge

$$\frac{\Delta M}{\Delta t} = 0.46 \frac{\Delta F}{\Delta t} \left[1 - \frac{0.8(b)(SRT)}{1+b\ (SRT)}\right]$$

$\frac{\Delta M}{\Delta t}$ = mass of solids produced/day

$$\frac{\Delta F}{\Delta t} = \text{BOD ultimate} \times \left[\frac{BOD_5}{0.68} + \text{Nitrogen} \times 4.6\right]$$

$b = 0.18\ (1.047)^{T-28}$ @ $10^{o}C$

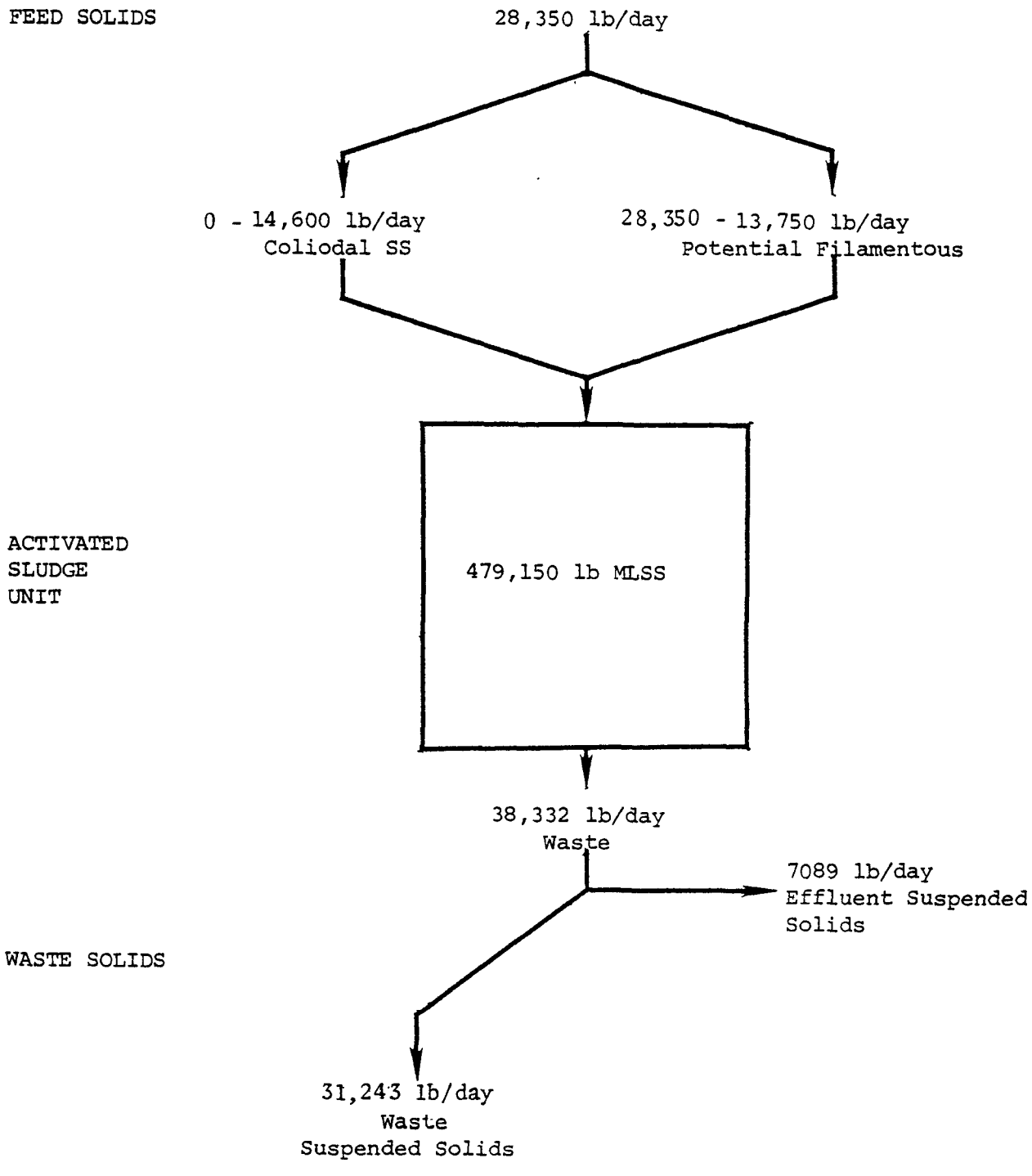
SRT = sludge retention time @ 12.5 days

SS = 10 mg/l

BOD_5 = 6 mg/l

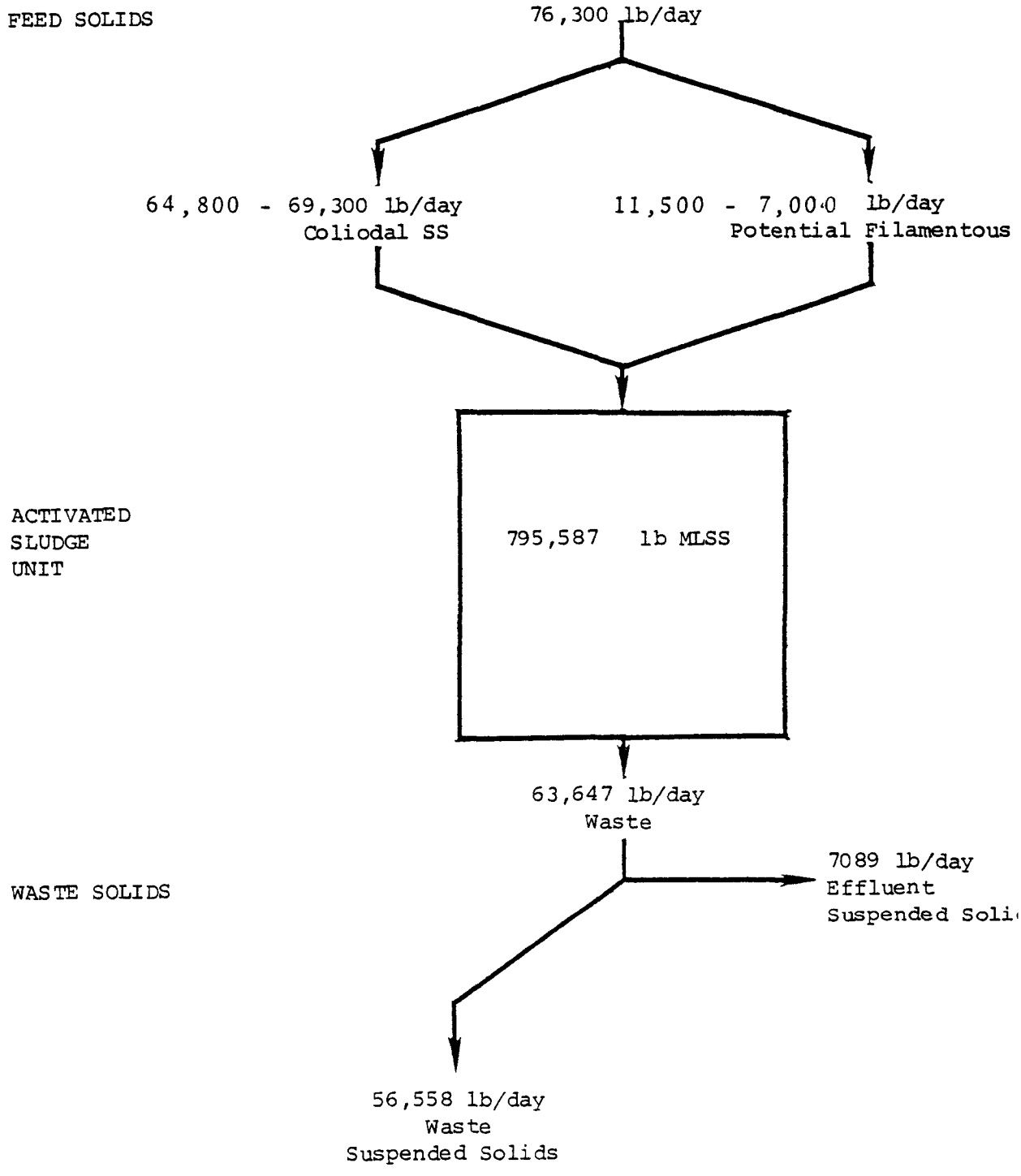
Results of calculations are on the following charts:

SLUDGE	WASTE STEAM COMPONENT			TOTAL
	NON-BREWERY	BREWERY	SLUDGE HANDLING	COMPOSITE WASTE
		Pretreatment Influent Susp. Solids 15,000 Total BOD_5 60,000 Susp. BOD_5 10,000 Sol. BOD_5 50,000		
	Influent Susp. Solids 150,000 Total BOD_5 145,000 Susp. BOD_5 100,000 Sol. BOD_5 45,000	Influent Susp. Solids 15,000 Total BOD_5 60,000 Susp. BOD_5 10,000 Sol. BOD_5 50,000	Influent Susp. Solids 12,000 Total BOD_5 7,000 Susp. BOD_5 2,000 Sol. BOD_5 5,000	Influent Susp. Solids 177,000 Total BOD_5 212,000 Susp. BOD_5 112,000 Sol BOD_5 110,000
Primary Sludge SS = 106,200	Primary Effluent Susp. Solids 60,000 Total BOD_5 85,000 Susp. BOD_5 40,000 Sol. BOD_5 45,000	Primary Effluent Susp. Solids 6,000 Total BOD_5 54,000 Susp. BOD_5 4,000 Sol. BOD_5 50,000	Primary Effluent Susp. Solids 4,800 Total BOD_5 5,800 Susp. BOD_5 800 Sol. BOD_5 5,000	Primary Effluent Susp. Solids 70,800 Total BOD_5 144,800 Susp. BOD_5 44,800 Sol. BOD_5 100,000
Secondary Sludge SS = (from T.F.) 74,750 SS = (from AS) 74, 31,243 SS = (from P removal) 23,800	In't T.F. Effluent Susp. Solids 22,500 Total BOD_5 39,000 Susp. BOD_5 30,000 Sol. BOD_5 9,000	In't T.F. Effluent Susp. Solids 2,250 Total BOD_5 13,000 Susp. BOD_5 3,000 Sol. BOD_5 10,000	In't T.F. Effluent Susp. Solids 3,600 Total BOD_5 1,600 Susp. BOD_5 600 Sol. BOD_5 1,000	In't T.F. Effluent Susp. Solids 28,350 Total BOD_5 53,600 Susp. BOD_5 33,600 Sol. BOD_5 20,000 Pot. Fila. Solids 28,350 13,750
Total Sludge SS = 235,993	Southerly Scenario #1 for 1995-2000 at 60,000 lb/day brewery waste (in lb per day)			Activated Sludge Effluent Susp. Solids 7089 Total BOD_5 4253 Susp. BOD_5 4253 Sol. BOD_5 0



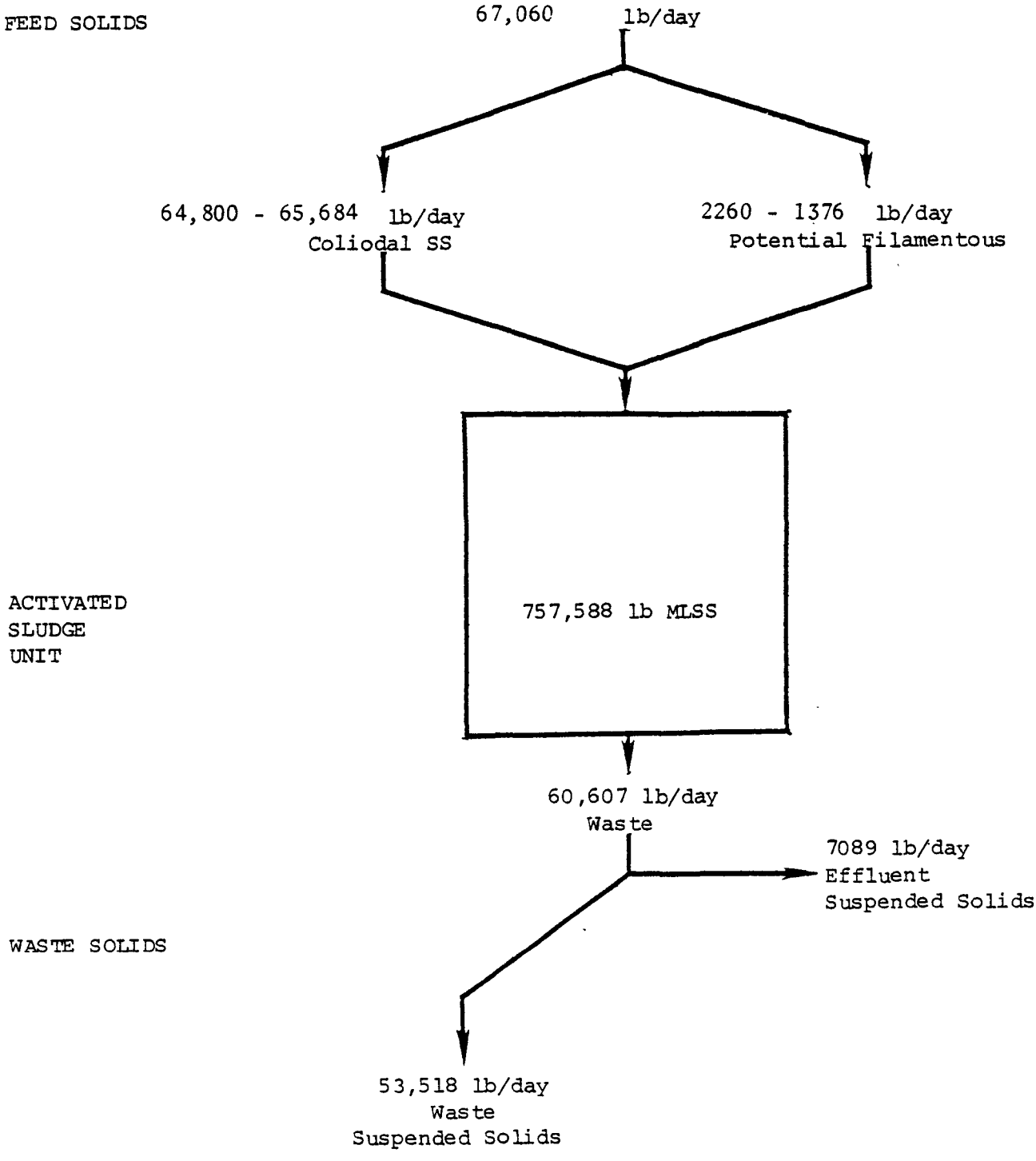
Southerly Scenario #1 or 1995-2000
at 60,000 lb/day brewery waste

SLUDGE	[redacted] WASTE [redacted] STEAM [redacted] COMPONENT			TOTAL COMPOSITE WASTE
	NON-BREWERY	BREWERY	SLUDGE HANDLING	
		Pretreatment Influent Susp. Solids 15,000 Total BOD_5 60,000 Susp. BOD_5 10,000 Sol. BOD_5 50,000		
	Influent Susp. Solids 150,000 Total BOD_5 145,000 Susp. BOD_5 100,000 Sol. BOD_5 45,000	Influent Susp. Solids 28,750 Total BOD_5 40,000 Susp. BOD_5 25,000 Sol. BOD_5 15,000 Pot Fila., Solids 28,750 to 7,000	Influent Susp. Solids 12,000 Total BOD_5 7,000 Susp. BOD_5 2,000 Sol. BOD_5 5,000	Influent Susp. Solids 190,750 Total BOD_5 192,000 Susp. BOD_5 127,000 Sol BOD_5 65,000
Primary Sludge SS = 114,450	Primary Effluent Susp. Solids 60,000 Total BOD_5 85,000 Susp. BOD_5 40,000 Sol. BOD_5 45,000	Primary Effluent Susp. Solids 11,500 Total BOD_5 25,000 Susp. BOD_5 10,000 Sol. BOD_5 15,000 Pat. Fila. Solids 11,500 to	Primary Effluent Susp. Solids 4,000 Total BOD_5 5,800 Susp. BOD_5 800 Sol. BOD_5 5,000	Primary Effluent Susp. Solids 76,000 Total BOD_5 .115,800 Susp. BOD_5 50,800 Sol. BOD_5 65,000 Pot Fila. Solids 11,500 to 7,000
Secondary Sludge SS = (from T.F.)- SS = (from AS) 56,558 SS = (from P removal) 23,800	In't T.F. Effluent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5	In't T.F. Effluent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5	In!t T.F. Effluent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5	In't T.F. Effluent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5
Total Sludge SS = 194,808	Southerly Scenario #2 for 1975-2000 at 60,000 lb/day brewery waste (in lb/day)			Activated Sludge Effluent Susp. Solids 7089 Total BOD_5 4253 Susp. BOD_5 4253 Sol. BOD_5 0



Southerly Scenario #2 for 1975-200
at 60,000 lb/day brewery waste

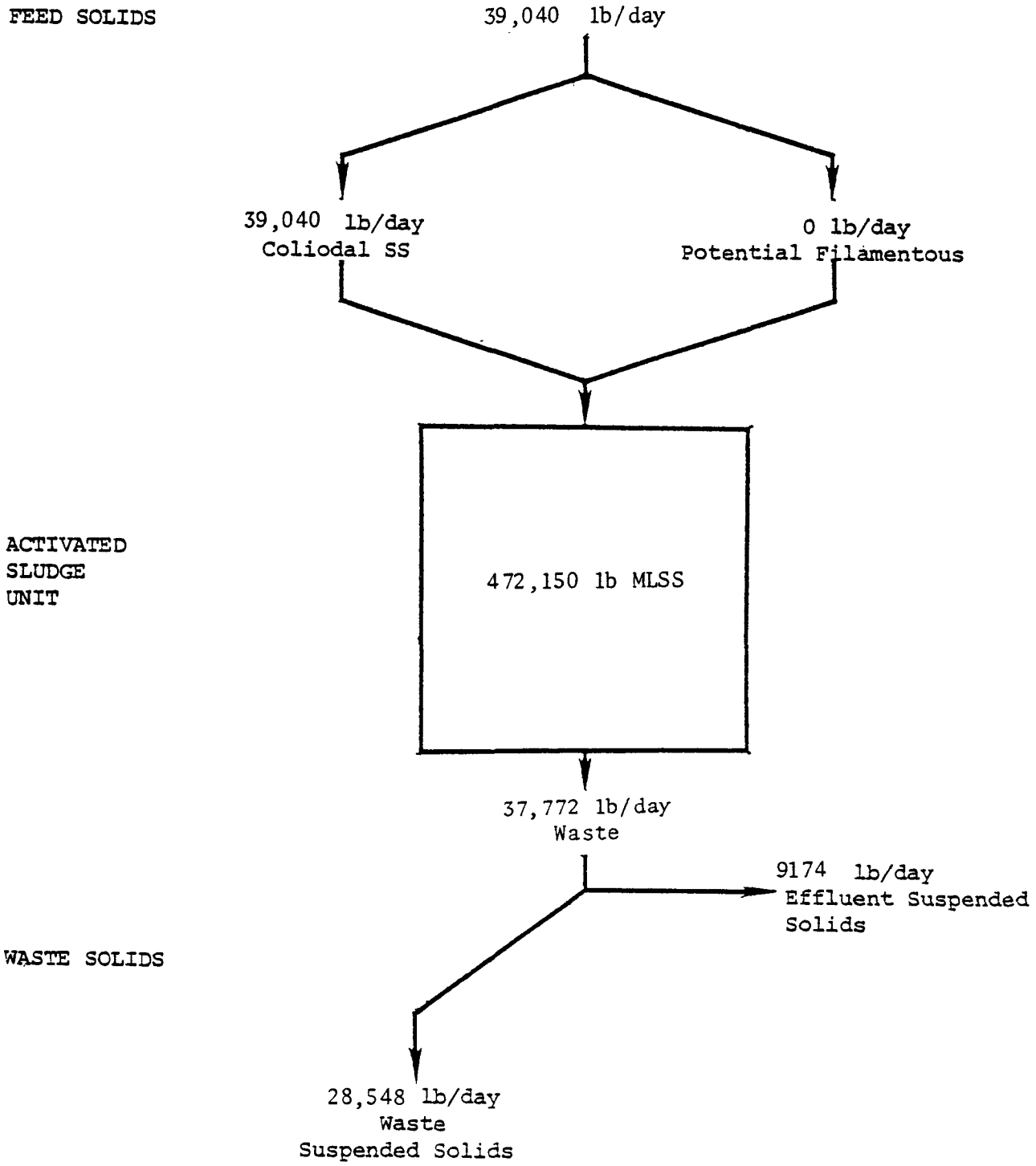
SLUDGE	[illegible] WASTE [illegible] COMPONENT			TOTAL COMPOSITE WASTE
	NON-BREWERY	BREWERY	SLUDGE HANDLING	
		Pretreatment Influent Susp. Solids 15,000 Total BOD_5 60,000 Susp. BOD_5 10,000 Sol. BOD_5 50,000		
	Influent Susp. Solids 150,000 Total BOD_5 145,000 Susp. BOD_5 100,000 Sol. BOD_5 45,000	Influent Susp. Solids 5,650 Total BOD_5 20,650 Susp. BOD_5 5650 Sol. BOD_5 15,000 Pot. Fila Solids =5630 3440	Influent Susp. Solids 12,000 Total BOD_5 7,000 Susp. BOD_5 2,000 Sol. BOD_5 5,000	Influent Susp. Solids 167,560 Total BOD_5 172,650 Susp. BOD_5 107,650 Sol BOD_5 65,000
Primary Sludge SS = 100,500	Primary Effluent Susp. Solids 60,000 Total BOD_5 85,000 Susp. BOD_5 40,000 Sol. BOD_5 45,000	Primary Effluent Susp. Solids 2,260 Total BOD_5 17,260 Susp. BOD_5 2,260 Sol. BOD_5 15,000 Pot. Fila Solids =2260-1376	Primary Effluent Susp. Solids 4,800 Total BOD_5 5,800 Susp. BOD_5 800 Sol. BOD_5 5,000	Primary Effluent Susp. Solids 67,060 Total BOD_5 108,060 Susp. BOD_5 43,060 Sol. BOD_5 65,000 Pot Fila Solids=2260-1376
Secondary Sludge SS = (from T.F.) - SS = (from AS) 53,518 SS = (from P removal) 23,800	In't T.F. Effluent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5	In't T.F. Effluent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5	In't T.F. Effluent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5	In't T.F. Effluent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5
Total Sludge SS = 177,818	Southerly Scenario #3 for 1995-2000 at 60,000 lb/day brewery waste (in lb/day)			Activated Sludge Effluent Susp. Solids 7089 Total BOD_5 4253 Susp. BOD_5 4253 Sol. BOD_5 0



Southerly Scenarios #3 for 1995-2000
at 60,000 lb/day of brewery waste

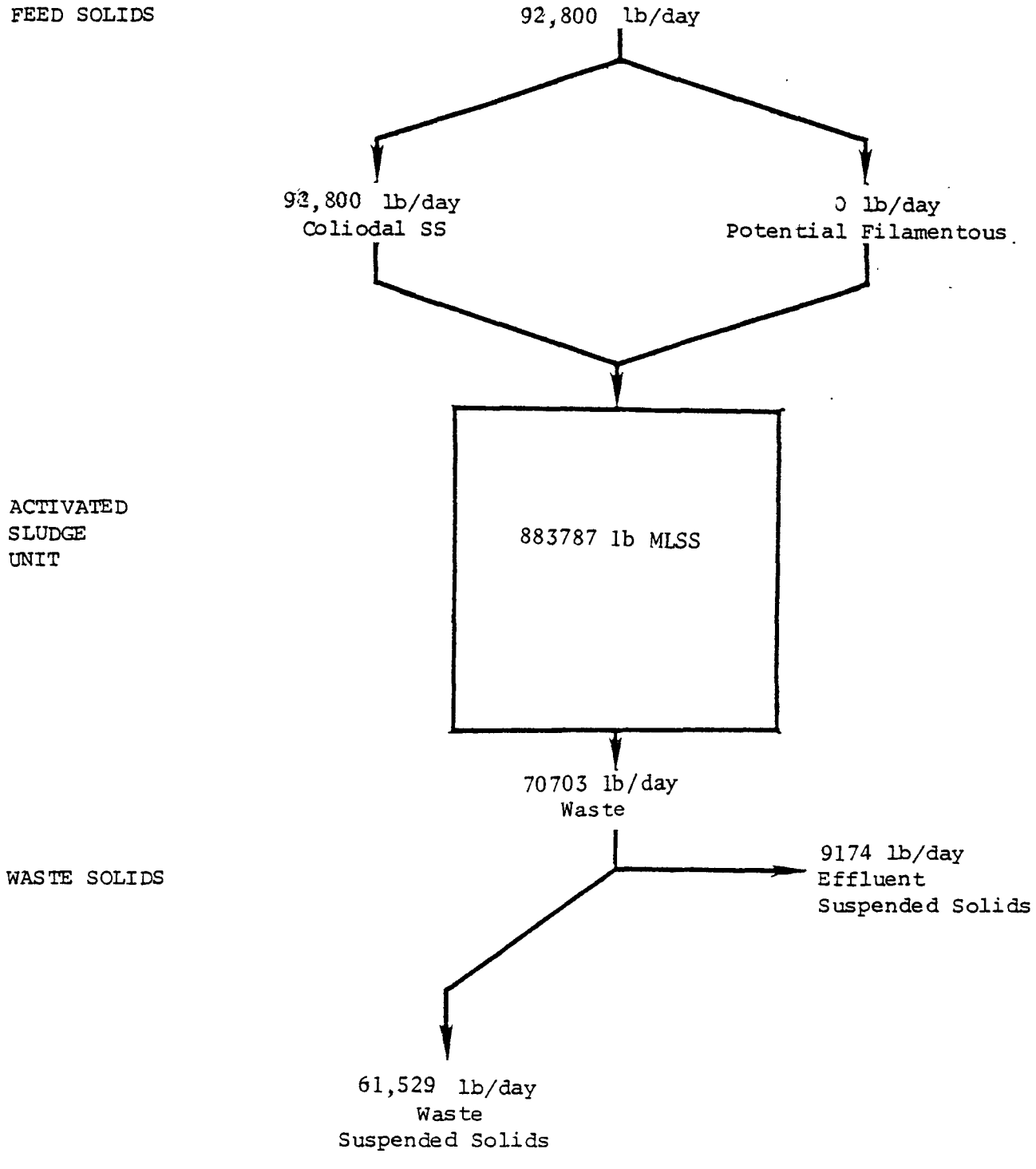
SLUDGE	[illegible] TE [illegible] TE [illegible] ONE [illegible]			TOTAL
	NON-BREWERY	BREWERY	SLUDGE HANDLING	COMPOSITE WASTE
		Pretreatment Influent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5		
	Influent Susp. Solids 85,000 Total BOD_5 80,000 Susp. BOD_5 55,173 est Sol. BOD_5 24,827 est	Influent Susp. Solids 25,000 Total BOD_5 100,000 Susp. BOD_5 16,667 Sol. BOD_5 83,338	Influent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5	Influent Susp. Solids 110,000 Total BOD_5 180,000 Susp. BOD_5 71839 Sol BOD_5 108,160
Primary Sludge SS	Primary Effluent Susp. Solids 34,000 Total BOD_5 46,846 Susp. BOD_5 22,069 Sol. BOD_5 24,827	Primary Effluent Susp. Solids 10,000 Total BOD_5 90,000 Susp. BOD_5 6,667 Sol. BOD_5 83,333	Primary Effluent Susp. Solids 0 Total BOD_5 48,000 Susp. BOD_5 0 Sol. BOD_5 48,000	Primary Effluent Susp. Solids 44,000 Total BOD_5 184,896 Susp. BOD_5 28736 Sol. BOD_5 156,160
Secondary Sludge SS = (from T.F.) SS = (from AS) SS = (from P removal)	In't T.F. Effluent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5	In't T.F. Effluent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5	In't T.F. Effluent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5	In't T.F. Effluent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5
Total Sludge SS	Southerly Existing Conditions			Activated Sludge Effluent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5

SLUDGE	[redacted]			TOTAL
	NON-BREWERY	BREWERY	SLUDGE HANDLING	COMPOSITE WASTE
		Pretreatment Influent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5		
	Influent Susp. Solids 220,000 Total BOD_5 190,000 Susp. BOD_5 125,000 Sol. BOD_5 65,000	Influent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5	Influent Susp. Solids 12,000 Total BOD_5 7,000 Susp. BOD_5 2,000 Sol. BOD_5 5,000	Influent Susp. Solids 232,000 Total BOD_5 197,000 Susp. BOD_5 127,000 Sol BOD_5 70,000
Primary Sludge SS = 139,200	Primary Effluent Susp. Solids 88,000 Total BOD_5 115,000 Susp. BOD_5 50,000 Sol. BOD_5 65,000	Primary Effluent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5	Primary Effluent Susp. Solids 4,800 Total BOD_5 5,800 Susp. BOD_5 800 Sol. BOD_5 5000	Primary Effluent Susp. Solids 92,800 Total BOD_5 120,800 Susp. BOD_5 50,800 Sol. BOD_5 70,000
Secondary Sludge SS = (from T.F.) 58,560 SS = (from AS) 28,548 SS = (from P removal) 30,800	In't T.F. Effluent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5	In't T.F. Effluent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5	In't T.F. Effluent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5	In't T.F. Effluent Susp. Solids 39,040 Total BOD_5 40,440 Susp. BOD_5 26,440 Sol. BOD_5 14,000
Total Sludge SS = 257,108	Jackson Pike for 1995 - 2000 with Trickling Filter (in lb/day)			Activated Sludge Effluent Susp. Solids 9174 Total BOD_5 5504 Susp. BOD_5 5504 Sol. BOD_5



Jackson Pike for 1995-2000
without Trickling Filter

SLUDGE	NON-BREWERY	BREWERY	SLUDGE HANDLING	TOTAL COMPOSITE WASTE
		Pretreatment Influent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5		
	Influent Susp. Solids 220,000 Total BOD_5 190,000 Susp. BOD_5 125,000 Sol. BOD_5 65,000	Influent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5	Influent Susp. Solids 12,000 Total BOD_5 7,000 Susp. BOD_5 2,000 Sol. BOD_5 5,000	Influent Susp. Solids 232,000 Total BOD_5 197,000 Susp. BOD_5 127,000 Sol BOD_5 70,000
Primary Sludge SS = 139,200	Primary Effluent Susp. Solids 88,000 Total BOD_5 115,000 Susp. BOD_5 50,000 Sol. BOD_5 65,000	Primary Effluent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5	Primary Effluent Susp. Solids 4,800 Total BOD_5 5,800 Susp. BOD_5 800 Sol. BOD_5 5000	Primary Effluent Susp. Solids 92,800 Total BOD_5 120,800 Susp. BOD_5 50,800 Sol. BOD_5 70,000
Secondary Sludge SS = (from T.F.) SS = (from AS) 61,529 SS = (from P removal) 30,800	In't T.F. Effluent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5	In't T.F. Effluent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5	In't T.F. Effluent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5	In't T.F. Effluent Susp. Solids Total BOD_5 Susp. BOD_5 Sol. BOD_5
Total Sludge SS = 231,529	Jackson Pike for 1995-2000 without Trickling Filter (in lb/day)			Activated Sludge Effluent Susp. Solids 9174 Total BOD_5 5504 Susp. BOD_5 5504 Sol. BOD_5 -



Jackson Pike for 1995-2000
without Trickling Filter

APPENDIX B

BIBLIOGRAPHY

A. Background Documents

1. Columbus, Ohio Facilities Plans

2. Columbus, Ohio Draft Environmental Impact Statement

3. Review of Draft EIS by Columbus, Ohio

4. Anheuser Busch Comments on Draft EIS

5. OEPA comments on Draft EIS

6. Southerly Influent Flow-Anheuser Busch Effluent Flor from January 1977 to March 1978

7. Preliminary Report on Elimination of Filamentary Blue-Green Algae at the Southerly Wastewater Treatment Plant

8. Enforcement Case Analysis Merrimack Treatment Facility July 14, 1975

9. Background Information on Hampton Roads Sanitation District's Williamsburg Sewage Treatment Plant, Williamsburg, Virginia

10. Correspondence on Anheuser Busch Brewery in Columbus

11. Havens and Emerson's response to comments on Draft EIS

12. Columbus, Ohio USER CHARGE/INDUSTRIAL Cost Recovery System

B. General References

1. Schoeder, E.D. and Tchobanoglous, G., "Mass Transfer Limitations on Trickling Filter Design". Journal Water Pollution Control Federation, Vol. 48, p. 771, 1976.

2. Beel, B.A., and Tsumpes, R.V., "Brewery Waste Treatment -- Trials and Tribulations", Flood and Associates, Inc. P.O. Box 8868, Jacksonville, FL, 1975.

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SUPERINTENDENT

DIVISION OF SEWERAGE AND DRAINAGE
CITY HALL
COLUMBUS, OHIO 43215

October 25, 1978

Mr. Charles Sutfin
Division of Water
U.S. Environmental Protection Agency
230 South Dearborn
Chicago, Illinois 60604

Re: Columbus EIS

Dear Mr. Sutfin:

The main points presented by U.S.E.P.A. at the September 13, 1978 meeting can be summarized as follows:

1. Wastewater Treatment Plant Process Evaluation Report - U.S.E.P.A. hired Mr. John Stamberg of Energy and Environmental Analysis, Inc., to prepare a report entitled "Evaluation of the Wastewater Treatment Processes Proposed for Columbus, Ohio in the Draft EIS." Basically, Mr. Stamberg's report arrives at the same conclusions as presented in the Draft EIS for wet stream processes at Southerly and pretreatment at the brewery. U.S.E.P.A. said the report would be made a part of the Final EIS.

2. Sludge Disposal Alternatives - U.S.E.P.A. will allow the City to build one new incinerator and rebuild one existing incinerator. U.S.E.P.A. stated that incineration would be considered only a short term solution and that the City should investigate other forms of solids disposal for long term solutions.

3. Interceptors - USEPA has lowered their design population presented in the Draft EIS from 1.11 million to 1.025 million. U.S.E.P.A. was still reviewing data for Reynoldsburg and New Albany so they did not discuss the interceptor alternatives for these areas. However, the other interceptor alternatives for the final EIS will not change from that presented in the Draft EIS. Also, the design criteria for sizing sewers will not change in the final EIS.

Other meetings have taken place with U.S.E.P.A. and the City on September 22, 1978 and October 10, 1978. The meetings did not result in any formal agreements.

In response to Mr. Stamberg's report, we feel Professor Sykes' letter, a copy of which is attached, leaves little doubt that the report and subsequent recommendations regarding process design at Southerly are invalid.

In regards to the sludge disposal alternatives, the City was told by U.S.E.P.A. to develop other methods of disposal such as composting. At the time of the meeting, no cost-effective analysis or final air modeling studies had been presented to support this directive. The City cannot develop other forms of disposal if the EIS dictates design of other parts of the solids handling processes. For instance, the EIS recommends thermal conditioning of waste activated sludge solids. The City's experience shows that thermal conditioning of sludge is very helpful to produce an autogeneous sludge cake for final disposal by incineration. However, thermally conditioned sludge has very little BTU and plant nutritional value and is not suitable for composting. Therefore, if the U.S.E.P.A. intends to limit the use of incinerators to a short term or standby method of disposal, and intends to promote composting and land application, then it must recognize that other unit processes and design criteria for solids handling must be reevaluated. At both plants, the City refuses to accept the EIS recommendation of anaerobic digestion of Zimpro wastes since this is an unproven process. The City expects the opportunity to consider other processes as a means of treating the Zimpro wastes. Also, as discussed before for both plants, the EIS recommendations for incineration are unrealistic if proper solids disposal is to be provided on a continuous basis.

In regards to wet stream facilities, neither the City nor their consultants know of any wastewater treatment plants of comparable size that have been designed and operated using the Draft EIS criteria and still meet 30 day NPDES limitations of 2 mg/l for BOD and SS and 1 mg/l ammonia, year round. Furthermore, the Draft EIS design criteria does not meet Ten States Standards or OEPA standards. Therefore, U.S.E.P.A. must prove to O.E.P.A. and the City that the proposed design criteria will meet NPDES limitations. We suggest that U.S.E.P.A. ask Havens and Emerson to locate at least five wastewater plants they have designed, using the design criteria in the Draft EIS. The City refuses to accept the EIS recommendations on the basis that NPDES effluent limitations would be unattainable and that EIS cost effectiveness analysis did not include enough money for rehabilitation of facilities, particularly at Jackson Pike.

U.S.E.P.A. has suggested that design criteria will be omitted from the Final EIS. However, unit process sizes and the cost effective analysis would still be in the EIS. If this is done, then the design criteria has not been

omitted from the Final EIS at all. If U.S.E.P.A. insists on printing mandatory unit process sizes or design criteria in the Final EIS, then the City wants one of the following statements placed in the Final EIS:

1. U.S.E.P.A. will guarantee NPDES effluent limitations will be met at all times at both facilities.

2. If the City of Columbus cannot successfully operate the facilities proposed in the EIS and meet NPDES effluent limitations, then U.S.E.P.A. will assume responsibility for operation of the facilities.

3. Use of design criteria in this final EIS is used only for comparing alternatives in the EIS and does not dictate the final design and unit process sizing. Selection of final design criteria shall be determined by the City and their designers with approval by Ohio E.P.A.

The City has yet to see a full cost-effective analysis of alternatives for the Scioto West Interceptor. Specifically, the EIS does not compare the cost of the proposed pump station with the cost of extending the Scioto West Interceptor from Manhole 3 to Manhole 2. Apparently, the EIS feels the population density is not great enough in this area to warrant sewer facilities and construction of such sewers would cause induced growth. However, a more realistic approach would be to build the one mile stretch between manholes 2 and 3 and eliminate a troublesome pump station. In our opinion, the reliability of the gravity sewer alternate is more important that the induced growth issue in this case.

The City has learned that the design criteria for interceptor sizing used in the Draft EIS is not consistent with large interceptor criteria used by other municipalities in Region 5. For instance, the Cuyahoga Valley Interceptor in Cleveland, which was subjected to an EIS, used an EPA approved design criteria based on a forty year design, a wastewater flow based on water consumption of 150-160 gpcd, infiltration based on 375 gpd per acre, and a peaking factor of 2.0 for average flows over 11 mgd. The City of Cincinnati presently uses 100 gpcd flow and 1000 gpd per acre for infiltration which has very recently been approved by U.S.E.P.A. Therefore, the design criteria used in the Draft EIS, aside from being unrealistic, is inconsistent with the criteria being approved for other major cities in Ohio.

One of the major concerns with the design criteria is the infiltration allowance of 10 gpcd which was based on an approximate relation to 200 gpd/in.-mi. The figure of 200 mgd/in.-mi. is fine for a construction specification, but not appropriate for infiltration flows that will enter the sewer during its lifetime.

Consider a 30 inch interceptor that has ten 18 inch trunk sewer connections. Assume the interceptor and each trunk are one mile long. The allowable infiltration for each trunk is 18 x 200 x 1 or 3600 gpd. The allowable infiltration for the interceptor is 30 x 200 x 1 or 6000 gpd. However, the total infiltration in the interceptor would be 10 x 3600 + 6000 or 42,000 gpd. For this interceptor, the design infiltration should be 42,000/30 x 1 or 1400 gpd/in.-mi.

By the time all of the laterals and service connections are considered, the amount of infiltration that would result in the above example could be much higher. Our experience has shown that the infiltration through the joints of interceptors is normally within 200 gpd/in.-mi., but infiltration flow increases significantly as connections are made to the interceptor.

It was also noted at the September 22 meeting that parallel sewer construction through Reynoldsburg in the future would be difficult and expensive. It would be more economical to build the ultimate size sewer through Reynoldsburg now. This same concept should apply to the EIS recommendation for the construction of the Rocky Fork Interceptor through Gahanna in 1995. The Rocky Fork area through Gahanna is just as developed as Reynoldsburg, and construction through the area would be extremely difficult and expensive. A more open route would be available as shown in Alternate B. If the EIS insists on eventual implementation of Alternate A, then the section through Gahanna should be built immediately.

Mr. Frank Baldy, Service Director for Reynoldsburg, identified several factors not included with U.S.E.P.A.'s proposal of a force main along Livingston Avenue in letters dated May 24, 1978 and September 20, 1978. U.S.E.P.A. has copies of both letters. A revised cost estimate has been prepared that includes all these factors and is shown on the attached table to be about $5.2 million. U.S.E.P.A.'s proposal of a force main to serve Reynoldsburg was apparently initiated to avoid induced growth south of Reynoldsburg. With the information provided by the Fairfield County Regional Planning Commission, induced growth is no longer an issue since there will be a population density of 1.7 persons per acre or more by the time an interceptor is built.

The City has estimated costs for the Blacklick Interceptor from Brice Road to Broad Street. Costs were estimated assuming connections to populations in Violet Township were made and assuming the ultimate size of interceptor was constructed through Reynoldsburg. Using the Draft EIS criteria of 90 gpcd average flow and 10 gpcd infiltration resulted in an estimated cost of $5,020,000, below that of a force main alternate in Livingston Avenue.

A $6,100,000 cost is estimated using a design criteria of 100 gpcd average flow and 600 gpd per acre infiltration, which would be consistent

with design criteria used in other major cities in Ohio. There was a difference of no more than two pipe sizes between the two alternates.

The City has met with U.S.E.P.A. in Chicago twice since the September 13, 1978 meeting in the hopes of reaching a compromise. However, we are not sure how the statements made by U.S.E.P.A. at those meetings will be incorporated into the Final EIS.

In order to eliminate confusion, we feel U.S.E.P.A. should clarify their position relative to design criteria, unit process sizing and the cost effectiveness analysis for both the interceptors and treatment plants. We also would like U.S.E.P.A. to reevaluate the alternatives for Scioto West, Rocky Fork, and Blacklick Creek in view of our comments above and on a consistent basis with other major cities in Ohio.

Very truly yours,

D. D. Robbins

D. D. ROBBINS, P.E.
Superintendent

DDR:MPI:jms

Enc.

cc: R. C. Parkinson
D. D. Robbins
G. B. Walkenshaw
R. Willis
R. Smith
F. Baldy (City of Reynoldsburg)
M. Macy (Malcolm Pirnie, Inc.)
G. Elmaraghy (O.E.P.A.)
File

CONSTRUCTION COST FOR FORCE MAIN
ALONG LIVINGSTON AVENUE

a.)	Gravity Sewer along Livingston	$1,500,000
b.)	Force main along Livingston	700,000
c.)	Pump Station at WWTP	540,000
d.)	Additional small Pump Stations and force mains as described in Frank Baldy's letter	570,000
e.)	Additional Major Pump Station	540,000
	Sub-Total	$3,850,000
	Engineering, Contingencies	1,350,000
	TOTAL	$5,200,000

OSU

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September 18, 1978

Mr. George B. Walkenshaw
Assistant Superintendent
Division of Sewerage and Drainage
90 West Broad Street
Columbus, Ohio 43215

Dear Mr. Walkenshaw:

I have read the report entitled "Evaluation of the Wastewater Treatment Processes Proposed for Columbus, Ohio, in the Draft EIS" written by Mr. John Stamberg of Energy and Environmental Analysis, Inc., and dated July 21, 1978. My comments on this report follows. Parenthetical references to page numbers in this report are included where needed.

(1) Identification of Filaments. The filaments are green and consist of cylindrical cells without terminal differentiation; growth is heterotrophic and occurs at low DO, but not under anoxia. They were identified as the blue-green alga Schizothrix (alias Phormidium) by Drs. Clarence Taft, of Ohio State University, and Francis Drouet, of the Academy of Natural Sciences, Philadelphia. These gentlemen are internationally recognized authorities on microbial taxonomy. They made their identification after independent, first-hand examinations of mixed liquor samples from Southerly. On the other hand, Mr. Stamberg is not a microbiologist (Note his misspelling of Schizothrix and Phormidium on page 7.), and he has not had access to mixed liquor samples from Southerly. His identification of the filaments as a photosynthetic bacterium is totally untenable. A careful reading of Bergey's Manual (Buchanan and Gibbons, 1974) shows that no species of photosynthetic bacteria fits the filaments' description. The only green forms (Rhodopseudomonas and various genera of the Chlorobiaceae) are nonfilamentous; furthermore, the Chlorobiaceae are strictly anaerobic and obligately phototrophic. Confusion of photosynthetic bacteria with blue-green algae or v.v. is virtually impossible, even for a novice. The Taft-Drouet identification of the filaments as Schizothrix (alias Phormidium) is, therefore, indisputable. (It should be noted that Mr. Wellings, Southerly's Chemist, has successfully isolated the alga using enrichment cultures growing aerobically on minimal medium. This disposes of Mr. Stamberg's objection to our own failure to isolate the alga, but it is not necessary to the identification.)

(2) Causes of Filamentous Bulking. There is no basis whatever in either theory or in fact for Table 2, nor for the conclusions allegedly drawn from it. First, the majority of the organisms in trickling filters are zoogloeal not

filamentous (Hawkes, 1963). Second, Mr. Stamberg implies that the suspended solids in an activated sludge mixed liquor are merely an accumulation of the influent suspended solids (pages 8 to 9). Fifty years ago, this position was sometimes maintained, but it is now known that MLSS consist of those microbes whose growth is favored by the mixed liquor conditions. Consequently, the composition of the MLSS is radically different from the composition of the influent suspended solids. Thus, even if substantial numbers of filaments occurred in the influent (which is unproved and unlikely) they would not dominate the MLSS unless conditions favored their growth. Third, Mr. Stamberg states (page 11) that activated sludge systems with long SRTs (incorrectly identified as sludge [SIC] retention time) are subject to filamentous growths. This statement flatly contradicts the well-established observation that filamentous bulking is associated with short SRT's, or high F/Ms, since the two are reciprocally related. Furthermore, if Mr. Stamberg's assertion were true, filamentous bulking would be the bane of nitrifying activated sludges. However, this is so rare a problem that the U.S.E.P.A.'s own manual on nitrogen control (Parker et al., 1975) does not even discuss it. Fourth, the occurrence of low DO's in systems intended for nitrification is the result of either a design error or of an attempt to save money by cutting corners; it simply does not happen in systems that are properly designed, constructed and operated. Thus nitrification systems should not be liable to filamentous bulking because of oxygen transfer deficiencies, at least, not if the U.S.E.P.A.'s plan review process actually works.

(3) Selection of Alternative Plan. The scenarios considered by Mr. Stamberg consist of a two-stage biological system consisting of trickling filters followed by activated sludge (page 1). He asserts that a trickling filter located at Southerly will induce filamentous bulking in the activated sludge process, whereas if the filter is moved to the brewery it will not induce bulking. A reason for this rather striking prediction is not given, perhaps because none exists. It appears to contradict his own (fallacious) seeding theory of bulking. First, on his principles, a trickling filter at the brewery should produce more filaments than one at Southerly, because the soluble BOD would be higher (see pages 3, 8 & 9). Moreover, the long time-of-travel in the sewer between the brewery and Southerly would tend to fragment the trickling filter solids. Thus more filaments would escape removal in primary treatment and seed the activated sludge. Actually, there should be no difference among the alternatives as regards bulking.

(4) Brewery Waste and Filament Growth. Mr. Stamberg has misrepresented our results regarding the effect of brewery waste on filamentous bulking (see page 1). To repeat, under continuously high DO conditions in plug-flow reactors fresh brewery waste never caused filamentous bulking regardless of the proportion of brewery waste in the sewage feed. Under continuously low DO conditions in plug-flow reactors, fresh brewery waste induced Beggiatoa bulking.

However, continuously low DO does not occur at Southerly, and Beggiatoa bulking is not Southerly's problem.

In summary, I disagree strongly with virtually all of Mr. Stamberg's biological statements. His reasonings are usually baseless and sometimes self-contradictory. He has misrepresented our own research. His cavalier dismissal of the work of Taft and Drouet is simply outrageous.

Respectfully yours,

Robert M. Sykes

ROBERT M. SYKES, Ph.D.
Associate Professor

RMS:jms

Literature Cited:

(1) Buchanan, R.E. and Gibbons, N.E. et. al. [ed.], Bergey's Manual of Determinative Bacteriology, 8th Ed., The Williams & Wilkins Co., Baltimore (1974).

(2) Hawkes, H.A., The Ecology of Waste Water Treatment, The Macmillan Co., New York (1963).

(3) Parker, D.S.; Stone, R.W. and Stenguist, R.J., Process Design Manual for Nitrogen Control, Tech. Transfer, U.S. E.P.A., Washington (1975).

(4) Stamberg, J., Evaluation of the Wastewater Treatment Processes Proposed for Columbus, Ohio, in the Draft EIS, Energy and Environmental Analysis, Inc., Arlington (1978).

ENERGY AND ENVIRONMENTAL ANALYSIS, INC.

1111 North 19th Street
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(703) 528-1900

January 4, 1979

Division of Water
EPA Region V
230 S. Dearborn
Chicago, Illinois 60604

Dear Mr. Luecht:

In Mr. D.D. Robbins' letter of October 25, 1978, the City of Columbus stated that they refuse to accept the wet process streams proposed in the draft EIS. This was based on the fact that "the NPDES effluent limitations would be unattainable." The foundations for their conclusion are not supported by any scientific or engineering theory, analysis or testing of the proposed wet process streams. Their arguments rely on the following points:

1. Robbins and his consultants know of no wastewater plants of comparable size that have been designed and operated using the criteria in the Draft EIS and still meet the NPDES limitations proposed in the Draft EIS year round.

2. The criteria in the Draft EIS do not meet "Ten States Standards" or OEPA standards.

3. Based on criticism from Dr. Robert Sykes, my report and subsequent recommendations concerning the Columbus plant were judged invalid.

The first factor simply shows a reluctance to use or rely on existing scientific and engineering knowledge in evaluating the problem. Given the restrictions of size, loading, NPDES standards, etc., it would be near impossible to find an exact parallel to the situation in Columbus. This type of statement could be made for about any design of a large treatment facility, even those in their 201 plan. Therefore, it is in these situations that scientific and engineering expertise is required.

The second factor implies that conformance with "Ten States Standards" and/or OEPA standards insures compliance with the proposed limitations NPDES for Columbus. In fact, a major survey[1] of municipal wastewater treatment plants conforming to "Ten States Standards" showed the vast majority did not comply with NPDES permit limitations. Paradoxically, the City of Columbus accepts these standards as appropriate to the

situation of Columbus independent of their knowledge of a facility of comparable size, loading rate, NPDES standards, etc., which has been design and operated for a year in compliance with the limitations. In any case, the simple conformance or non-conformance of the criteria in the Draft EIS to the above standards does not prove that the system in the EIS could not attain the proposed NPDES requirements.

Finally, the dismissal of my report on the basis of Dr. Sykes' criticism is absurd. Dr. Sykes' comments generally ranged from trivial (e.g., his spelling corrections) to misleading (e.g., his assertions regarding the effect of brewery waste on bulking growths).

An example of one area of conflict between Dr. Sykes and myself is the problem of identification of the bulking organism. Certainly, Drs. Taft and Drouet are authorities of the highest repute. However, it is probable that neither examined the bulking organisms under a microscope where the genera Schizothrix and Phormidium would be readily distinguishable to the trained eye.[2/] Their identification was likely based upon un-aided visual examination only and hence must be considered tenuous. On this basis, we cannot discard the theory that the bulking organisms are filamentous bacteria which have been observed to morphologically closely resemble some types of blue-green algae.[3/]

Of considerably more importance is the determination of the cause of Southerly's bulking problem. The bench studies done by Dr. Sykes showed replication of bulking activity under conditions of low or variable D.O. on reactors fed "fresh brewery waste" and/or settled influent sewage plus addition acetate. Dr. Sykes viewed the insufficiency of fresh brewery waste alone to induce bulking under simulated plant conditions as proof that the brewery waste was not a cause of the bulking. He instead concluded that acetate was the probable cause of the Southerly bulking.

Although Dr. Sykes' data are somewhat useful, it is apparent that his conclusions are misleading. Dr. Sykes gives the impression that his one shot batch type bench studies accurately duplicate equilibrium conditions of Southerly's treatment processes. However, the anaerobic or microaerobic conditions in the sewers and in the activated sludge tanks are omitted from Dr. Sykes treatment. In the treatment plant under these conditions much anaerobic metabolism occurs, which can transform brewery wastes into volatile acid metabolities such as acetic and propionic acid.[4/] These metabolities, microaerobic conditions and high soluble BOD concentrations (from the brewery waste) in the activated sludge tanks form an ideal environment for filamentous bulking organisms.

This hypothesis explains why the addition of acetate was seen to induce bulking in Dr. Sykes' studies. Hence, Dr. Sykes' conclusion incorrectly implies that brewery wastes play little part in either the formation of acetate or of conditions favoring bulking. Also, Dr. Sykes' analysis fails to answer the crucial question of how chemicals such as acetate and low D.O. are generated at the Southerly plant. Again, these conditions can be caused by anaerobic microbial metabolism in response to high soluble BOD loadings from the brewery wastes. Certainly, the satisfactory performance of the Jackson Pike plant in contrast with that of the Southerly plant only reinforces the conclusion that the brewery wastes both directly and indirectly (via anaerobic breakdown into low molecular weight metabolities) cause Southerly's bulking growth.

In summary, the City of Columbus uses nothing but specious rationale to render the wet process design criteria in Draft EIS unacceptable.

Sincerely,

John Stamberg

Note: References attached.

References

1. Stamberg, J.S., et al, "Evaluation of Municipal Wastewater Treatment Plant Operations under the NPDES Permit/Enforcement Program" (Prepared for EPA, 1978).

2. Smith, G.M., Fresh Water Algae of the United States, McGraw Hill Book Co. New York (1933).

3. Eikelboom, D.H., "Filamentous Organisms Observed in Activated Sludge", Water Research 9: 365-388 (1974).

4. McCarty, P.L., Jeris, J.J. and Murdoch, W., "Individual Volatile Acids in Anaerobic Treatment", JWPCF 35: 1501-1516 (1963).

APPENDIX BB

REVIEW OF COLUMBUS, OHIO DRAFT EIS

BY

MUNICIPAL ENVIRONMENTAL RESEARCH LABORATORY

U.S. EPA CINCINNATI, OHIO

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
CINCINNATI, OHIO 45268

DATE: April 19, 1979

SUBJECT: Review of Columbus, Ohio Draft Environmental Impact Statement (dated February, 1978)

FROM: Edwin F. Barth, Chief R.C. Brenner for
Biological Treatment Section, TPDB, WRD, MERL

TO: Stephen P. Poloncsik, Chief
Technology Division (5WEE)
U.S. EPA Region V
Chicago, Illinois 60604

THRU: Robert L. Bunch, Chief J.R. Cohen for RLB
Treatment Process Development Branch, WRD
THRU: John J. Convery, Director
Wastewater Research Division

I. Background

In accordance with the understanding among Messrs F. Mayo, J. Convery, S. Poloncsik, G. Williams, J. Roesler and E. Barth, the subject document was reviewed to evaluate the process design for the Southerly Treatment Plant in relation to pretreatment Scenario #2.

In preparing for this, the following documents were reviewed:

1) Environmental Impact Statement, "Wastewater Treatment Facilities for the Metropolitan Area Columbus, Ohio" (February 1978).

2) "Evaluation of the Wastewater Treatment Processes Proposed for Columbus, Ohio." Energy and Environmental Analysis, Inc., J. Stamberg (July 21, 1978).

3) Responses to subject EIS; A collection of letters and prepared responses to comments (unbound and undated).

4) Cost Effective Analysis; "Columbus Metropolitan Area Facilities Plan," Malcolm Pirnie, Inc. (Volume One of One, and Volume Two of Two, July 1976).

5) "Preliminary Report on Elimination of Filamentous Treatment Plant," Robert Sykes, Ohio State University, Columbus, Ohio (April 1978).

This review does not address the need, desirability or regulatory aspect of pretreatment of brewery waste before discharge to the Southerly plant. It concerns only the compatibility of process selection and unit sizing for Scenario #2 in relation to the discharge permit for the Southerly plant.

These discharge requirements are tabulated in the draft EIS as follows:

Parameter	Average Permissible Value 30 Day	7 Day
BOD_5, mg/l	8	12
SS, mg/l	8	12
Fecal coliform, #/100 ml	200	400
NH_4-N, mg/l:		
July-October	1.0	1.5
November-December	2.5	5.0
P, mg/l	1.0	1.5
DO, mg/l	6.0	-
pH, units	6 to 9	6 to 9

It should be noted that the draft EIS and the Facilities Plan work with different volumes of flow to Southerly and the EIS is not consistent in regard to flow between text and appendix pages. Also, the EIS does not completely finalize the sludge handling options at Southerly. Since the design is mainly in the conceptual stage at this time these points should not materially effect the evaluation.

II. Review

1. Filamentous and/or Bulking Sludge at Southerly

Section IV, pages 3 and 4 indicate soluble carbohydrate induces a bulking activated sludge at Southerly. The Sykes report describes bulking in pilot reactors caused by Sphaerotilus, Beggiato and Schizothrix under different operating and feed regimes. Stamberg dismisses the Sykes work and ascribes the causative organism to a class of filamentous photosynthetic bacteria. Mr. Rodgers of the Columbus staff, has isolated and corelated the blue-green algae Schizothrix, with bulking conditions at Southerly.

Dr. R. Safferman, EMSL-Cincinnati, has observed a mixed liquor sample from Southerly, provided by Mr. Rodgers, and reviewed the Sykes report. From gross observation, Dr. Safferman was not able to confirm the presence of Schizothrix in that particular sample. Dr. Safferman's review of the Sykes report brought forth many questions on the adequacy of the work in regard to controls and cultural conditions. It is Dr. Safferman's judgement that to resolve the problem of association of the bulking condition at Southerly with a specific organism would require at least a man year of effort under carefully controlled conditions.

It is WRD's position that resolution of the causative organism is not a central feature of process selection for Southerly. The main consideration should be that historically, bulking has been observed at Southerly and any design modification should provide the flexibility of operational control to manage a bulking situation.

2. General Comments on Process Design, Irrespective of Scenario #2

a) Aeration Configuration

The conceptual layout of the aeration system shown on Table IV-18, page IV-77 is considered quite appropriate for the Southerly situation. This configuration would provide operation flexibility to meet the intermittent nitrification requirements, provide energy savings during the non-nitrification season, assist in controlling solids flux to the clarifiers, and provide control of bulking sludges.

The total aeration volume at Southerly, after the addition of 5.2 million gallons of tankage recommended in the facilities plan, will be ~~26.3~~ 31.5 million gallons. This would provide 7.4 hours of detention time based on 85 mgd of flow. If the 5.2 million gallon capacity were used for reaeration as indicated in Section K-9 of the EIS, this would provide 5.9 hours of detention time. At the process peak flow the respective detention times would be 4.8 and 3.9 hours.

Since nitrification kinetic rate is based on 10 ^{o}C and the Southerly nitrification requirement is most stringent during warm weather, no difficulty in achieving nitrification at these detention times with a CRT of 15 days is anticipated.

In the responses to the EIS it was noted that a step aeration process such as shown on Table IV-18 was not considered suitable for nitrification. This is true if detention times are very short; however, as noted above, this is not the case with Southerly; the reactor can be managed to provide full detention time or increased mixed liquor solids and yet limit solids flux to the clarifier. This point also relates to

a response comment regarding clarifier overflow rates higher than the "Ten State Standards." At process design flow of 85 mgd, the Southerly final clarifiers will have a surface overflow rate of 626 gallons per day per square foot. The EIS properly indicates that in addition to surface overflow rates the solids flux to clarifiers should be controlled. The flux of a maximum of 25 pounds per square foot per day indicated for Southerly is adequate.

The provision for reaeration of the return sludge should not only assist in maintaining a high CRT, but materially assist in minimizing the occurrence of bulking sludge at Southerly. Aeration of the mixed liquor in the absence of substrate shifts the metabolism toward an endogenous stage and improves settleability.

b) Efficient Oxygen Transfer

The EIS recommends a change to an oxygenation system which is more efficient than the present sock diffusers at Southerly. This is considered vital to success of nitrification and improvement of the sludge bulking as well as a necessary step to increase energy utilization. Recent testing of jet aerators by the Los Angeles County Sanitation District under WRD sponsorship has shown these devices not to be as efficient as the EIS indicates. However other fine bubble devices showed efficiencies in the neighborhood of 5 to 7 pounds of oxygen transferred per horsepower hour (wire). As indicated in MERL's June 5, 1978 memo to Dale Luecht, we would reemphasize the desirability of a Step 1 engineering feasibility study of aeration devices for the Southerly plant. MERL could assist in this study in any manner your Division thinks necessary.

c) Design Flexibility

Review of the EIS shows a good deal of effort in regard to process flexibility. Aside from the aforementioned aeration concept, the provision for routing flow around the plastic first stage filters and capability of directing return sludge to these filters is sound practice. This will allow energy savings and process control to meet the seasonal discharge requirements at the Jackson Pike plant.

Provision for mating aeration bays with respective final clarifiers will allow maintenance without major deterioration of effluent quality.

The interconnecting piping between Southerly and Jackson Pike should help ease peak loading for both main stream flow and sludge handling operations.

Provision of multiple metal dosing points for phosphorus control is desirable practice to allow efficient use of precipitant and process control with changing wastewater characteristics.

3. Scenario #2

Scenario #2 process design as given in the EIS differs from the facilities plan for Southerly in that the recommended first stage plastic filter and intermediate clarifier have been deleted. To compensate for this deletion, pretreatment of the brewery waste by plastic media filters will be provided upstream of the Southerly plant, and the filter under drain discharged directly into the sewer system leading to Southerly.

Section V-12 of the EIS indicates that the existing pretreatment and primary sedimentation facilities at Southerly will not be expanded. This is the most severe reservation we have in regard to Scenario #2. The sloughed solids from the brewery plastic media filters will have to be caputured by the existing primary tankage. In addition, a portion of the phosphorus will be precipitated in the primaries which will increase the solids load. Also, aside from normal primary solids, solids from phosphorus control and sloughed brewery pretreatment solids, recycle solids will enter the primary tanks. These recycle loads will be tertiary polish filter backwash, air flotation subnatant, thermal conditioning recycle, digester supernatant, and vacuum filter filtrate (or centrifuge centrate). Appendix J outlines these recycles.

Section A-19 of the EIS states that historically Southerly operation has been plagued with solids handling problems. Coupled with this is the statement in Section IV-64 (4.42) and Appendix J (J.6) that an intermediate clarifier is considered essential for the reliability of the Jackson Pike plant. Since the sloughed solids from the upstream brewery plastic filter will be transported to Southerly via the sewer, efficient solids capture will be necessary to protect the single stage nitrification process from excessive sludge wasting and consequent loss of CRT control.

Conceptually we see nothing wrong with Scenario #2, but express concern over implementing good solids control, with the above considerations in relation to Southerly operation, when the primary tankage receives incremental solids.

4. Environmental Effects of Sloughed Solids

Several of the responses to the EIS stated concern over the fate and effects of sloughed plastic media trickling filter solids during transport in the sewer to Southerly. A newspaper account of two fatalities occurring under conditions of similar circumstances cannot be related directly to sloughed solids. Extreme safety measures must always be followed when entering any enclosed area conveying wastewater, whether or not sloughed trickling filter solids are present.

Several proposals have been put forth to use sewer travel time as a part of complete treatment by aeration or oxygen injection at selected sewer sites (Boon, A. C., et al., "The Use of Oxygen to Treat Sewage in a Rising Main," Water Pollution Control, Volume 76, pages 98-112, 1977).

Inherently sewers are devoid of oxygen to an extent that depends on character of the waste being conveyed, flow characteristics and geometry. Whether or not the introduction of some quantity of actively respiring organisms would lead to a deleterious condition would have to be based on site specific evaluation.

Los Angeles County Sanitation Districts' have evolved over the years the concept of satellite treatment facilities that handle constant flow and a centralized sludge handling facility. The satellite plants discharge primary and waste secondary solids directly to sewers leading to the central sludge processing plant. WRD suggests that historical data on this practice could help resolve the deliberations on the environmental effects of the brewery filter solids discharged to the sewer leading to Southerly.

cc: F. T. Mayo
Dr. R. Safferman

HAVENS AND EMERSON
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ENVIRONMENTAL ENGINEERING

WATER RESOURCES
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AIR POLLUTION CONTROL
RATE INVESTIGATIONS
SANITARY LABORATORIES
AREAWIDE PLANNING

May 9, 1979

ENVIRONMENTAL PROTECTION AGENCY
REGION V

Mr. Dale Luecht
Water Division
U. S. Environmental Protection Agency
Region V
230 S. Dearborn
Chicago, Illinois 60604

Dear Mr. Luecht:

In response to your request, we are pleased to document the conversation between Mr. E. F. Barth and myself in USEPA's Chicago office on May 8th regarding his April 19, 1979 memorandum, "Review of Columbus, Ohio Draft Environmental Impact Statement".

Page 2, Paragraph 3, Sentence 1

The inconsistencies mentioned only reflect a 10 mgd credit for recycle flows (filter backwash, etc.) on the average daily flow received at the plants. Mr. Barth acknowledged the point and indicated that he had no further problem in understanding.

Page 3, Paragraph 3, Sentence 1

Mr. Barth was advised that the final volume is 31.5 million gallons, inclusive of the 5.2 million gallon expansion which can be used for return sludge aeration during the winter to satisfy biomass cell residence time considerations (see Table K-4). Mr. Barth acknowledged the misunderstanding.

Page 5, Paragraph 2, Sentence 5

Mr. Barth was advised that the filter backwash at Jackson Pike is to be preferentially returned to the intermediate settler; at Southerly the process stream is to be returned to the head of the final settler (see Figure V-1). At Jackson Pike, the potential return of filter backwash to the final clarifier is also shown. We also indicated that return of this flow to the primaries at both plants was also viable as an alternate point of introduction and should be provided if possible. Mr. Barth acknowledged the misunderstanding.

Page 5, Paragraph 2, Sentence 5 - Continued

Further, although not discussed with Mr. Barth, for calculation convenience and a worst case statement, we assumed that the other recycles were applied directly to the primary effluent (see Table K-1). Thus, at Southerly, the primary routinely sees only raw wastewater, sloughed brewery pretreatment solids, and the additional solids mass derived from phosphorus control by metal salt addition.

We believe that the foregoing adequately described our conversation and adds clarity where Mr. Barth's review comments inadvertently conflicted with statements in the Draft EIS. By copy of this letter, we are informing Mr. Barth of our response to your request. If either he or you are in disagreement, we request that you inform us by May 21, 1979. Otherwise, we will assume that there is no need for further discussion and that the comments are correctly stated.

Very truly yours,

HAVENS AND EMERSON, INC.

Michael C. Mulbarger

MCM:fch

cc: Mr. E. F. Barth

APPENDIX CC

REVISED CHAPTER III:
SERVICE AREA AND SEWER SYSTEM ALTERNATIVES

CHAPTER III

(REVISED MAY 1979)

SERVICE AREA AND SEWER SYSTEM ALTERNATIVES

(WITH ASSOCIATED CORRESPONDENCE)

III. SERVICE AND SEWER SYSTEM ALTERNATIVES

3.1 REGIONALIZATION

This Section discusses the possibility of regionalization of various divisions of the planning area. Each subarea is first defined and described, as are the regionalization alternatives proposed for each in the Facilities Plan and by subsequent review of the Plan. A final section examines the cost sensitivity of the chosen plan to various design philosophies.

3.1.1 Description of Planning Area

Figure III-1 shows the planning area and 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.

3.1.2 Existing Service Area

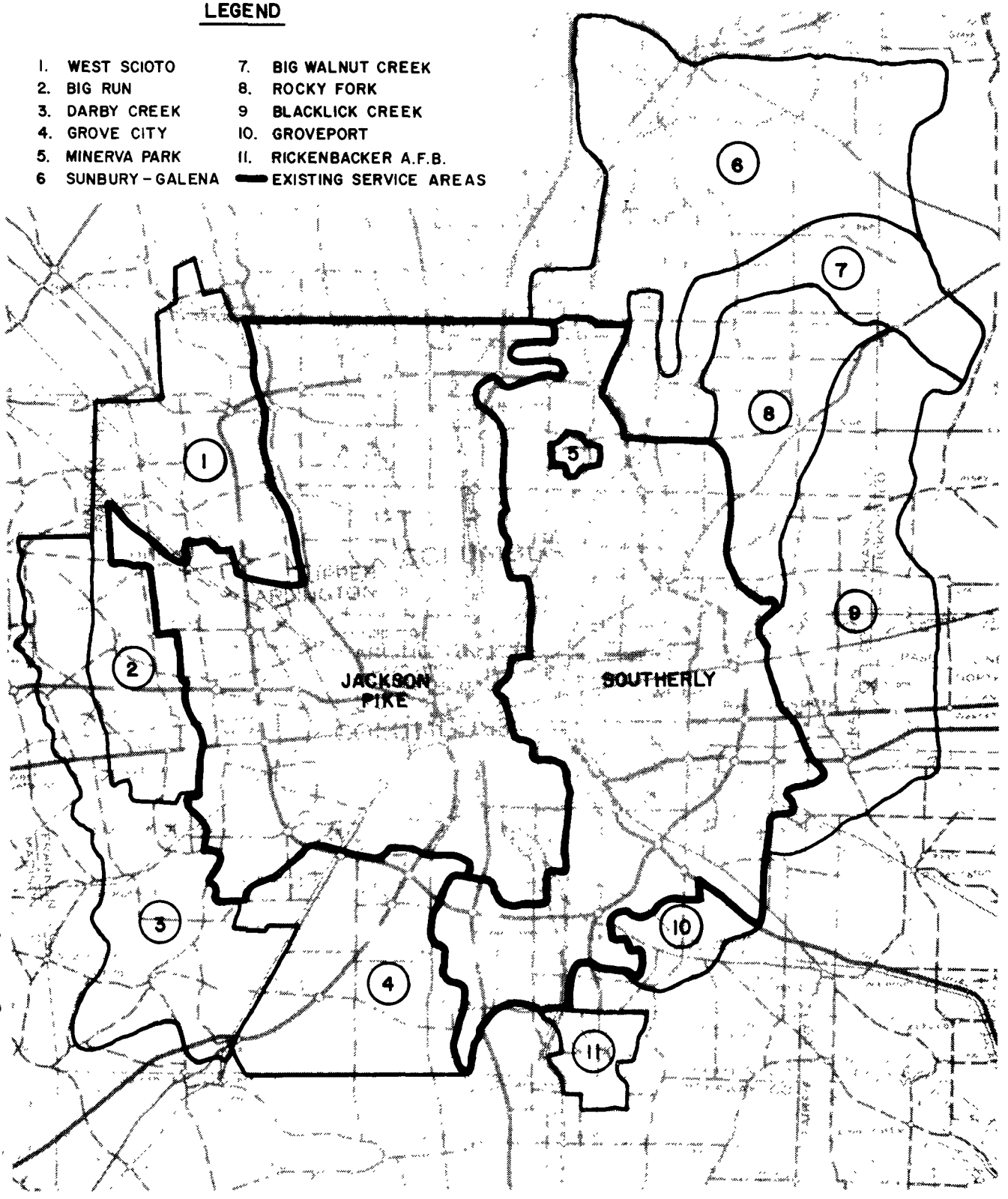
The existing service areas for the two wastewater treatment facilities serving the City of Columbus are also shown on Figure III-1. These two plants, Jackson Pike and Southerly, presently serve the City of Columbus as well as the communities of Bexley, Worthington, Westerville, White Hall, Upper Arlington, Marble Cliff, Grandview Heights, portions of Gahanna, Hilliard, and small unincorporated areas surrounding the City of Columbus.

A 42-inch gravity sewer designed to service the areas along the eastern edge of Griggs Reservoir and the upper Scioto River as well as the Dublin area west of the Reservoir is presently nearing completion. The latter area will contribute its flow via a force main across the Reservoir south of State Route 161. This main will continue to be used until an interceptor along the western edge of Griggs Reservoir is constructed. All intercepted flow will be transported to the Jackson Pike Plant for treatment.

Also nearing completion is the interconnecting sewer between the Jackson Pike and Southerly service areas. This line, which varies from 150 to 156 inches in diameter throughout the gravity portions of its length, currently

Figure III-1

Planning Area For Metropolitan Columbus



transports flow from Grove City to the Southerly Plant. Presently, the City of Columbus has a construction contract (City Auditors Engineer Contract Reference Number 2032) which would tie the interconnecting sewer to the Big Run and Frank Road Interceptors and divert these flows to the Southerly WWTP. Appendix I to this report proposes that the interconnecting sewer be used to transport excessive Jackson Pike flows (greater than 200 mgd) to Southerly to avoid a 25 to 50 mgd expansion at Jackson Pike and to utilize the full hydraulic capacity of both treatment plants. In order to fully tie the two plants together, it is proposed that the interceptor be extended from the Big Run and Frank Road connections some two to three thousand feet to connect to the Jackson Pike influent sewers. The estimated cost for this extension is $1.2 million.

Approximately 12,000 acres, or 12 percent of the areas tributary to the wastewater treatment facilities, are served by combined sewers. Twenty-five hundred acres of this total contribute flow to Southerly while the remainder are influent to Jackson Pike. At the present time, there are at least three major combined overflow points in the Southerly system, and 30 major overflows to the Scioto River in the Jackson Pike system. OEPA reports that there are some 80-90 additional overflow points in both systems. Present plans for the combined system are somewhat undefined, with an ongoing sewer system evaluation survey being conducted and plans being laid for the separation of some key areas. Therefore, a detailed analysis and recommendations of and for the combined areas are inappropriate for this Impact Statement at this time.

However, in the interest of completeness, a preliminary analysis and mathematical modeling of the combined sewer overflows was done to determine if any tentative conclusions could be drawn. Appendix H presents the inputs and results of this work. The major conclusions of the Appendix are:

- Degradation of Alum Creek is primarily dependent upon the quality of the combined sewer overflow, indicating treatment may be a viable alternative.

- Degradation of the Scioto River below the combined overflows is severe even at relatively good quality loadings (BOD_5 < 10 mg/l) in conjunction with all quantities of overflow modeled, indicating the need for improvements within the sewer system before attempting to treat at overflow points.

3.1.3 Subarea Description

This Section describes and discusses each of the 11 subareas shown in Figure III-1, and considers the feasibility of the inclusion of each in a regionalized system.

(1) West Scioto

This 24,300 acre unit is located in the northwestern part of Franklin County, and is bordered on the east by the Scioto River and on the south by the Cities of Hilliard and Upper Arlington. Also included are the Muirwoods Village and Shawnee Hills areas of southern Delaware County.

The present population of the West Scioto area is estimated to be 13,500 people, and is projected to increase to 31,800 by 1985, and to 42,600 by the year 2000.

(2) Big Run

The Big Run service area is also located in western Franklin County just south of the West Scioto subarea, and is comprised of the drainage to Hellbranch Run upstream of U.S. Route 40. This 12,900 acre subarea is estimated to presently contain 1,500 people, and is expected to increase to 4,600 by 1985 and 10,400 by the year 2000. The area is presently unsewered.

(3) Darby Creek

The Darby Creek area encompasses the remaining 28,500 acres in the western portion of the planning area. The present population is estimated at 4,500. The largest population center, 750 people, is the Village of Darbydale. The population projections for this area envision 11,100 people by 1985 and 17,000 by the year 2000.

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.

(4) Grove City

The Grove City subarea is bounded on the south by the Franklin-Pickaway County line, on the east by the

Scioto River, on the north by areas presently served by the City of Columbus sewer system, and on the west by the Darby Creek subarea. Relatively heavy development has taken place in and around both Grove City itself and the Village of Urbancrest. These two municipalities have a present total estimated population of 19,000, a value which is expected to increase to 20,900 by 1985 and to 26,200 by the year 2000. Recently, wastewater flows from Grove City and Urbancrest have been diverted to the Southerly-Jackson Pike interconnecting sewer, making further regionalization considerations academic.

Rural areas predominate south of Grove City, and consist of approximately 16,100 acres with expected 1985 and 2000 populations of 6,100 and 12,300 respectively. Due to this sparse population, the rural areas of this subunit will not be considered further for regionalization.

(5) Minerva Park

The Minerva Park subarea consists of 750 acres located in the north-central portion of Franklin County. Sewer service is presently provided by the Southerly WWTP for the areas to the north, south, and west of Minerva Park, with the 72-inch Alum Creek Interceptor bounding the eastern side. Wastewater from the area is presently collected and conveyed to the Minerva Park WWTP, which dicharges to Minerva Lake Creek. The existing plant is a 0.17 mgd extended aeration facility which serves a contributory population of approximately 1,500 people. Projected populations for the total subarea are 3,400 by 1985 and 3,500 by the year 2000.

(6) Sunbury-Galena

The 45,000 acre Sunbury-Galena subarea is located in Delaware and Licking Counties. It is bounded on the north by an imaginary line just north of Sunbury, on the east by the Hoover Reservoir watershed divide, on the south by a line just above the Duncan Run drainage area, and on the west by a line one to two miles west of Hoover Reservoir.

Homes in the area 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.

(7) Big Walnut Creek

The 24,300 acre Big Walnut Creek subarea is located in northeastern Franklin County and southeast Delaware County. It includes all the drainage to Big Walnut Creek from Duncan Run south to the existing 84-inch interceptor at State Route 161.

Projected populations for this area are 14,100 by 1985 and 21,300 by the year 2000. The portion of the subarea located in Delaware County is to be included in the facilities planning activities discussed for Sunbury-Galena. This area was also included in the Columbus Facilities Plan and was, therefore, retained for review in this Environmental Impact Statement. Due to the physical layout of this and the following two subareas (Rocky Fork and Blacklick Creek), a regionalization decision made for one must be implemented in all three.

(8) Rocky Fork

The Rocky Fork subarea consists of some 11,400 acres, all of which is tributary to Rocky Fork. The Big Walnut Creek and Blacklick Creek units form the boundaries to the northeast and west, respectively. The Rocky Fork subarea presently has 4,300 people, and is expected to grow to 9,100 by 1985 and 17,800 by the year 2000. The largest centers of population are the Villages of Gahanna and New Albany (which is presently unsewered).

(9) Blacklick Creek

This subarea consists of 32,700 acres of the Blacklick Creek drainage basin, and extends from the Creek's headwaters to the existing 96-inch interceptor at Brice Road. Portions of both Franklin and Licking Counties are included.

The estimated present population of the area is 27,700. The population is projected to be 30,300 by 1985, and 41,900 by the year 2000. The heaviest population concentration is found in Reynoldsburg, which had a 1970 total of about 13,900 people. The City of Reynoldsburg operates a contact stabilization wastewater treatment plant with a 2.25 mgd design capacity. Present operation of this facility reportedly requires occasional bypassing of untreated sewage directly to Blacklick Creek.

(10) Groveport

The 5,000 acre Groveport subarea consists of the Village of Groveport and surrounding unincorporated areas. In 1970, Groveport had approximately 2,500 people. Most of the present population contributes wastewater to a 0.30 mgd trickling filter facility. The Franklin County Commissioners currently own and operate the treatment plant for the Village of Groveport. The plant and sewer system will be turned over to the Village when the bonds are retired in the near future. The discharge from this plant is to Little Walnut Creek. An expanded sewer system could collect flow from the entire area and transport them by gravity into the existing 96-inch Blacklick Creek and 108-inch Big Walnut Creek Interceptors; a total service option which is not possible with the location of the present treatment plant.

(11) Rickenbacker Air Force Base

The Rickenbacker Air Force Base consists of some 4,200 acres. The Base is currently being served by a 1.25 mgd trickling filter plant which discharges to Walnut Creek. In 1970, there were approximately 5,600 persons at the Base. However, the Department of Defense has decided to deactivate the air base making regionalization academic.

3.1.4 Summary

The following subareas were chosen from those discussed above as suitable for possible inclusion in a regionalized system:

- West Scioto
- Big Run

- Minerva Park
- Big Walnut
- Rocky Fork
- Blacklick Creek
- Groveport
- Rickenbacker Air Force Base[1]

Selection of a final total regional area from among these subareas is dependent upon the cost-effectiveness of the inclusion of each, as analyzed and discussed in the following section.

3.2 ALTERNATIVE COMPARISON

This section will contain a description of alternatives within each planning subarea and a discussion of the primary impacts and costs associated with each. Ultimately, a final recommended plan is selected and described. (Secondary impacts are discussed for each subarea in Chapter VII of Volume III.)

3.2.1 General

The Brookside Estates area, which was considered in the Columbus Facilities Plan, will not be evaluated in this Impact Statement, since its construction has been approved and completed. Construction consisted of the installation of a 30-inch sewer that connects to the Olentangy Interceptor Sewer a few hundred feet north of State Route 161. This plan was that recommended by the Brookside Estates Mini-Facilities Plan.

The East Scioto area has a newly constructed 42-inch extension of the existing 42-inch East Scioto Interceptor from Case to Martin Roads parallel to Riverside Drive. This system will serve the east side of the Scioto River as well as the portion of the City of Dublin which is located on the western side of the River. Service to the western side is provided by a completed pump station and force main crossing the River on the south side of Route 161. Servicing of the western side is to continue until another means of disposal is provided or the eastern side grows in population and

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[1] Reasons for including Rickenbacker Air Force Base in the analysis are given in Section 3.2.7.

requires the extra capacity of the East Scioto Sewer extension for its sanitary flow. Because of this sewer construction, the East Scioto area will not be considered further in this Environmental Impact Statement.

Sewers for the areas to be regionalized were designed in the Facilities plan based on ultimate population. Guidelines proposed since the preparation of the Facilaities Plan have recommended the use of year 2000 populations for sewer design. Accordingly, the sewer sizes developed in the following sections have used the slopes and peaking factors listed in the Facilities Plan (with a 0.013 Manning's n) in conjunction with year 2000 population projections. Sewers specified are assumed to flow at or near half capacity at the end of the planning period Size and cost sensitivities to designs predicated on ultimate populations, half capacity at year 2000, and full capacity at year 2000 are provided in a later section of this chapter.

The quantity of dry weather sewage flow was calculated to be approximately 90 gpcd. This flow was developed after analyzing the Infiltration/Inflow data available for the City of Columbus(1).

The overall gaged infiltration from 19 existing service areas discussed in the I/I report can be expressed in two ways: 3,580 gallons per inch-diameter mile per day, or 173 gallons per capita per day. For ease of design computation, an allowance for infiltration expressed in gallons per capita is desirable. Using 200 gallons per inch-diameter mile as an allowable infiltration number which can be achieved in new sewers, and assuming the ratio of 3,580 gallons per inch-diameter mile to 173 gallons per capita to hold true (20:1), a value of 10 gallons per capita per day results for infiltration into newly constructed sewers.

Having established a total estimate of 100 gallons per capita per day (gpcd) for infiltration and sanitary flow, the total design flow was calculated using the following equation:

$$\text{Design Flow} = P_{2000} \times 100 \text{ gpcd} \times \text{P.F.}$$

P_{2000} = Population in the year 2000

P.F. = Columbus Peaking Factor

(1) "Infiltration/Inflow Analysis, Columbus Metropolitan Area Facilities Plan" by Malcolm Pirnie, Inc., 1975.

The flow calculated by this equation was then divided by 0.51, a factor which will provide the capacity for a sewer which will flow half full in the year 2000[1]. The relationship of average daily flow to the peaking factors selected for use in the equation is shown in Figure III-2 [2].

Interceptor costs used in the following sections were based on recent bids for sewer construction in the Columbus area. Capital costs for lateral sewers and house connections are not included in alternative comparisons, since Federal funding for their construction will not be available except in scattered cases meeting the requirements of Appendix G [3]. Other capital costs for items such as pump stations and treatment plants were estimated based on past experience with the structures under consideration. Operation and maintenance (O&M) expenses were computed using actual current plant costs and estimates of costs that will be incurred through the year 2000. Annual O&M costs for interceptors were assumed to be equal to 0.25 percent of the initial construction cost. Any computations involving interest used an annual rate of 6-3/8% over the period starting in 1980 and ending in the year 2000. Service lives of interceptors and wastewater treatment plants were assumed to be 50 and 35 years, respectively.

A study of the New Albany area, which presently experiences water quality problems due to overutilization of septic tanks, provided a basis for establishing a threshold for maximum population densities allowable before interceptor construction should be considered. New Albany currently has an estimated population of 600 contained in an area of 400 acres. Thus, it was assumed that when other areas with soil suitabilities for septic tank usage similar to those in New Albany reach a density of 1.5-2.0 people per acre, the provision of centralized sewage treatment or interception systems should be examined in light of the pollution problems encountered. This density criterion was used throughout the planning area, as the great majority of soil associations present are considered to be marginally suitable, at best, for heavy septic tank and leachfield usage.

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[1] Appendix F provides design tables for each alternative investigated.

[2] Taken from "Cost-Effective Analysis, Vol. One", Malcolm Pirnie, Inc., 1975.

[3] PRM 77-8, "Funding of Sewage Collection System Projects", U.S. EPA, June, 1977.

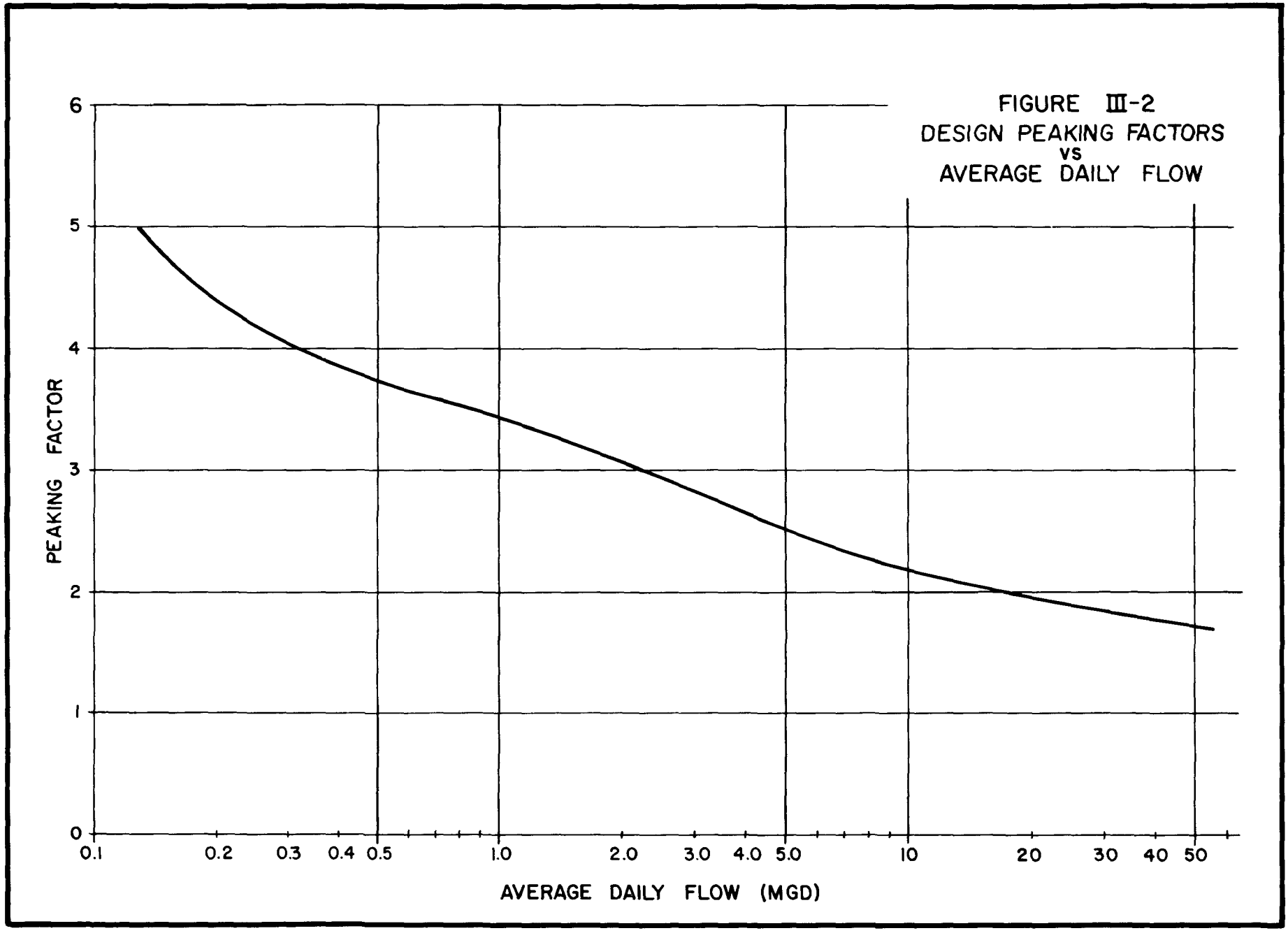
FIGURE III-2
DESIGN PEAKING FACTORS
vs
AVERAGE DAILY FLOW
PEAKING FACTOR
6
5
4
3
2
1
0
0.1
0.2
0.3
0.4
0.5
1.0
2.0
3.0
4.0
5.0
10
20
30
40
50
AVERAGE DAILY FLOW (MGD)

In the sub-areas that are projected to have 2.0 people/acre or more within the planning period prior to construction of the recommended intercepting sewers, it will be necessary that localized facilities planning be conducted. The Village of Minerva Park, the City of Reynoldsburg, and the Village of New Albany are exceptions to this having already established their needs. The localized facilities planning will determine the specific needs for wastewater treatment facilities as well as evaluate alternative methods of wastewater treatment. The localized facilities planning can be conducted by either the City of Columbus or the appropriate municipality. During the above additional localized facilities planning, the Ohio Environmental Protection Agency's "Procedures for Archaeological and Historic Preservation" must be followed prior to the design and construction of any recommended wastewater treatment facilities.

It should be noted that the sizes of all interceptors, force mains, and pump stations mentioned in the following sections are based on half-full flow in the year 2000. As detailed design data become available, small changes in alignment and/or sizing may be necessary. It should also be noted that EIS statements as to interceptor sizing over a given length may ultimately be designed more practically by starting with a smaller diameter sewer with increases in size up to or slightly over that specified in this document.

3.2.2 West Scioto [1]

The West Scioto subarea will contribute flow to the Jackson Pike Wastewater Treatment Plant if tied into the Columbus sewerage system. For the most part, this area is presently unsewered. The exceptions are the Dublin and Muirfield Village areas to the north which presently have sewers and plan to tie-in temporarily to the interceptor constructed along the east side to the Scioto. The present population of the total area is estimated to be 13,500 people, and is expected to increase to 31,800 people by 1985 and to 42,600 by the year 2000.

(1) Alternative Description

There are two gravity sewer alternatives under consideration for servicing this area, as shown in Figures

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[1] Figures depicting the routes for all subareas which were considered in the Columbus Facilities Plan prepared by Malcolm Pirnie, Inc. have been reproduced for this Environmental Impact Statement with only minor changes.

III-3 and III-4. The first, known as the Low Level Alternative, consists of an interceptor that travels along the edge of Griggs Reservoir from the existing 72-inch stub of the Scioto Interceptor to Indian Run Creek near Dublin. The interceptor is 33,300 feet long, and ranges from 36 to 48 inches in diameter.

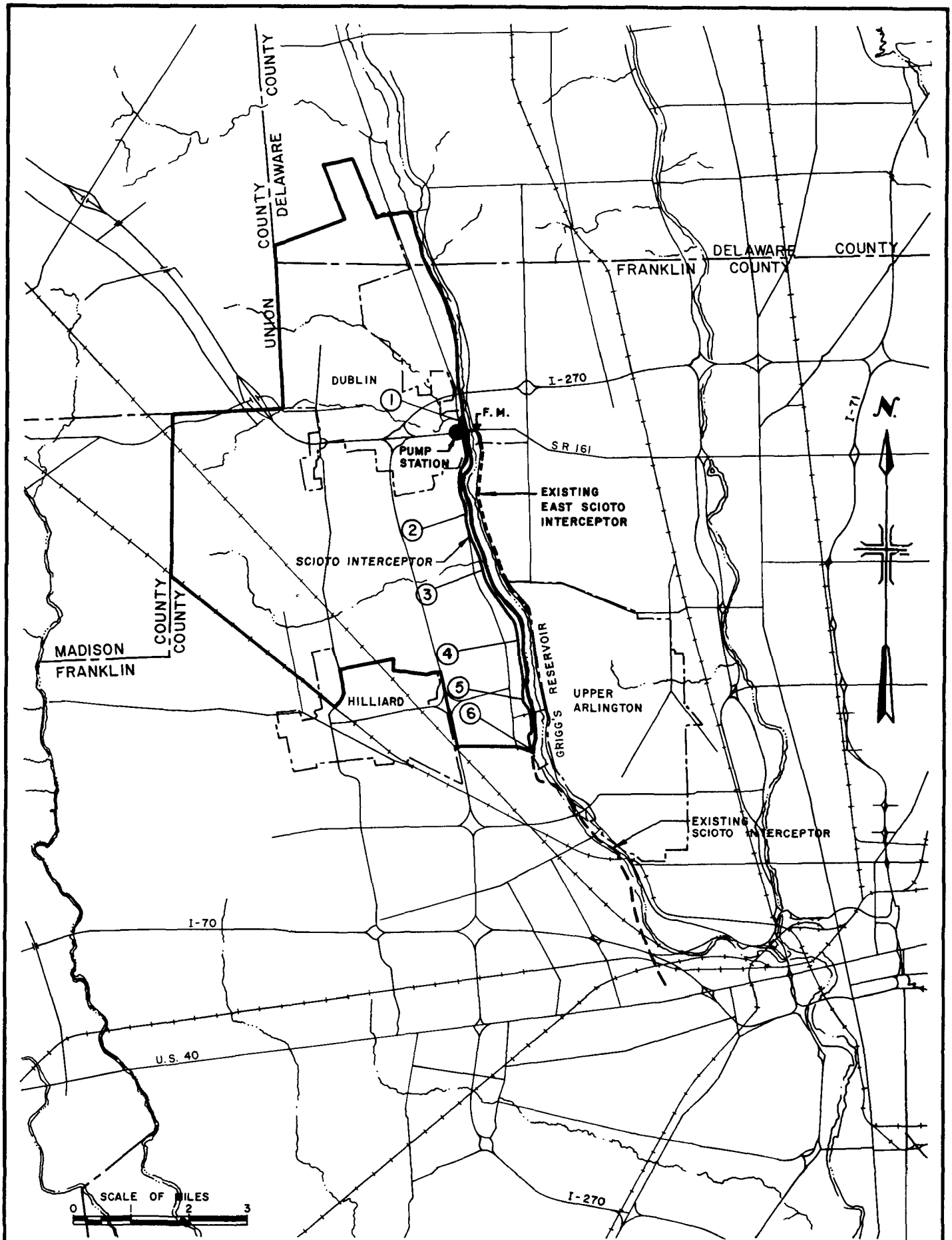
The second, or High Level Alternative, connects the same two points as the Low Level option. It differs from the Low Level Alternative north of Tudor Ditch. At this point, the interceptor crosses over open and residential area to the intersection of Dublin and Schirtzinger Roads. From this intersection northward, the interceptor follows Dublin Road to Rings Road. After traveling west on Rings Road for about one-quarter of a mile, the route turns north through more open land until finally reaching Indian Run Creek. The length of the interceptor in the High Level Alternative is 33,800 feet, with a diameter that varies from 36 to 48 inches.

A No Action Alternative was not considered viable, since increasing pollutant loads upon the area's Crosby-Brookston and Milton-Ritchey-Miamian soil associations through continued use of septic tank and leach field systems could result in contamination of Griggs Reservoir, which is presently used as a potable water supply.

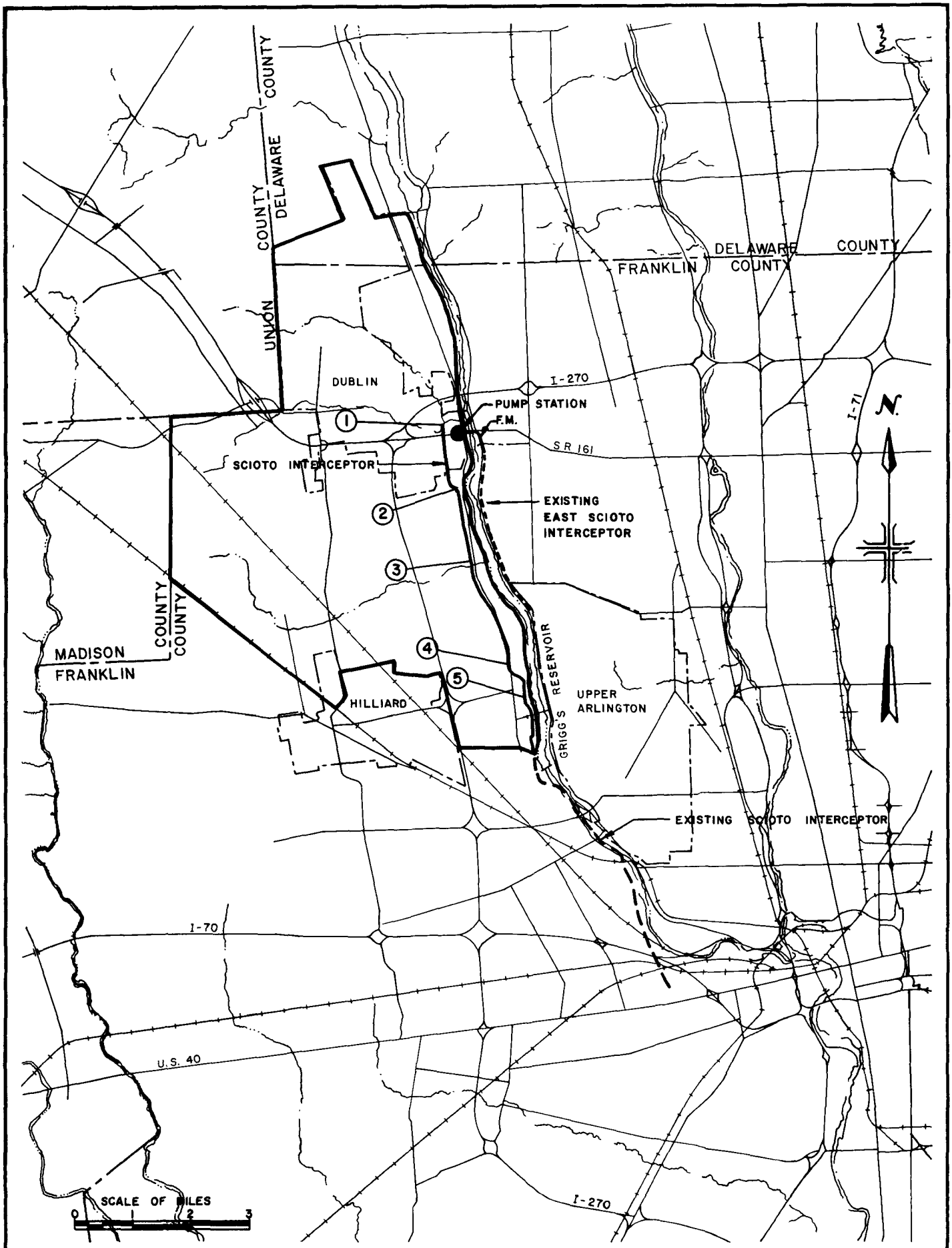
(2) Primary Impacts

Short-term primary impacts of the Low Level Alternative would largely be due to the erosion caused by the close proximity of interceptor construction to Griggs Reservoir and the crossing of ten streams or ditches. Levels of suspended solids and turbidity can be expected to temporarily increase in these watercourses. The Low Level Alternative also traverses 22,700 feet of steep slopes and 1,600 feet of the James Thomas Park. Because of the type of land use close to the Resrvoir, this Alternative also traverses 21,900 feet of wooded area.

The long-term effects of the Low Level Alternative are associated with the purchase of easements through private yards and the removal of large trees. Most of the interceptor route is within a flood plain, and is frequently across stream and ditch outlets. These conditions will require raised manholes along with 5,400 feet of aerial sewer, creating a permanently adverse aesthetic appearance.



MALCOLM PIRNIE, INC.	COLUMBUS METROPOLITAN AREA FACILITIES PLAN	SCIOTO RIVER SERVICE AREA LOW LEVEL ALTERNATE	FIGURE III-3



MALCOLM PIRNIE, INC.	COLUMBUS METROPOLITAN AREA FACILITIES PLAN	SCIOTO RIVER SERVICE AREA HIGH LEVEL ALTERNATE	FIGURE III-4

DEFIANCE

The High Level Alternative, which calls for 16,500 feet of sewer along Dublin Road, would create a short-term adverse impact by disruption of traffic. Dublin Road is used by commuters going to and from the City of Columbus, and presently has two schools and several churches and residential areas located along it. Another short-term adverse impact is involved in the construction of the proposed interceptor through 6,400 feet of steep slopes with 12 stream and ditch crossings. This alternative route also crosses the same 1,600 feet of the James Thomas Park as that in the Low Level Alternative.

The main long-term impact resulting from the High Level Alternative is the 1,300 feet of interceptor which must be aerial and will create an adverse impact upon the aesthetics of the area.

Both alternatives have local short-term adverse impacts due to construction, such as noise, air quality, and temporary aesthetic degradation. Both alternatives have the beneficial impact of the elimination of most septic tank systems which could possibly contaminate ground water if continued and increased usage was permitted. The High Level Alternative would require most of the homes on the east side of Dublin Road to tie into the interceptor by pumping, with some continuing to use individual septic tank systems. The Low Level Alternative would collect all sewage flow from this area.

(3) Phasing

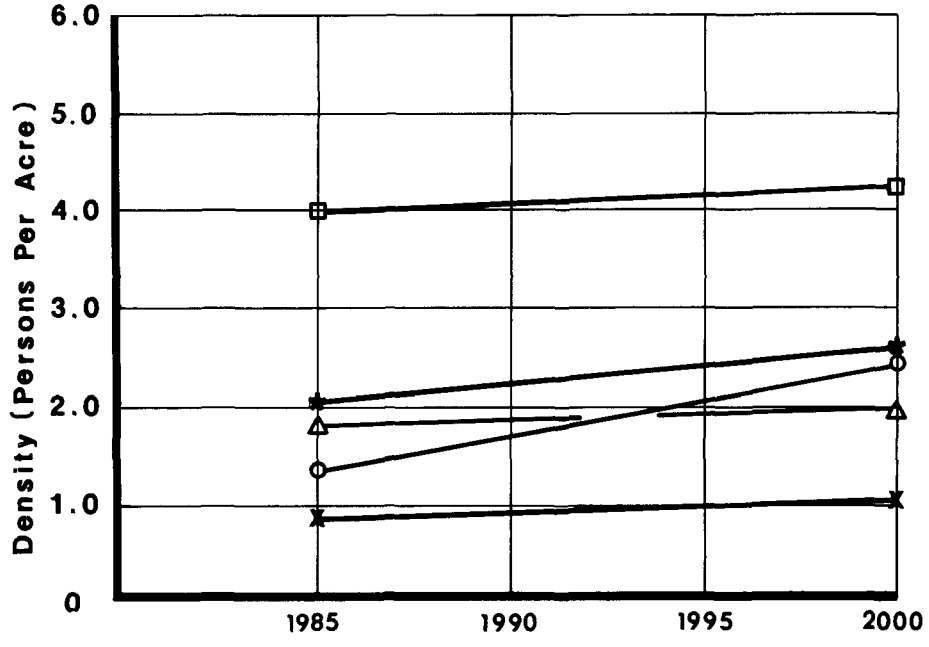
Figure III-5 shows population densities for the West Scioto subarea for both High and Low Level Alternatives. All interceptor sections below Manhole 3 may be needed by 1980 due to both the densities indicated in the Figure and the need to protect Griggs Reservoir from possible contamination. Additional facilities planning will assess the situation of the sub-area and determine the need for the interceptor sections. Between Manholes 2 and 3, the density is low, indicating no immediate need for construction. The City of Dublin lies above Manhole 2, and currently pumps sewage over Griggs Reservoir into the East Scioto Interceptor.

(4) Costs

Phasing considerations point toward the cost-effectiveness on a present worth basis of constructing a permanent pump station and parallel 12-inch force main

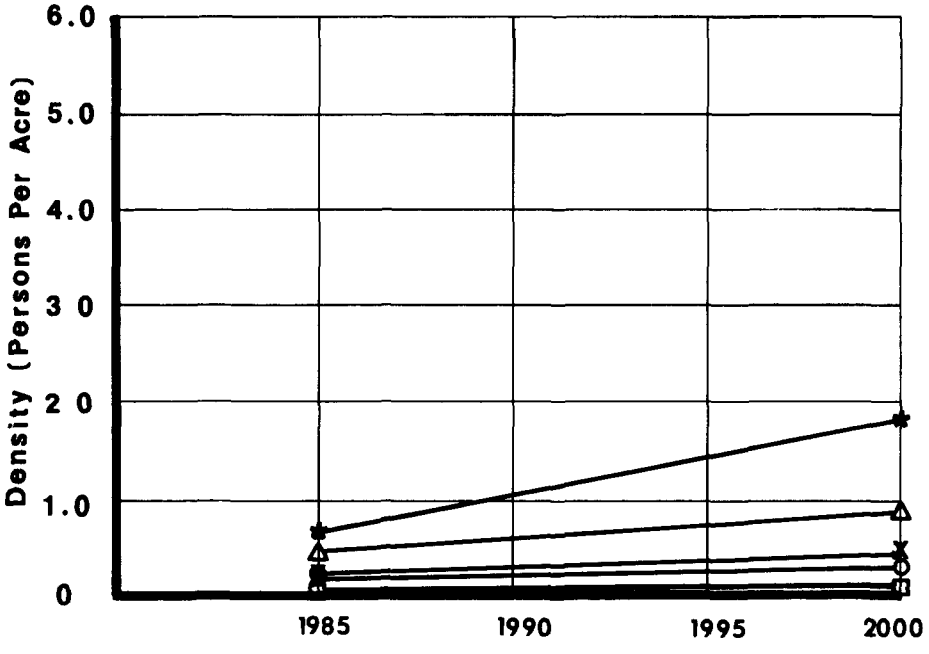
FIGURE III-5

DENSITY TRENDS FOR THE
WEST SCIOTO AND BIG RUN SUBAREAS



Manholes Beginning to #2	Code
#2 to #3	X
#3 to #4	△
#4 to #5	✱
#5 to #6	□

SCIOTO RIVER INTERCEPTOR
(HIGH & LOW LEVEL ALTERNATIVE)



Manholes Beginning to #2	Code
#2 to #3	X
#3 to #4	△
#4 to #5	✱
#5 to #6	□

BIG RUN INTERCEPTOR

across Griggs Reservoir, since the interceptor sections above Manhole 3 will not be required until after the planning period.

The capital cost of the pumping station and additional force main is about $413,000 with an equivalent annual O&M cost of $28,800. This cost is common to both alternatives. The remaining capital cost of the Low Level ($2,825,000) is associated with the gravity interceptor. The capital cost of the High Level Alternative serving the same area is only $2,206,000. On a present worth basis (including salvage), the Low Level Alternative amounts to $3,227,000, a value some 20% above the $2,697,000 attributable to the High Level Alternative.

(5) Summary and Further Considerations

A summary of West Scioto data and cost results is provided in Table III-1.

The costs and primary impacts for the West Scioto area regionalization favor the High Level Alternative. Because of the large difference in costs and the less serious nature of the associated primary impacts, the High Level Alternative is the selected plan for the West Scioto area.

The Environmental Impact Statement for the Delaware County area [1] presented a plan which called for the upper reaches of the Scioto River basin within Delaware County to contribute flow to the City of Columbus' sewer system, a plan which would increase the year 2000 population projections by about 15,000 people. To allow for this option without the need to parallel interceptors and undergo dual construction impacts, a larger interceptor than that proposed for the High Level Alternative would be required. The increased sizes and costs for this modification are compared to the original alternative in Table III-2.

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(1) "Final Environmental Impact Statement, Olentangy Environmental Control Center and Interceptor System", for the Delaware County, Ohio Board of Commissioners, Prepared by the U.S. EPA, Region V, July 1976.

Table III-1
Alternative Summary for the West Scioto Subarea

Item	Alternatives	
	Low Level	High Level
Length of Sewers (feet)	33,300	33,800
Type of Land Traversed (feet)		
Woodland	21,900	12,200
Open Space (rural)	100	4,600
Stream Corridor	6,400	4,100
Steep Slopes	22,600	6,400
Parks and Recreation	1,600	1,600
Reservoir Shoreline	26,900	6,400
Residential	3,700	4,300
Highway Right-of-Way	3,000	16,500
Stream Crossings	10	12
Highway Crossings	4	24
Costs (Thousands of Dollars)		
Capital (1980)	$ 3,238	$ 2,619
Capital (2000)	1,550	1,421
Annual O&M (1980-2000)	(1)	(2)
Present Worth	$ 3,227	$ 2,697

(1) O&M varies from $24,200 in 1980 to $55,100 in the year 2000.

(2) O&M varies from $22,600 in 1980 to $53,500 in the year 2000. Does not include O&M for pumpage of flows from homes unable to reach the interceptor by gravity.

Table III-2
Proposed Modification to the High Level Alternative
for the West Scioto Subarea

Length of Sewer (feet)	Original Size	Modified Size
7,100	36"	42"
6,600	36"	42"
9,800	36"	42"
3.900	36"	42"
6,400	48"	48"
Pumping Station (Peaked Flow)	4.5 mgd	9.0 mgd
Cost (Thousands of Dollars)		
Capital (1980)	$2,619	$2,981
O&M (2000)	1,421	2,173[2]
Present Worth	2,697[1]	3,139[2]

[1] O&M varies from $22,600 to $53,500 in 1980 to 2000.

[2] O&M varies from $38,200 to $100,000 in 1980 to 2000.

Thus, for an 18 percent ($446,000) increase in present worth cost, the option of serving the Scioto River area within Delaware County can be maintained. An annual equivalent cost of $21 per person per year would result for this plan using the present population, a figure which reduces to $7 per person per year for the year 2000 population. Prior to implementation of the recommended alternative, localized facilities planning must be completed in the Delaware County, Scioto Basin to determine the needs for the planning period.

3.2.3 Big Run

The 12,900 acre Big Run subarea is located in western Franklin County, and is comprised of the Hellbranch Run drainage basin upstream of U.S. Route 40. The flow from this area will be transported to the Jackson Pike WWTP if connection is made to the City of Columbus' sewer system. The present population is estimated at 1,500, and is expected to increase to 4,600 by 1985 and 10,400 by the year 2000.

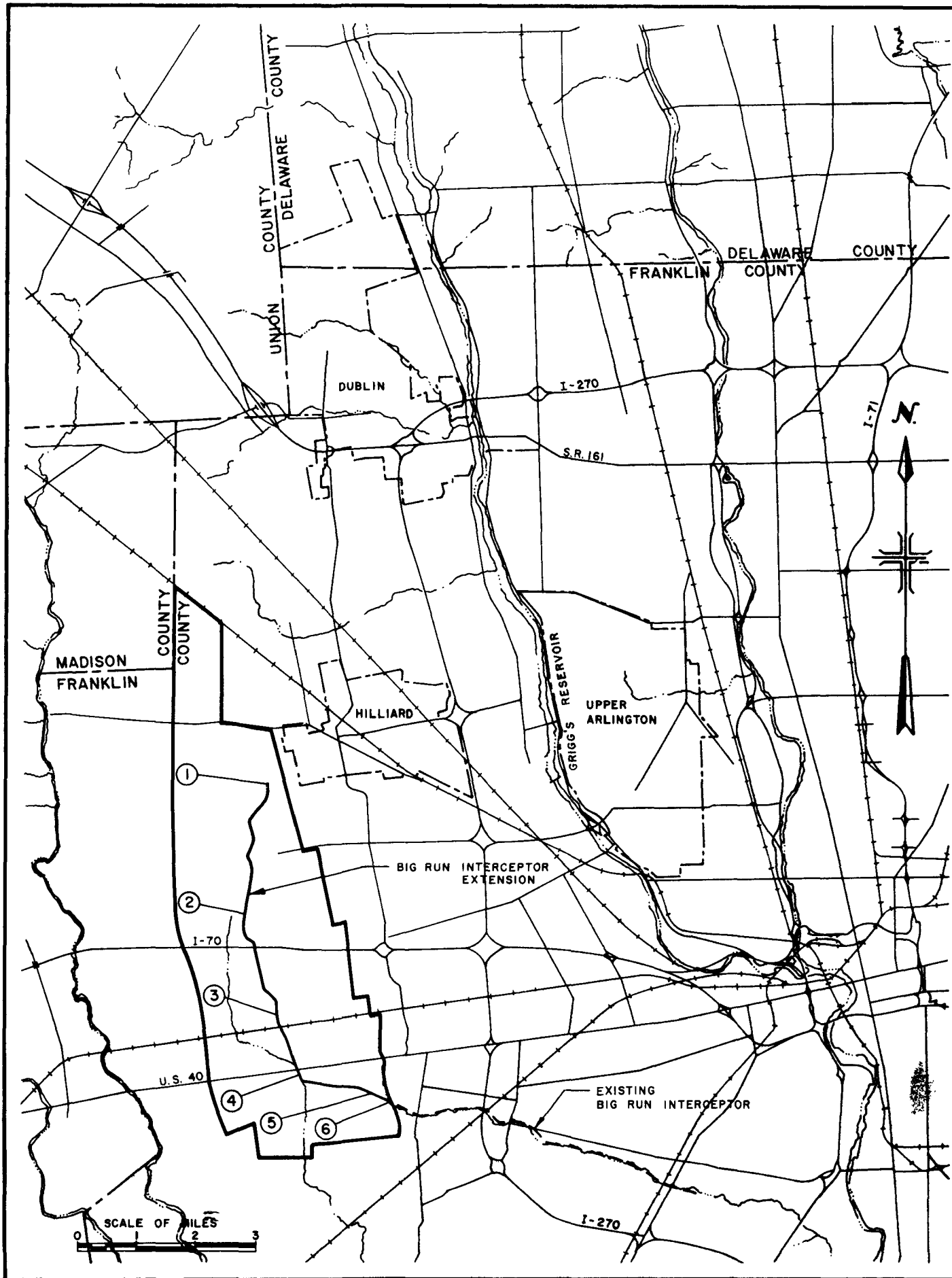
(1) Alternative Description

The general soil association within the region is the Crosby-Brookston-Lewisburg. This association is characterized by a high seasonal groundwater table and low permeability. These conditions prohibit heavy use of septic tank systems, indicating that as population increases, sewer service should be provided. The type of soil present does not permit a viable No Action Alternative.

Alternative A calls for areawide regionalization. As shown on Figure III-6, this system requires 33,000 feet of interceptor construction along Hamilton Ditch, starting approximately one mile north of the Roberts Road crossing and ending with a connection to the existing 54-inch Big Run Interceptor at Galloway Road. The proposed interceptor would vary in diameter from 18 to 27 inches. This is the only regionalization alternative deemed viable for this area.

(2) Primary Impacts

The alignment of the interceptor will result in two stream crossings and five highway crossings. The type of land which will be affected is mainly open or grassland. Adverse short-term impacts may result due



MALCOLM PIRNIE, INC.

COLUMBUS METROPOLITAN AREA FACILITIES PLAN

BIG RUN INTERCEPTOR

FIGURE III-6

to the close proximity of the interceptor route to Big Run for some 25,000 feet. Short-term impacts resulting from noise, air pollution, and aesthetics are not judged to be severe due to the open space and grasslands which will generally separate construction activities from heavily populated areas.

(3) Phasing

The population density increases shown on Figure III-5 for the Big Run area illustrate that most of the interceptor sections should not be built during the planning period. The exception to this is the section between manholes 4 and 5, which may be needed by 1995.

(4) Costs

The capital cost of Alternative A is $2,200,000, with an associated annual O&M cost of $2,500 (between 1995 and 2000). These values, along with salvage and phasing considerations, represent a present worth of only $140,000.

(5) Summary

Table III-3 provides a summary of alternative data and costs for the Big Run subarea.

Table III-3
Alternative Summary for the Big Run Subarea[1]

Item	
Length of Sewers (feet)	33,000
Type of Land Traversed (feet)	
Open Space (rural)	33,000
Stream Corridor	25,000
Residential	0
Stream Crossings	2
Highway Crossings	5
Costs (Thousands of Dollars)[1]	
Capital (1995)	$ 1,008
(2000)	$ 1,192
Annual O&M (1995-2000)	3
Present Worth	$ 140

(1) Does not include the individual treatment unit costs necessary under a phased construction plan.

Population projections point toward a fairly heavy growth in areas surrounding Interstate 70 close to the City of Columbus. A more detailed analysis of this area suggests that sewer service may be needed by 1985. Therefore, a modification to the Big Run alternative proposed in the Facilities Plan is recommended.

This modification entails providing sewer service to a 1,350 acre area with a population projected to be 4,100 by the year 2000. This area can be served by two trunk sewers tying into the existing Columbus system, one along Feder Road and one along Renner Road, in order to serve areas south and north of I-70, respectively. The primary impacts of these trunk sewers are minor, since they travel along highway right-of-ways or through open farmland and lightly residential areas. The total capital cost for the construction of 7,200 feet of 18-inch diameter sewer along Renner Road and 7,900 feet of 15-inch diameter sewer along Feder Road is about $770,000. It should be noted that these sewers can only serve the two areas described, and cannot be extended, using a gravity system, any further west within the Big Run subarea. This modification results in an annual cost of $17 per person per year, for the year 2000 populations. Figure III-6 has included the routes of these proposed extensions.

Prior to implementation of the recommended alternative, localized facilities planning must be completed to determine the needs of this segment of the Big Run subarea.

3.2.4 Minerva Park

The Minerva Park subarea is located in the north-central portion of Franklin County. Wastewater treatment is presently provided by the Columbus Southerly WWTP for the areas to the north, south, and west of Minerva Park. The Alum Creek Interceptor forms the eastern boundary. Minerva Park's present wastewater treatment plant, which discharges to Minerva Lake Creek, is a 0.17 mgd extended aeration facility. The present estimated population is 1,500 people. The projected populations for this area by the years 1985 and 2000 are 3,400 and 3,500 respectively.

(1) Alternative Description

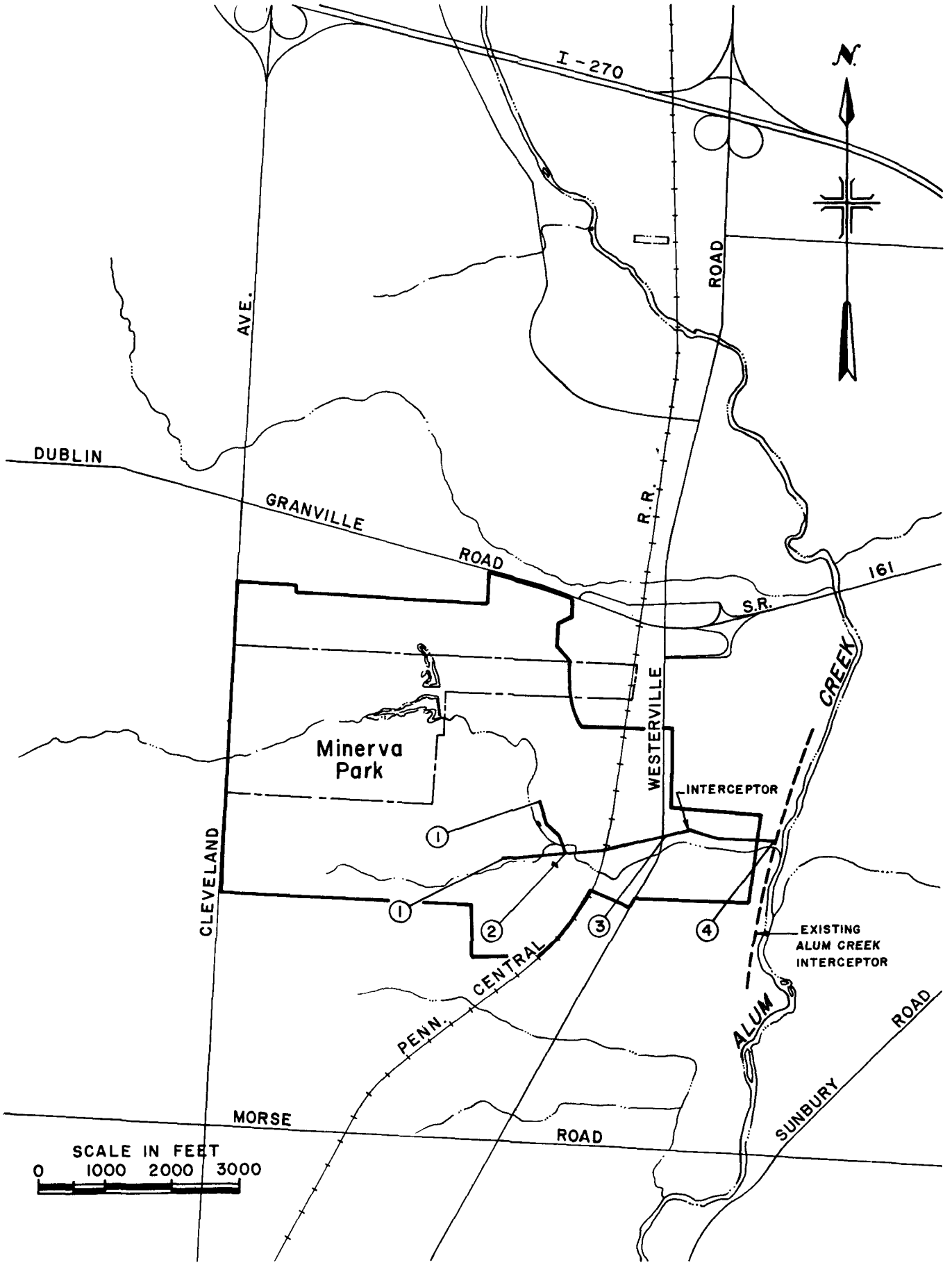
Two alternatives were considered for serving the Minerva Park subarea. The Interceptor Alternative shown in Figure III-7 is one in which an interceptor would be constructed from the Minerva Park WWTP in an easterly direction to a point on the 72-inch portion of the existing Alum Creek Interceptor. The flow would be treated at the Southerly WWTP. The proposed interceptor will be about 3,900 feet long, and will vary from 12 to 15 inches in diameter. An extension will continue upstream of Minerva Lake Creek with approximately 900 feet of 12-inch sewer. A 20-foot permanent right-of-way has been purchased and the design of the interceptor has been completed as per the recommendations of the Facilities Plan. Plans have progressed to such an extent that a portion of the interceptor crossing Westerville Road has already been installed as part of a highway reconstruction project.

The second, or Plant Alternative, proposes expansion and improvement of the existing treatment plant. By the year 2000, a 0.6 mgd plant will be necessary. Required additions will be built adjacent to the old plant on land presently used for farming. Effluent requirements for a 0.6 mgd plant at this location will probably be quite stringent. Costs summarized at the end of this section have assumed design release levels of 8 mg/l BOD_5, 8 mg/l SS, 1.0 mg/l ammonia nitrogen (summer), and a minimum of 5.0 mg/l of dissolved oxygen at all times. Due to the large population increase projected by 1985, the plant should be built by 1980 with full capacity installed for the wastewater flow in the year 2000.

It has been reported that the effluent from the WWTP adds nutrients to and depletes oxygen from the relatively small flow in Minerva Lake Creek. It was estimated that the present flow from the WWTP is about one-third of the creek's dry weather flow. These existing conditions do not permit consideration of a No Action Alternative.

(2) Primary Impacts

The short-term impacts due to construction of the Interceptor Alternative would be the degradation of surface water quality from increases in turbidity due to construction activities along 4,200 feet of stream banks and at three stream crossings. Aquatic biology would be hampered by the increase in turbidity and by the area destruction caused by work activities in or near the stream. Woody



MALCOLM PIRNIE, INC.	COLUMBUS METROPOLITAN AREA FACILITIES PLAN	MINERVA PARK INTERCEPTOR ALTERNATE	FIGURE III-7

vegetation is sparse along the proposed route, thereby minimizing the effect of any removal required. The interceptor mainly traverses open fields and farmland, with no structures occurring along the proposed route. This situation will reduce adverse noise, aesthetic, and air quality impacts. Traffic disruption and public inconvenience is expected to be minimal, since no houses occur along the route and only one road, which already has a portion of the interceptor constructed beneath it, would be crossed. A short section of proposed interceptor will pass beneath railroad tracks. The 900-foot branch in the Interceptor Alternative requires some 350 feet of construction through steep slopes, a situation which will cause adverse short-term impacts.

Long-term beneficial impacts will mainly be found in the improvement of water quality in the Minerva Lake Creek due to the elimination of the Minerva Creek Plant. The elimination of the plant will have further beneficial impacts by improving local aesthetics, decreasing manpower costs, energy commitment, and land requirements.

Long-term adverse impacts resulting from retention of the treatment plant are the commitment of more manpower, energy, and land due to the needed expansion by 1980. The retention of the WWTP close to growing residential communities could increase impacts from odor, noise and aesthetics.

(3) Phasing

Phasing through the use of projected densities was not necessary for this subarea since the combination of the large population growth expected by 1985 and the probable stringent permit release levels for a WWTP in the area require interceptor or treatment plant construction by 1980.

(4) Costs

The capital cost for the Interceptor Alternative is $380,000, with an associated annual operation and maintenance cost of $1,000. For a true comparison, the O&M should include the cost of treating the 0.6 mgd from the Minerva Park area at the Columbus Southerly plant. When this consideration is included, (along with salvage value) a total present worth for the Interceptor Alternative of $542,000 is derived.

The capital cost for the Plant Alternative (excluding land costs) is estimated to be $2,070,000. The costs for operation and maintenance of the proposed 0.6 mgd plant are estimated as approximately $400/mg. Total present worth of the Plant Alternative is then $2,325,000, assuming construction takes place by 1980.

(5) Summary

A tabular summary of data and costs for Minerva Park is provided in Table III-4. The selected plan for this subarea is the Interceptor Alternative. This selection was made primarily to minimize the long term impacts associated with operating and maintaining a local treatment plant and because of the large difference in capital and O&M costs between the Plant and Interceptor Alternatives. Construction impacts of the Interceptor Alternative may be somewhat severe, but they will be short-term and will occur only once. A cost of $32 per person per year results using present population, whereas using the year 2000 population results in a cost of $14 per person per year for the Interceptor Alternative.

Localized facilities planning need not be completed prior to implementation of this alternative since the needs have been adequately identified and evaluated.

3.2.5 Big Walnut Creek, Rocky Fork, Blacklick Creek

The three individual subareas (Big Walnut Creek, Rocky Fork, Blacklick Creek) that are described in the following sections must be taken as a single unit in any regionalization alternative analysis. Three possible regionalization systems, designated as A, B and C, were proposed in the Columbus Facilities Plan. These will be reviewed in the following paragraphs along with another alternative (D) which proposes only partial regionalization of the three subareas during the planning period. Figures III-8 through 12 show the routes of the five alternatives investigated.

(1) Alternative Description

1. Big Walnut Creek

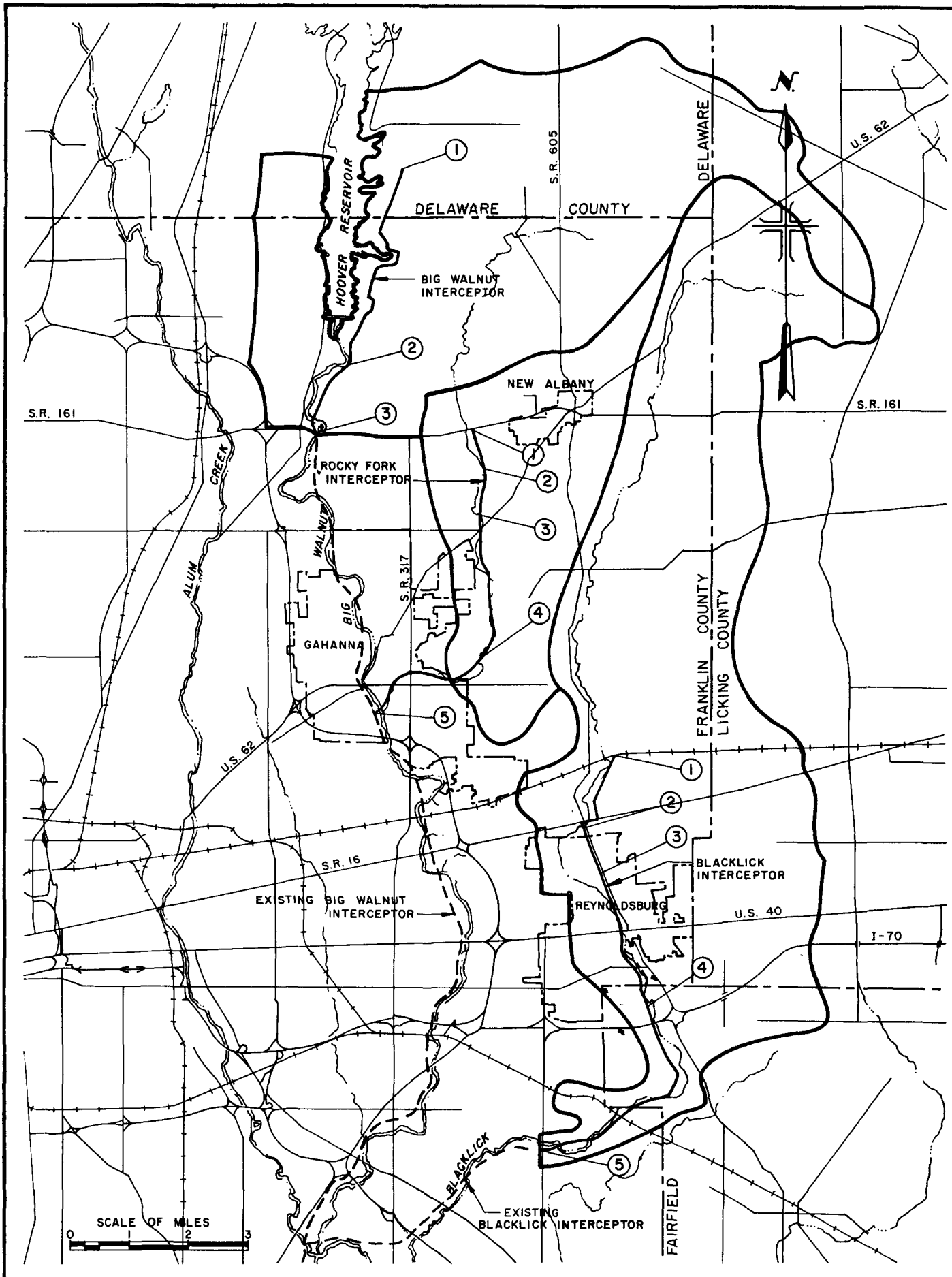
The Big Walnut Creek subarea is located in northeastern Franklin County and southeastern Delaware County. This area presently has an estimated population of 6,000. The population is expected to increase

Table III-4
Alternative Summary for Minerva Park Subarea

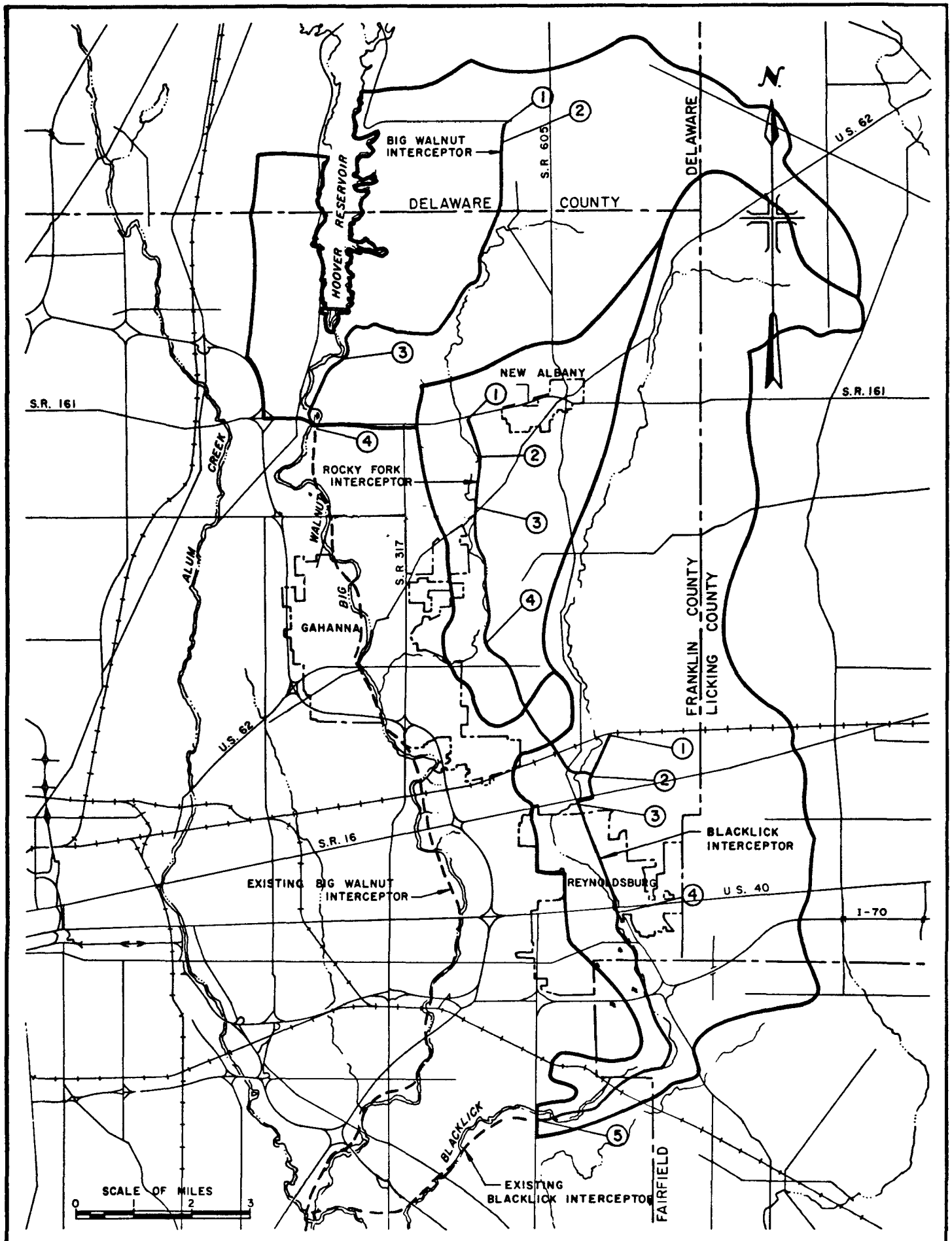
Item	Alternatives	
	Interceptor	Plant
Length of Sewers (feet)	4,800	0
Type of Land Traversed (feet)		
Woodland	1,500	0
Open Space (rural)	3,300	0
Stream Corridor	4,200	0
Steep Slopes	350	0
Agricultural	0	5 acres
Stream Crossings	3	0
Highway Crossings	Already Constructed	
Costs (Thousands of Dollars)		
Capital (1980)	$ 380	$ 2,070
Annual O&M	(1)	(2)
Present Worth	$ 542	$ 2,325

(1) O&M varies from $24,300/year in 1980 to $32,300/year in 2000.

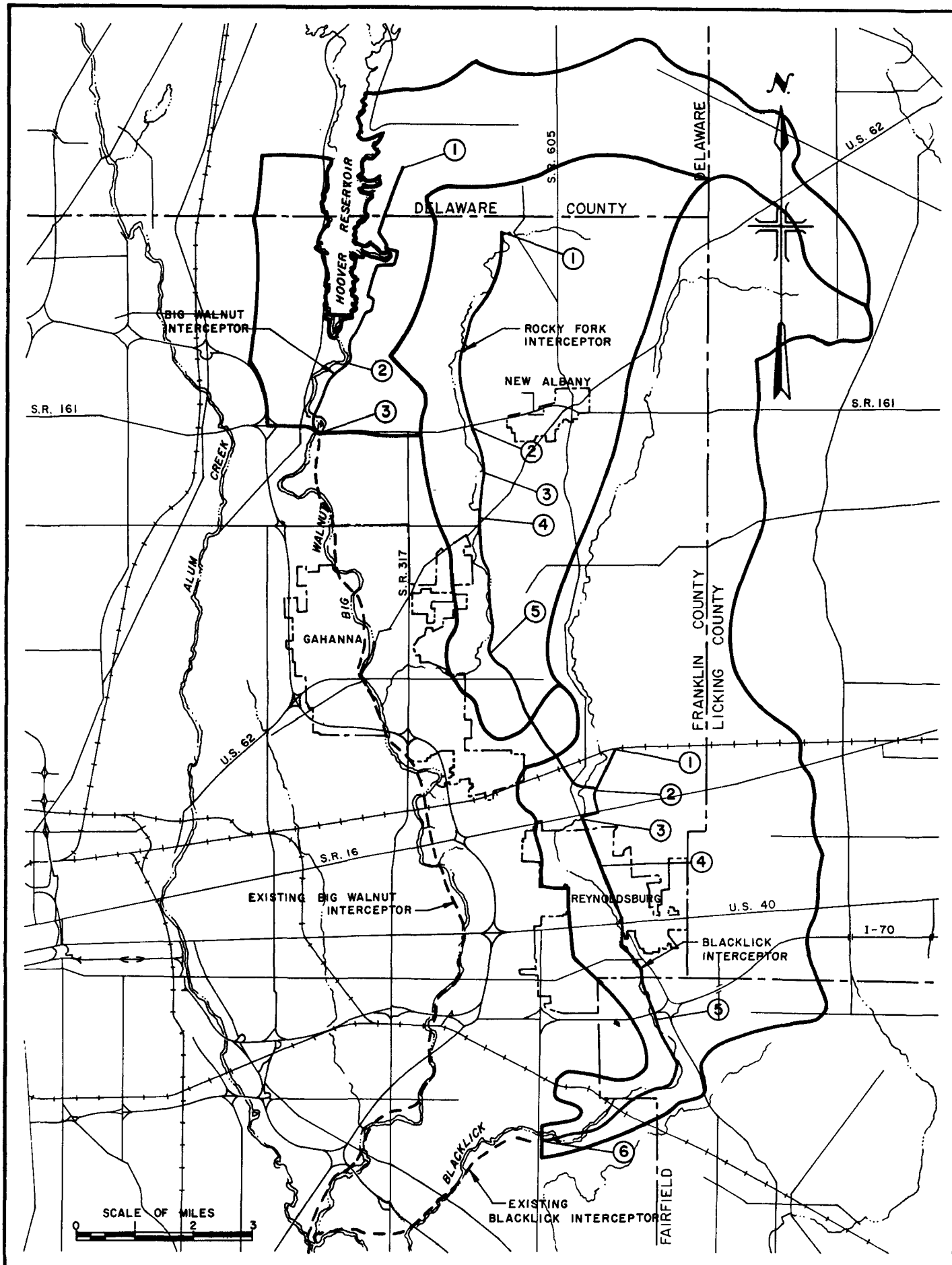
(2) O&M varies from $32,300/year in 1980 to $51,100/year in 2000.



MALCOLM PIRNIE, INC.	COLUMBUS METROPOLITAN AREA FACILITIES PLAN	BIG WALNUT CREEK SERVICE AREA ALTERNATE A	FIGURE III-8

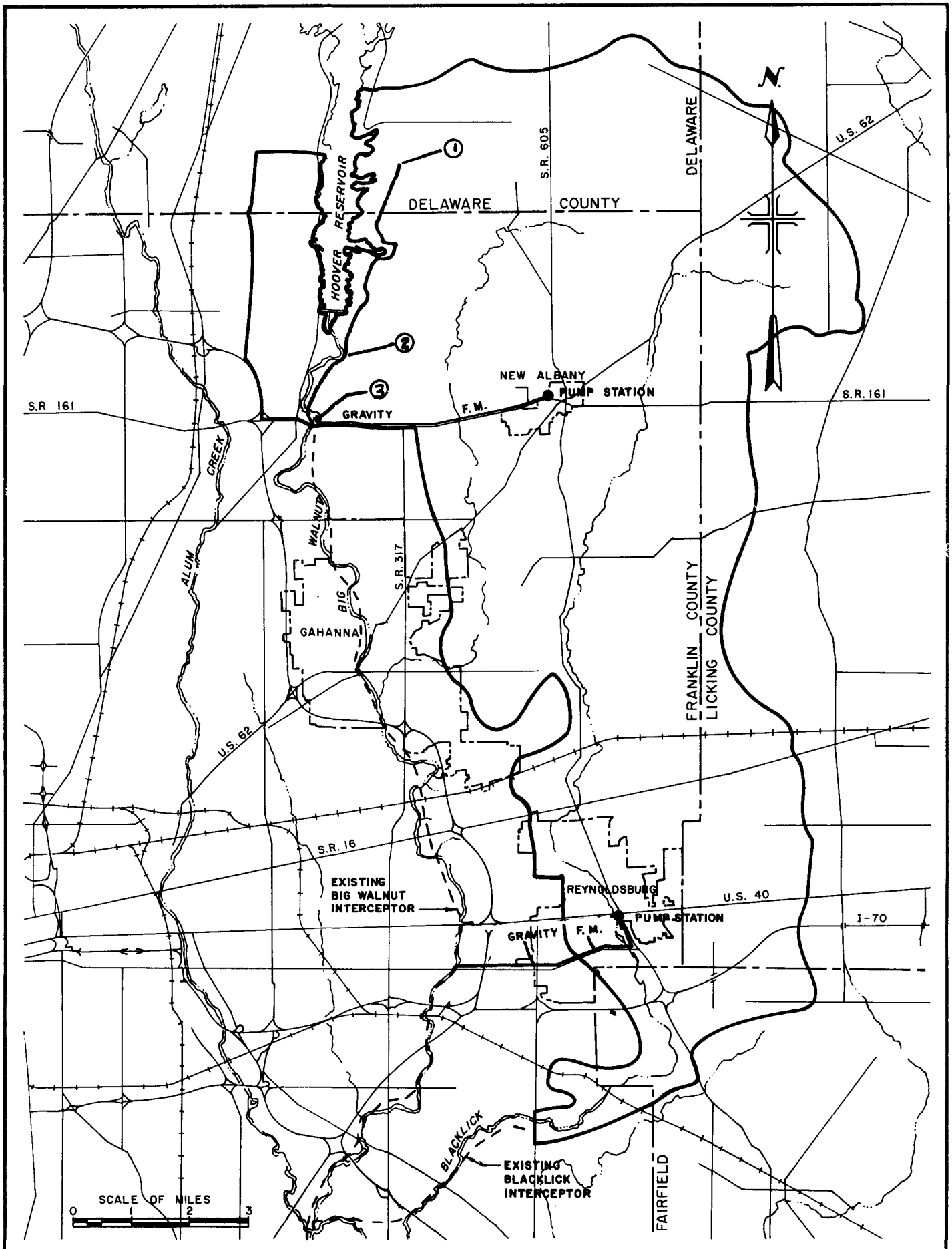


MALCOLM PIRNIE, INC.	COLUMBUS METROPOLITAN AREA FACILITIES PLAN	BIG WALNUT CREEK SERVICE AREA ALTERNATE B	FIGURE III-9



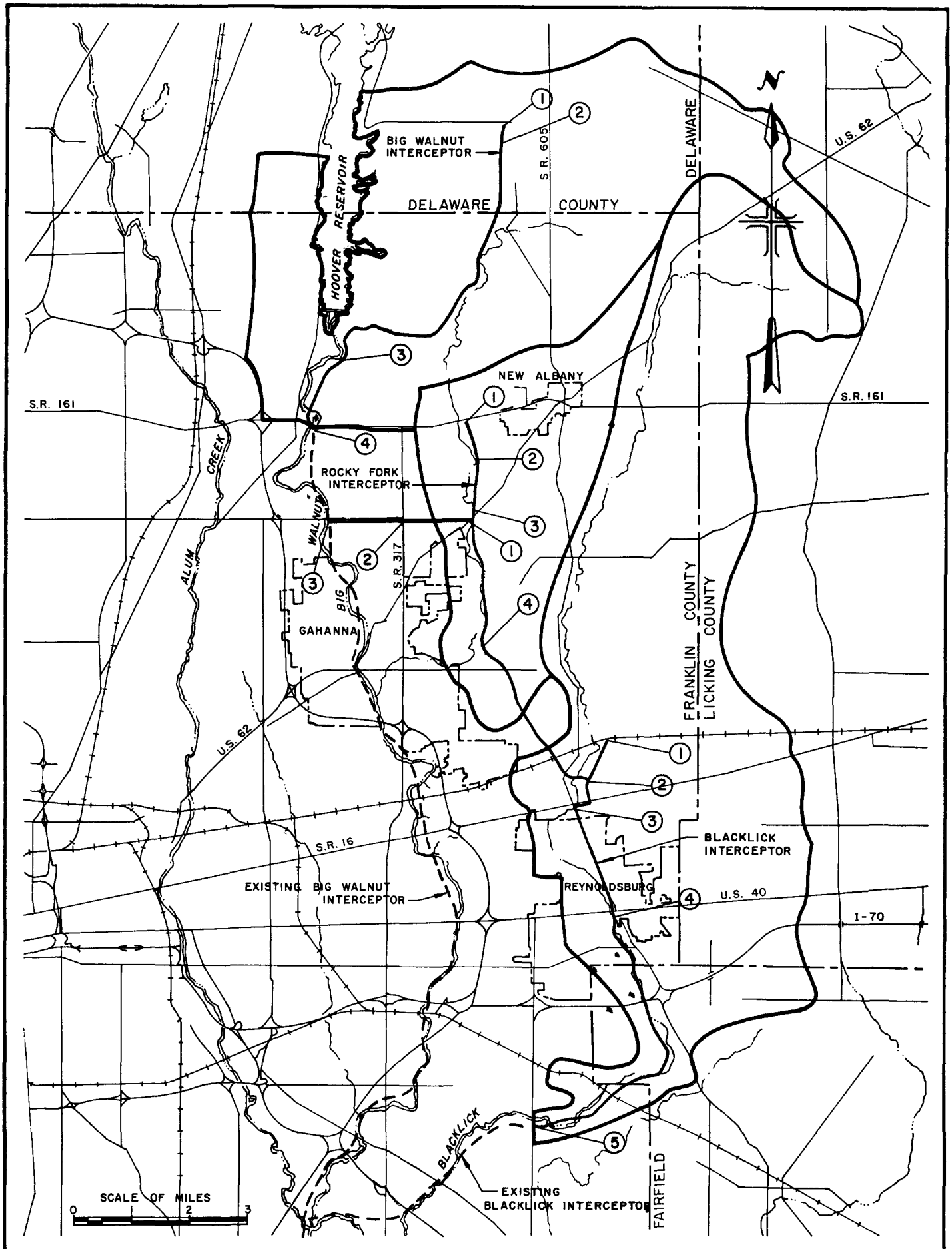
MALCOLM PIRNIE, INC.	COLUMBUS METROPOLITAN AREA FACILITIES PLAN	BIG WALNUT CREEK SERVICE AREA ALTERNATE C	FIGURE III-10

DEFIANCE



MALCOLM PIRNIE, INC.	COLUMBUS METROPOLITAN AREA FACILITIES PLAN	BIG WALNUT CREEK SERVICE AREA ALTERNATE D	FIGURE III-11

DEFIANCE



MALCOLM PIRNIE, INC.	COLUMBUS METROPOLITAN AREA FACILITIES PLAN	BIG WALNUT CREEK SERVICE AREA ALTERNATE SUB B	FIGURE III-12

DEFIANCE

to almost 14,100 by 1985 and 21,300 by the year 2000. If regionalized into the Columbus sewerage system, flow from this subarea will be treated at the Southerly WWTP.

One of the major concerns within the Walnut Creek area is the protection of Hoover Reservoir, which is used as a potable water supply. If population growth is as predicted, heavy use of septic tanks and leachfields will occur if sewers are not provided. The local soils are mainly of the Bennington-Pewamo Association, and are unacceptable for septic tank systems.

Alternatives A and D would involve the construction of a 36-inch interceptor over 28,000 feet. The proposed interceptor route parallels the eastern edge of Hoover Reservoir and Walnut Creek. Service would be instituted from the existing 84-inch interceptor at State Route 161 northward to the Lake of the Woods area.

Alternative B envisions an interceptor which begins at Duncan Run and follows Rocky Fork to Central College Road. The interceptor route then runs westward to Walnut Creek where it turns to the south to ultimately connect to an existing 84-inch interceptor, which transports the flow to the Southerly WWTP. The proposed interceptor varies in size from 18 to 36 inches over a length of 40,000 feet.

Alternative C will involve the construction of an interceptor which is the same length and follows the same route as that in Alternative A but which would serve a smaller area. Due to this decrease in service area, the diameter of the proposed interceptor is reduced, and will vary from 30 to 36 inches. In this Alternative, some of the subarea will be served by an extended Rocky Fork Interceptor, as discussed in the next section.

2. Rocky Fork

The Rocky Fork subarea is located in the northeastern portion of Franklin County, encompassing some 11,400 acres. The present population for this subarea is about 4,300 people, and is expected to increase to 9,100 by 1985 and to 17,800 by the year 2000.

At the present time, the surface waters in and around the Village of New Albany are heavily polluted during low flows. Specifically, Rose Run, Sugar Run, and Rocky Fork are heavily impacted by point and non-point releases from individual septic tanks and leach-fields. This situation again eliminates consideration of a No Action Alternative.

Alternative A consists of an interceptor running parallel to Rocky Fork for some 33,700 feet. The diameter of this proposed interceptor varies from 24 to 36 inches. Service will be provided to the Rocky Fork drainage area from just south of Granville Road to the Village of Gahanna, which presently is included in the City of Columbus' sewer system. The proposed Rocky Fork Interceptor will tie into the existing 84-inch Walnut Creek Interceptor near the confluence of Walnut Creek and Rocky Fork.

Alternative B consists of an interceptor which varies in diameter from 24 to 36 inches as it traverses some 36,800 feet along Rocky Fork to a point just north of Havens Corners Road. The route then turns southeast running across country until reaching the proposed 36-inch Blacklick Creek Interceptor. The point of connection to the Blacklick Creek Interceptor is approximately one-quarter mile south of the intersection of Taylor and Reynoldsburg-New Albany Roads.

Alternative C for the Rocky Fork subarea consists of an interceptor 46,100 feet long which varies in diameter from 18 to 36 inches. This proposed interceptor would begin near the Rocky Fork, approximately one-quarter mile south of the Franklin-Delaware County line. The route would parallel Rocky Fork on the eastern side until reaching the same location north of Havens Corners Road proposed in Alternative B. The Alternative B route is followed from this point on to the proposed 36-inch Blacklick Creek Interceptor.

Alternative D utilizes 8,000 feet of 8-inch force-main and 10,500 feet of 12-inch gravity sewer. This sewerage system is designed to collect flows only from the New Albany area and transport them to the existing Big Walnut Creek Interceptor. The remainder of the Rocky Fork area will not be included in a regional system until at least 1995.

The cost of building a treatment plant in the New Albany area was also investigated using a base population of approximately 20,000 people, and is summarized in Table III-5 along with the pump station and force main costs involved in Alternative D. The pump station-force main system is shown to be half as expensive as the treatment plant option.

A modification to the lower section of the interceptor proposed for the Walnut Creek subarea may be necessary. The portion of this unit which is in Delaware County will be included in a Facilities Plan to be undertaken shortly by entities within Delaware County. It is suggested that the final design size for this interceptor be determined by the Facilities Plan.

During the comment period, the City of Columbus expressed concern of the Draft EIS's Alternative D for the Rocky Fork Basin for not utilizing a section of sewer already constructed below Morse Road. The Final EIS considered the City's proposed alternative as shown in Figure III-13. The alternative would utilize the existing 15 to 21-inch sewer with an extension of approximately 1,000 feet of 12-inch gravity sewer connecting to an 8,000 foot 8-inch force main. The pump station would be located near the intersection of Route 62 and Morse Road. An 18-inch interceptor follows Route 62 northward into the Village of New Albany comprising an estimated length of 12,000 feet.

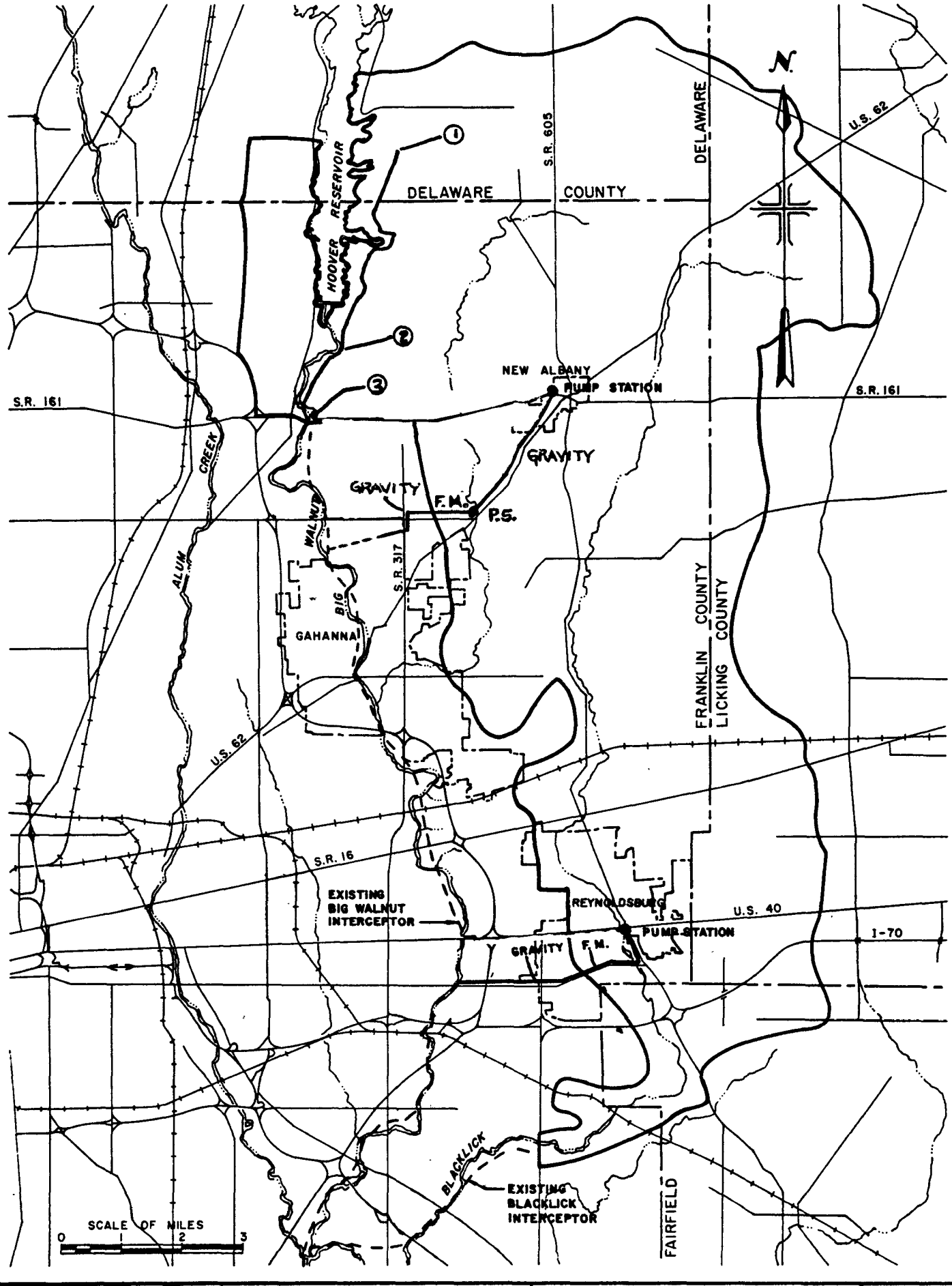
A table comparing sizes, lengths, and costs of the original Alternative D for the Rocky Fork area and the alternative proposed by the City for servicing the same area is presented in Table III-6.

As shown by the table, the original Alternative D for the Rocky Fork area is some 14% less expensive than the alternative proposed by the City.

The primary impacts associated with each alternative are relatively small in difference, in that they both utilize a pump station and 8,000 feet of force main. The City's alternative, however, is some 6,000 feet shorter when everything is constructed.

Table III-5
Treatment Plant Costs vs. Pump Station
Costs in the New Albany Area

	Treatment Plant	Pump Station
Capital Cost		
Treatment Plant	$2,070,000	-
Pump Station	-	$ 170,000
Interceptor	-	710,000
Total	$2,070,000	$ 880,000
Present Worth		
Treatment Plant		
(capital)	$1,810,000	-
(O&M)	$ 990,000	-
Pump Station (capital)	-	$ 170,000
(O&M)	-	110,000
Interceptor (capital)	-	590,000
(O&M)	-	20,000
Southerly Treatment Plant (O&M)	-	420,000
Total	$2,800,000	$1,310,000



MALCOLM PIRNIE, INC.

COLUMBUS METROPOLITAN AREA FACILITIES PLAN

BIG WALNUT CREEK SERVICE AREA ALTERNATE D-1

FIGURE III-13

Table III-6
City vs. Draft EIS Rocky Fork Alternative

Proposed City Alternative

Facilities	Time of Construction	Length (ft)	Construction Cost	($/yr)
Pump Station	1980	-	$105,000	26,500
1-8-inch Force Main	1980	8,000	156,000	400
1-12-inch Interceptor	1980	1,000	75,000	200
1-18-inch Interceptor	1980	12,000	508,000	1,300
New Construction(1)	1980	25,200(2)	660,000	6,700
TOTAL		46,200	$3,504,000	

PRESENT WORTH = $1,465,000

Original Draft EIS Alternative

Facilities	Time of Construction	Length (ft)	Construction Cost	($/yr)
Pump Station	1980	-	$105,000	26,500
1-8-inch Force Main	1980	8,000	156,000	400
1-12-inch Interceptor	1980	10,500	480,000	1,200
New Construction(a)	1980	33,700	3,360,000	8,400
TOTAL		52,200	$4,101,000	

PRESENT WORTH = $1,290,000

(1) New Construction is gravity sewer as proposed in Alternative A for the Rocky Fork area.

(2) Sections 1-2 and 2-3 of the sewer proposed under the original Alternative D are not considered to be necessary since a nearby gravity section was already constructed in 1980.

The secondary impacts are also considered to be similar except that the City's alternative constructs more length of gravity sewer at an earlier period in time, possibly inducing earlier growth into the area.

Therefore, the alternative for the Rocky Fork area as proposed by the City was disregarded from further consideration. This was determined on the basis that the impacts were considered to be similar and the costs favored the original Alternative D as proposed in the Draft EIS.

3. Blacklick Creek

The proposed Blacklick Creek Interceptor will extend 47,700 feet from just south of the Penn Central Railroad Bridge crossing of Blacklick Creek to Brice Road where it will connect to an existing 96-inch interceptor. This length and route are the same for all alternatives. The only difference between alternatives is in the proposed pipe size due to the varying wastewater flows intercepted from the areas to the north of the Blacklick Creek subarea. The Blacklick Creek Interceptor route in all but Alternative D includes approximately 4,600 feet of spur line which will continue upstream along Blacklick Creek. Service will be provided by this spur line to a relatively small area on the east side of the Creek.

Alternative D calls for 11,100 feet of 24-inch gravity sewer and 5,700 feet of a 16-inch force main. This system is designed to collect the sanitary flow from the Reynoldsburg area and transport it to the existing Big Walnut Creek Interceptor by way of Route 256 and Livingston Avenue. The remainder of the Blacklick Creek area is to be served by individual treatment units. Interceptor construction will be necessary by 1990 for sections #3 to #5, as shown on Figure III-8 in Alt. A.

The present population within the subarea is estimated at 27,700. This is projected to increase to 30,300 by 1985 and 36,200 by the year 2000. The major center of population is the City of Reynoldsburg, which is presently served by an overloaded contact stabilization treatment facility. Since

expansion of this plant is site-limited and its continued operation unattractive economically[1], all alternatives considered have included Reynoldsburg's flow in the Blacklick Creek Interceptor.

Table III-7 lists the different interceptor lengths and sizes for each alternative for the Big Walnut, Rocky Fork and Blacklick Creek subareas. Also provided in this table is the proposed construction date for each system.

The lower section of the Big Walnut Creek interceptor will be required by 1980, since most of the future growth is projected to occur in this area. The remaining section or sections for all the Big Walnut Creek alternatives will be constructed up to twenty years later.

Due to the need for providing sewer service to the New Albany area, all alternatives call for providing sewer service to New Albany. The 18-inch line proposed in the Facilities Plan for Alternative C was found to not be required during the planning period. Populations in the lower portion of the subarea are not projected to increase rapidly, and early construction of an interceptor may cause secondary growth impacts. Therefore, a cost comparison is presented later in Table III-8 (as Sub-alternative B) to determine whether an interceptor should be built through this area by 1980 or if service to the upper portion of the subarea should be provided by means of a 12-inch force main. The force main would be constructed from the proposed interceptor westward along Morse Road to an existing 15-inch sewer. The pump station and force main would be constructed immediately, and would remain in service until the capacity of the existing 15-inch sewer is reached. At such a time (assumed to be 1985 in this analysis), the remaining 28,300 feet of 36-inch interceptor will be constructed.

(2) Primary Impacts

1. Big Walnut Creek

The Big Walnut Creek subarea will suffer the same environmental impacts with Alternative A, C, or D. The short-term primary impacts are traffic

(1) Blacklick Creek Area Mini-Facilities Plan, Columbus Metropolitan Area Facilities Plan by Malcolm Pirnie, Inc., Page 46.

Table III-7
Interceptor Lengths and Sizes for the Big Walnut Creek, Rocky Fork, and Blacklick Creek Subareas

Subarea	Length (feet)	Size (inches)	Construction Date (Year)
Alternative A			
Big Walnut Creek			
	19,000	36	2000
	9,000	36	1985
	28,000		
Rocky Fork			
	3,500	24	1980
	5,000	27	1980
	25,200	36	1980
	33,700		
Blacklick Creek			
	7,700	21	2000
	5,000	27	2000
	35,000	36	1980
	47,700		
Alternative B			
Big Walnut Creek			
	3,000	18	2000
	30,000	27	2000
	7,000	36	1985
	40,000		
Rocky Fork			
	3,500	24	1980
	5,000	27	1980
	28,300	36	1980
	36,800		
Blacklick Creek			
	4,600	18	2000
	3,100	30	1980
	11,000	36	1980
	29,000	42	1980
	47,700		
Subalternative B[1]			
Rocky Fork			
	3,500	24	1980
	5,000	27	1980
	6,200	12 F.M.	1980
	28,300	36	1985
	43,000		

Table III-7 - Continued
Interceptor Lengths and Sizes for the Big Walnut Creek, Rocky Fork and Blacklick Creek Subareas

Subarea	Length (feet)	Size (inches)	Construction Date (Year)
Alternative C			
Big Walnut Creek			
	19,000	30	2000
	9,000	36	1985
	28,000		
Rocky Fork			
	19,300	18	2000
	8,500	27	1980
	28,300	36	1980
	56,100		
Blacklick Creek			
	4,600	18	2000
	3,100	30	1980
	5,000	36	1980
	16,000	42	1980
	19,000	42	1980
	47,700		
Alternative D			
Big Walnut Creek			
	19,000	36	2000
	9,000	36	1985
	28,000		
Rocky Fork			
	8,000	8 FM	1980
	10,500	12	1980
	3,500	24	1995
	5,000	27	1995
	25,200	36	1995
	52,200		
Blacklick Creek			
	9,600	16 FM	1980
	11,200	18	1980
	7,700	21	2000
	5,000	27	2000
	35,000	36	2000
	64,500		

(1) These values replace those in Alternative B for Rocky Fork
F.M. = Force Main

disruption and the effects of construction in residential areas. The proposed route will traverse several thousand feet of steep slopes and wooded areas which may cause both short- and long-term adverse impacts. Due to construction near streams and Hoover Reservoir, including three major stream crossings, temporarily severe erosion and siltation of these waters may result. Another long-term adverse aesthetic impact of these alternatives will be caused by the need for approximately 500 feet of aerial sewer in order to cross a ravine south of the Lake of the Woods area.

Alternative B for Big Walnut retains the lower portion of the interceptor proposed in Alternatives A and C. This 7,000 foot length includes the steep slopes and wooded area mentioned above. Above this portion, the interceptor route is along Central College Road, parallel to the western side of Rocky Fork. This area is mainly open grassy or cultivated land, with most wooded areas occurring within 20 to 50 feet of the stream.

The long-term benefit derived in all alternatives will be the protection of surface and ground water quality from degradation caused by continued use of inadequate individual and centralized wastewater treatment systems.

2. Rocky Fork

Short-term impacts to the Rocky Fork subarea in Alternative A are primarily due to erosion and turbidity caused by the close proximity of construction to the stream and the several creek crossings required, including one across Walnut Creek. Destruction of trees and vegetation will occur at stream crossings, through a wooded area south of Morse Road, and in an area above Sugar Run. Most of the remaining land traversed is agricultural, with residential areas disturbed only within the City of Gahanna. Traffic disruption is expected to occur since the interceptor route crosses several roadways. A public park, which consists mostly of cleared grassland, is along the route of the Rocky Fork interceptor in Alternative A. The interceptor would also cross through a few areas near Rocky Fork which have steep slopes.

The long-term beneficial impact of all alternatives for the Rocky Fork subarea is the central collection of sewage, thereby avoiding use of individual disposal systems which release to the generally nonreceptive area soils. (The septic tank and leachfield systems presently in use around New Albany are reported to already contribute to surface water pollution.)

In Alternative B, the Rocky Fork subarea is to be served by extending the interceptor to the proposed 36-inch Blacklick Interceptor. This new section eliminates Alternative A route problems such as the crossing of Walnut Creek, most of the affected residential area, and the park. The bulk of the different construction route for Alternative B is through agrarian areas.

The primary impacts associated with the construction of the pump station and force main required for Subalternative B focus on the commitment of energy, materials, and manpower required for construction that will be phased out fairly early in the planning period. The force main will be constructed along S.R. 161, and will cause some minor traffic disruption. The construction of this 6,200 feet of 12-inch main will add two more road crossings and three more stream crossings. The main reason for acceptance of this section of the alternative is the delayed construction of some 28,300 feet of 36-inch interceptor in the southern portion of the Rocky Fork subarea.

Alternative C for the Rocky Fork area is an extension of Alternative B. The basic route is the same, but instead of ending below Sate Route 161, the interceptor continues northward to approximately one-quarter mile of the Franklin-Delaware County line. Primary environmental impacts will be the same as with Alternative B, with the addition of four highway crossings, two pipeline crossings, and the construction of some 19,300 feet of interceptor through open and cultivated areas.

The major primary impacts associated with Alternative D (apart from the ongoing localized impacts from construction of individual treatment systems) are caused by construction of the 18,500 feet of sewer and force main for the interception

of the New Albany waste flow. The force main (8,000') is completely within highway right-of-ways near open farmland and lightly residential areas, a situation which will cause some traffic disruption. The route is through some 900 feet of wooded area and 600 feet of steep slopes. The route involves three stream crossings and four highway crossings. Erosion could result from construction at the stream crossings. Final construction in 1995 will result in the same impacts as those noted for similar sections proposed in Alternative A.

3. Blacklick Creek

The primary impacts to the Blacklick Creek sub-area are the same for Alternatives A, B, and C, since only the sewer size varies. The proposed interceptor route would cross the eastern side of Blacklick Woods Metropolitan Park. The Park contains a 55 acre State Nature Preserve, which should be protected from any construction damage. The proposed interceptor route through the Park is about a quarter mile from the Nature Preserve, but care should be taken during construction so as not to disturb the Preserve in any way. Contact and permission must also be obtained from the proper agencies in regards to crossing the Blacklick Metropolitan Park.

In a letter from ODNR(1), the Park was identified as having been developed with Land and Water Conservation Fund Act money. This funding restricts the future use of the Land under Section 6(f) of the Act. It has been established by ODNR that: "Granting control or partial control of land within the Park for a sewer line would constitute a Section 6(f) conflict. Any requrest for a conversion of land use must first be submitted by the Park District to this Department (ODNR) for review and approval. The conversion request must also be reviewed by the Heritage Conservation & Recreation Service and meet the prerequisite for approval of a Section 6(f) conversion request before final approval by the Secretary of the Interior." Additional facilities planning is required to address the Section 6(f) conflict and to evaluate gravity sewer and force main alternatives which bypass the Park.

(1) See attachments to this Appendix.

The principal long-term beneficial impact of the three alternatives is in the improvement of water quality in Blacklick Creek which will result from the elimination of the Reynoldsburg WWTP and several other inadequate smaller treatment plants.

During the planning period, Alternative D collects flow only from the Reynoldsburg area through a 20,200 foot gravity sewer and force main system. The route crosses Blacklick and Big Walnut Creeks once each along with 17 highway crossings (including Interstate 270). The type of land traversed is mainly residential with the exception of 800 feet of open grassy areas which have about 400 feet of steep slopes. The route will be entirely within the highway right-of-way. Primary impacts expected are due to the short-term surface water quality degradation from construction activities beneath or near the two creeks, the possible erosion caused by construction on steep slopes, and traffic disruption, primarily on Livingston Avenue. The construction of Sections #3 and #5 shown on Figure III-8 should begin in 1990, and the impacts noted for Alternative A will again be applicable.

(3) Phasing

1. Big Walnut Creek

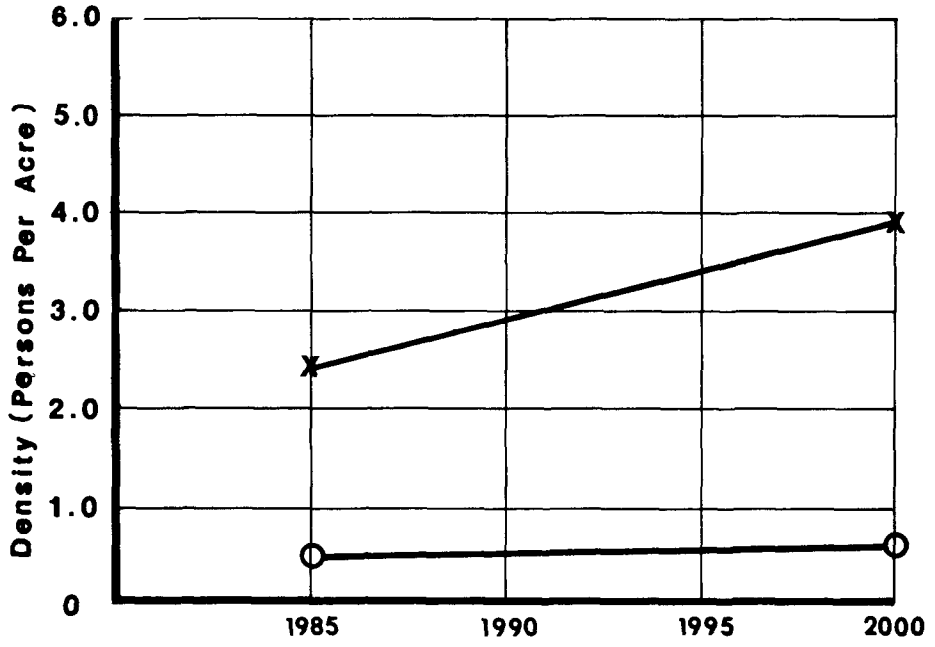
Figure III-14 illustrates the population densities for the Big Walnut Creek alternatives. In all cases, the projected population densities (apart from the section just below the Hoover Reservoir) are below 1.0 person/acre during the planning period. The section below the Reservoir may require construction by 1985 if the population growth occurs as predicted.

2. Rocky Fork

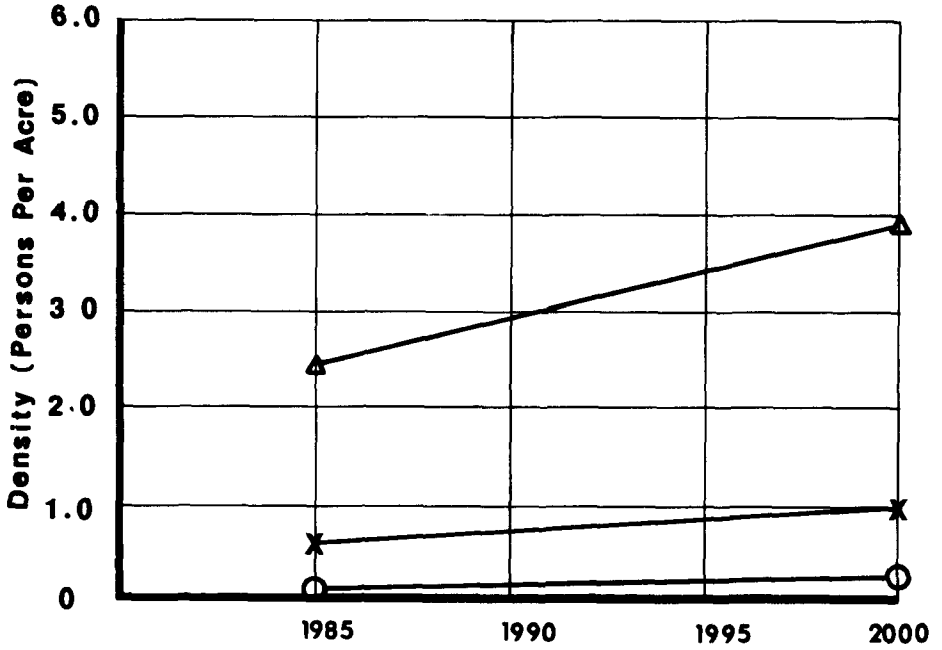
Figure III-15 indicates that no interceptors for this subarea should be constructed until 1995, with the far upstream sections of each probably not required during the planning period. However, Alternatives A, B, and C must have all sections from manhole 2 to the connection with the existing interceptor constructed by 1980 due to the immediate need of transporting sewage away from the New Albany Area. The provision of the force main in Alternative D delays the need for interceptor construction below New Albany until 1995.

FIGURE III-14

DENSITY TRENDS FOR THE BIG WALNUT SUBAREA



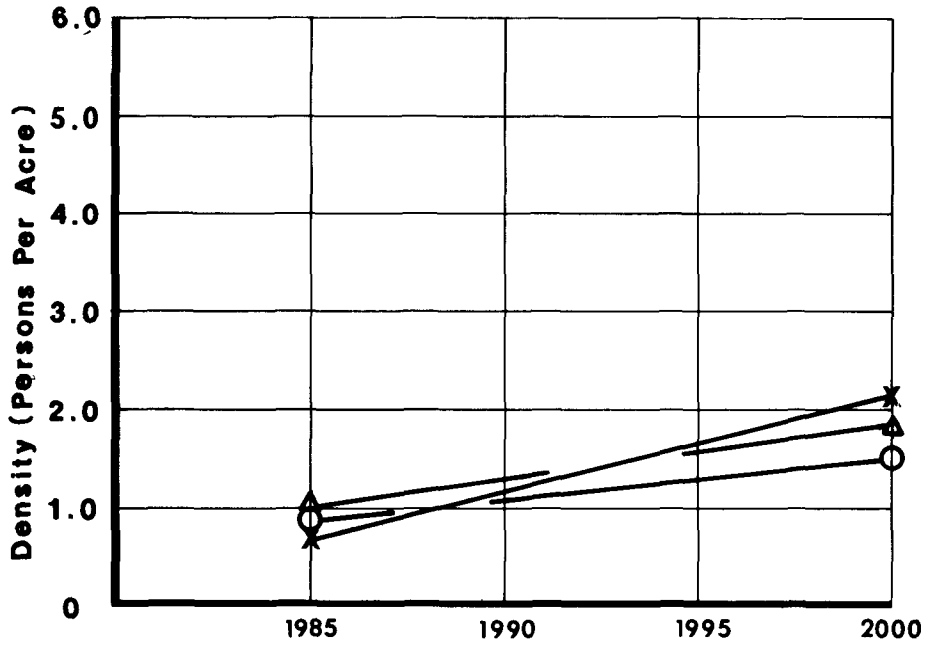
BIG WALNUT INTERCEPTOR (ALTERNATIVES A & C)



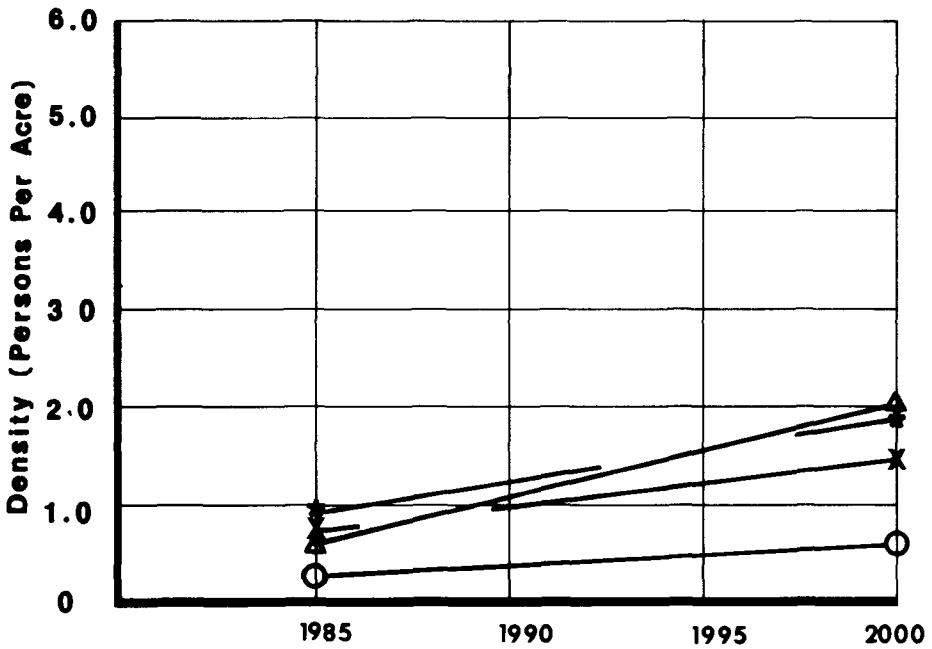
BIG WALNUT INTERCEPTOR (ALTERNATE B)

FIGURE III-15

DENSITY TRENDS FOR THE ROCKY FORK SUBAREA



ROCKY FORK INTERCEPTOR (ALTERNATIVES A & B)



ROCKY FORK INTERCEPTOR (ALTERNATE C)

3. Blacklick Creek

Figure III-16 illustrates that the only portion of the Blacklick Creek Interceptor which must be built immediately is that which collects and transports the waste flow from the Reynoldsburg area to the Southerly treatment plant. Additional facilities planning to address the Section 6(f) conflict and to evaluate force main and gravity sewer alternatives in the Blacklick Creek subarea is required before a final decision can be made.

(4) Costs

The costs presented in Table III-8 show the total capital costs for each subarea alternative broken into the proper time frame.

Table III-8 shows that Alternative A, at $15,710,000 has the lowest capital cost; while Alternative D has the highest, $19,510,000. The cost of the force main variation of Alternative B is higher than the nonforce main Alternative by $320,000. This is due to an increase of $170,000 for the force main construction and $150,000 for the construction of a prefabricated pumping station with an assumed life of 20 years. However, it should be noted that this cost difference is reversed on a present worth basis due to the delaying of portions of the interceptor construction.

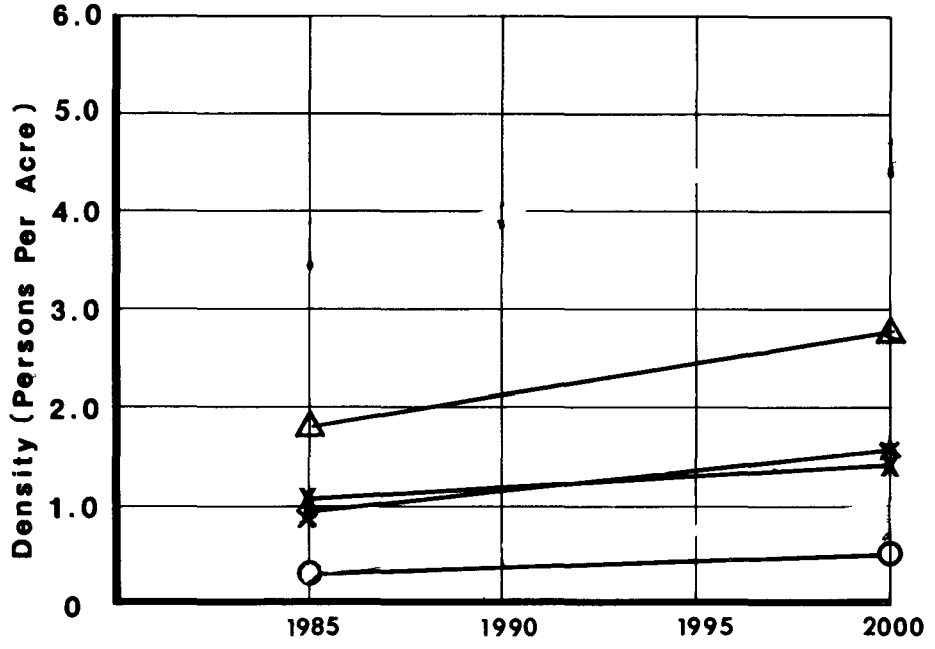
(5) Summary

Table III-9 provides a summary of each alternative in regards to primary impacts and cost.

Alternative D is shown to be the most cost-effective on a present worth basis, followed by Alternative A, which is 28 percent higher. Since Alternatives B, Sub. B, and C are all much greater in present worth than Alternative D, they were considered as not cost-effective. Alternatives A and D both provide service to the Big Walnut Creek, Rocky Fork, and Blacklick Creek areas by independent sewer systems. In other words, the cost-effective alternative will involve service to each basin separately (something Alternatives B, Sub B and C cannot do). For this reason, a detailed present worth cost analysis was performed for Alternatives A and D for each individual service area as follows:

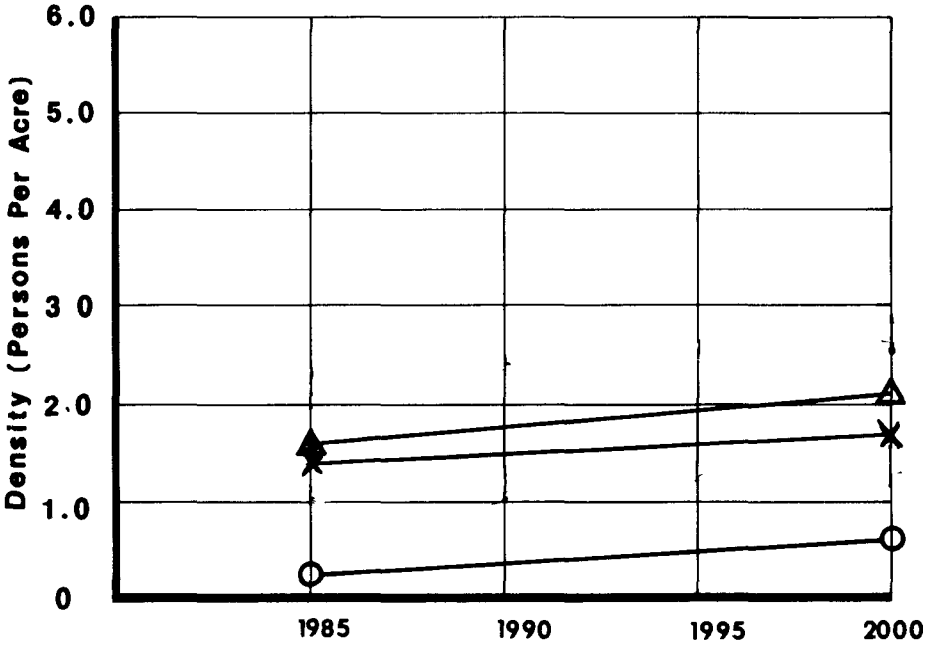
FIGURE III-16

DENSITY TRENDS FOR THE BLACKLICK SUBAREA



Manholes Beginning	to	Code
#2	#3	X
#3	#4	Δ
#4	#5	✱

BLACKLICK INTERCEPTOR (ALTERNATIVES A & C)



Manholes Beginning	to	Code
#3	#4	X
#4	#5	Δ

BLACKLICK INTERCEPTOR (ALTERNATE B)

Table III-8
Interceptor Costs for the Big Walnut Creek, Rocky Fork, and Blacklick Creek Subareas

Subarea	Construction Costs, $1,000 1980	1985	2000	Total
Alternative A				
Big Walnut Creek	$ 0	$1,720	$3,670	$5,390
Rocky Fork	3,360	0	0	3,360
Blacklick Creek	4,920	0	2,130	7,050
TOTAL	$8,280	$1,720	$5,800	$15,800
Alternative B				
Big Walnut Creek	$ 0	$1,330	$5,510	$ 6,840
Rocky Fork	4,280	0	0	4,280
Blacklick Creek	6,160	0	230	6,390
TOTAL	$10,440	$1,330	$5,740	$17,510
Subalternative B[1]				
Big Walnut Creek	$ 0	$1,330	$5,510	$ 6,840
Rocky Fork	970[1]	3,630	0	4,600
Blacklick Creek	4,720	1,440	230	6,390
TOTAL	$5,690	$6,400	$5,740	$17,830
Alternative C				
Big Walnut Creek	$ 0	$1,720	$3,960	$ 5,680
Rocky Fork	4,350	0	1,790	6,140
Blacklick Creek	5,140	0	230	5,370
TOTAL	$ 9,490	$1,720	$5,980	$17,190
Alternative D				
Big Walnut Creek	$ 0	$1,720[2]	$3,670	$ 5,390
Rocky Fork	740[1]	3,360	0	4,100
Blacklick Creek	2,660	4,920[4]	2,040	9,620
TOTAL	$ 3,400	$10,000[3]	$5,710	$19,110

[1] Includes capital cost of pump station(s).

[2] Construction in 1995.

[3] Construction in 1985 and 1995.

[4] Construction in 1990.

Table III-9
Alternative Summary for the Big Walnut Creek, Rocky Fork, and Blacklick Creek Subareas

Item	Alternatives				
	A	B	Sub B	C	D
Length of Sewers (feet)	109,400	124,500	157,500	131,800	140,000
Pump Stations	0	0	1	0	2
Type of Land Traversed (feet)					
Woodland	28,000	18,900	18,900	26,000	28,000
Open Space (Rural)	54,200	70,200	76,400	83,700	74,000
Stream Corridor	34,900	30,500	30,500	35,300	34,900
Steep Slopes	9,200	5,100	5,100	8,800	9,600
Parks and Recreation	7,600	6,200	6,200	6,200	7,600
Reservoir Shoreline	10,900	0	0	10,900	10,900
Residential	8,600	7,300	7,300	8,600	28,200
Highway Row	12,500	25,100	31,000	12,500	43,200
Stream Crossings	27	28	31	29	32
Highway Crossings	35	31	33	41	56
Costs (Thousands of Dollars)					
Capital (1980)	$8,280	$10,440	$5,690	$9,490	$3,400
(1985-1995)	1,720(3)	1,330(3)	6,400(3)	1,720	10,000(4)
(2000)	5,710	5,740	5,740	5,980	5,710
Annual O & M (1980-2000)	20.7 to 25.0	26.1 to 29.4	(1)	23.7 to 28.0	(2)
Present Worth	$8,051	$9,640	$8,644	$9,043	$6,309

(1) O & M varies from $32,600/year in 1980 to $48,600/year in 2000.
(2) O & M varies from $71,500/year in 1980 to $113,000/year in 2000.
(3) Construction in 1985.
(4) Construction in 1990 and 1995.

Alternative A

	Capital ($1,000)	Present Worth ($1,000)
Big Walnut Creek	5,390	985
Rocky Fork	3,360	2,847
Blacklick Creek	6,960	4,199
TOTAL		8,051

Alternative D

	Capital ($1,000)	Present Worth ($1,000)
Big Walnut Creek	5,390	985
Rocky Fork	4,100	1,290
Blacklick Creek	9,620	4,034
TOTAL		6,309

On a present worth basis, the least costly alternative would be a mixture of Alternatives A and D for Blacklick Creek and Rocky Fork (Big Walnut Creek is the same in both alternatives). Alternative D is slightly higher in capital cost for the Rocky Fork service area, but is significantly less than Alternative A on a present worth basis. This present worth difference along with its allowance for flexibility in future decision-making and lessening of possible secondary impacts makes Alternative D the recommended plan for the Rocky Fork Area.

In the Blacklick Creek Area, Alternative A was thought to be the recommended plan, since it is less than Alternative D in capital costs and close on a present worth basis. The implementability of a force-main alternative has been characterized as extremely difficult by local agencies and officials in the Blacklick area, and would not allow the abandonment of several package plants which will be picked up by the gravity interceptor of Alternative A. Yet, the new Section 6(f) conflict requires a rethinking of all alternatives for Blacklick during localized facilities planning. The force main may yet be the alternative of choice for reasons of feasibility or cost when the Park issue is resolved.(1)

(1) An Assessment of costs of going through the park was made by Metro Parks and is attached to this Appendix.

3.2.6 Groveport

The Groveport subarea consists of approximately 5000 acres. Route 33 near Blacklick Creek makes up most of the unit's northern boundary, while the eastern edge lies just east of George Creek. Walnut Creek and Swisher and Saltzgaber Roads form the southern and western boundaries, respectively. The only existing sanitary sewer system serves the City of Groveport. Sewage is treated at a 0.30 mgd trickling filter installation which currently discharges to Little Walnut Creek.

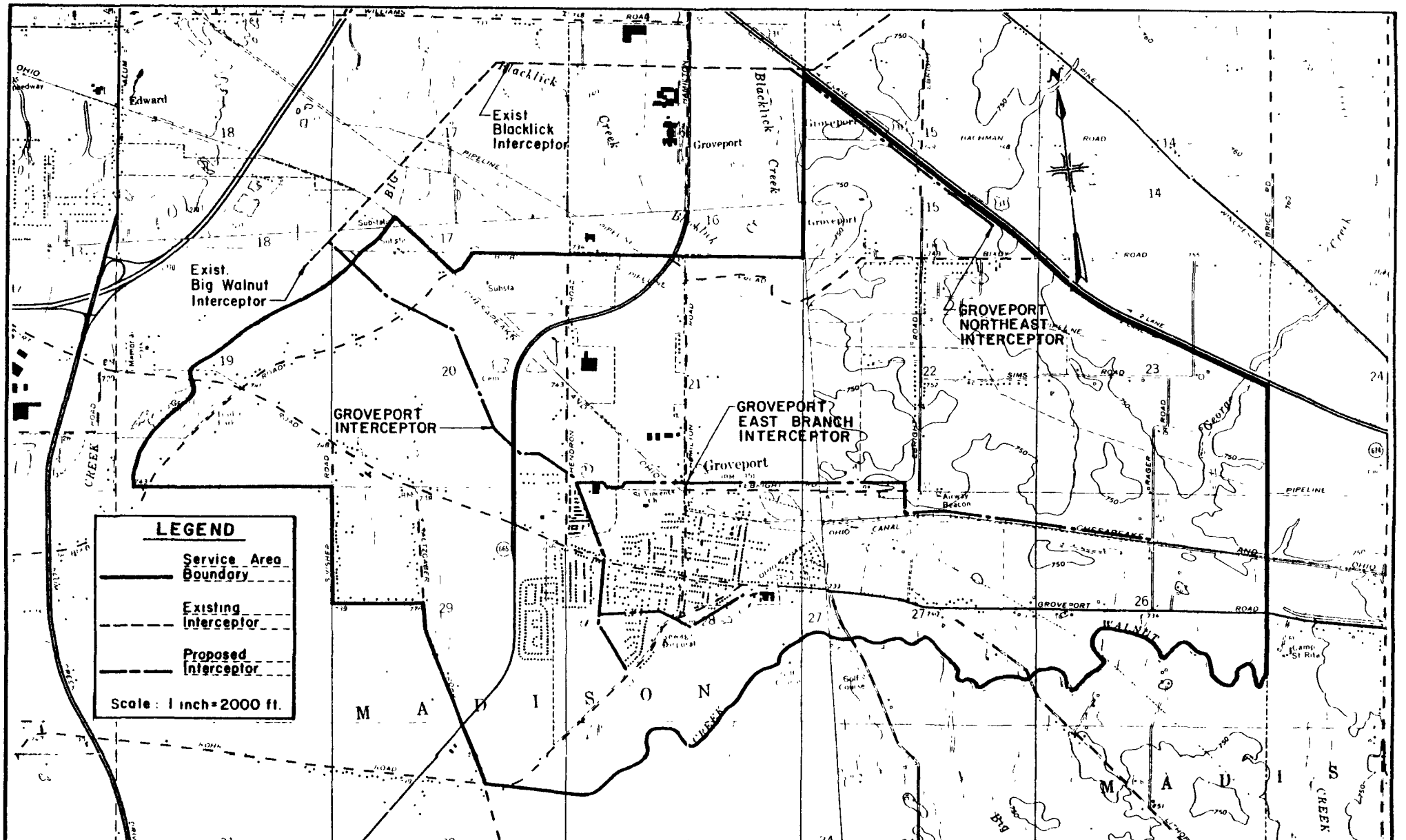
(1) Alternative Description

The Groveport area population is presently estimated at about 4,000, and is expected to increase to 6,500 by 1985 and to 11,600 by the year 2000. This projected increase in population, coupled with the varying suitability of the local soils to septic tank and leachfield treatment systems, precludes further analysis of a No Action Alternative for this subarea.

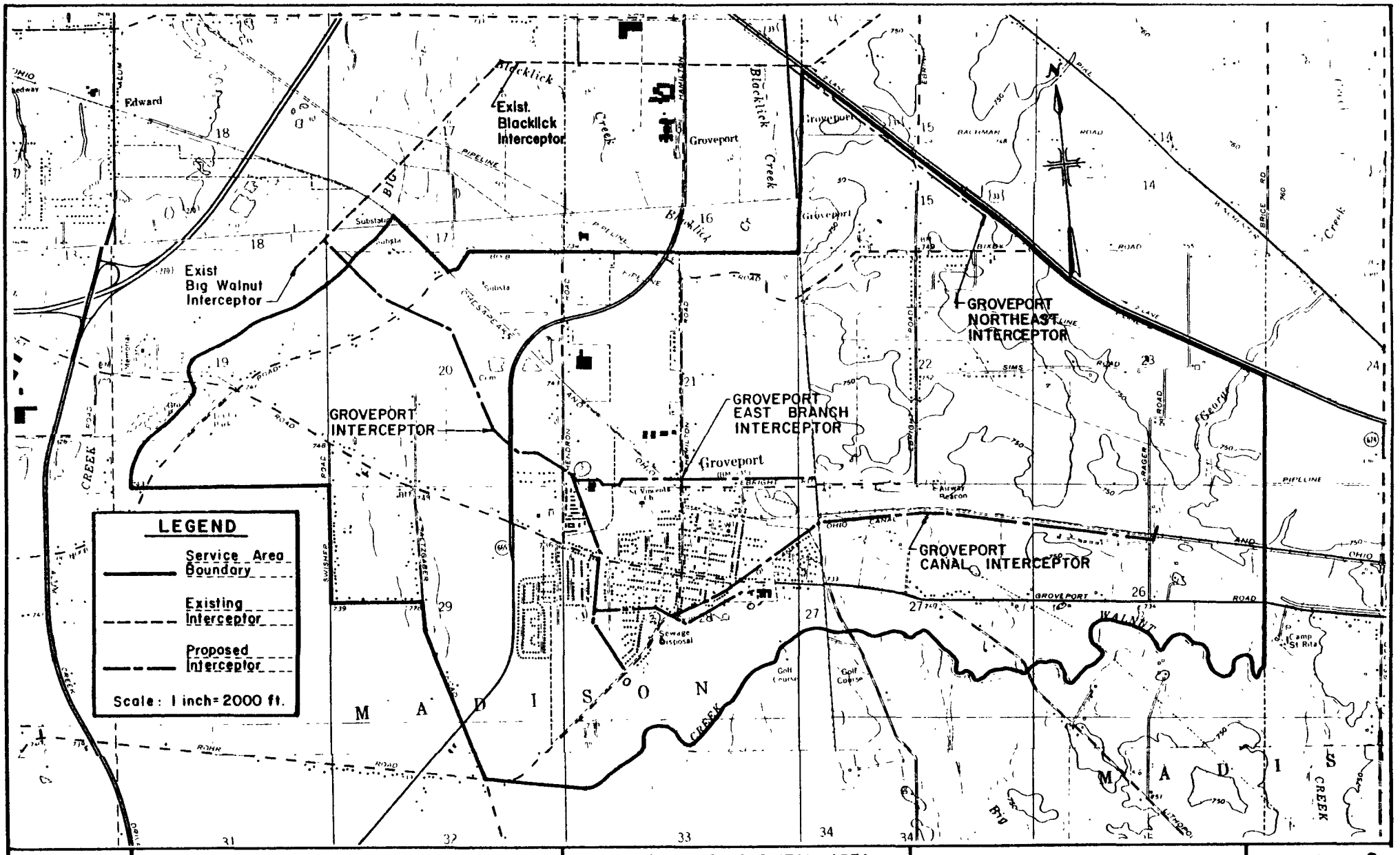
Service to the developing portions of the Groveport area cannot be entirely provided by a gravity system while totally utilizing the existing wastewater treatment plant. Since it discharges to Little Walnut Creek near the Rickenbacker Air Force Base, it was assumed that eventually both releases will have the same effluent limitations. The proposed 30 day average release levels for the Air Force Base are 8 mg/l BOD_5, 8 mg/l suspended solids, 1 mg/l ammonia nitrogen (summer), and 1 mg/l of total phosphorus.

Three regionalization alternatives will be considered for this subarea: a plant alternative and two interceptor alternatives (shown in Figures III-17 and 18). The treatment plant alternative would upgrade and expand the existing facility to 1.7 mgd. This alternative will also require the construction of a gravity sewer to handle the 1.2 mgd average flow coming from the area northeast of the plant near Route 33.

The two interceptor alternatives also utilize a "northeast interceptor" which will parallel Route 33 for some 5,000 feet to provide service to the northern portion of Groveport. This 15-inch interceptor will connect to a 96-inch section of the existing Blacklick Creek Interceptor on the eastern bank of Blacklick Creek near Route 33.



MALCOLM PIRNIE, INC.		COLUMBUS METROPOLITAN AREA FACILITIES PLAN FACILITIES REPORT	GROVEPORT SERVICE AREA ALTERNATE A	FIGURE III-17



MALCOLM PIRNIE, INC.		COLUMBUS METROPOLITAN AREA FACILITIES PLAN FACILITIES REPORT	GROVEPORT SERVICE AREA ALTERNATE B

FIGURE III-13

Interceptor Alternative A differs from Alternative B in the manner of interception of flows from the southern portion of the area. Alternative A includes an interceptor branch which starts at Rager Road and travels westward along the Chesapeake and Ohio Railroad to a point just south of the 90 degree turn in Ebright Road. Here the interceptor crosses to the north, and follows Ebright Road into the main interceptor at Hendron Road. This 14,100 foot branch will be 24 inches in diameter.

The main interceptor in Alternative A collects flow from the area near the wastewater treatment plant. From this point, the route crosses a few streets within the City, turns in a northwestern direction, and follows an intermittent stream to Big Walnut Creek. After crossing Big Walnut Creek, the interceptor will tie into a 108-inch section of the existing Big Walnut Creek Interceptor. The proposed line is some 17,500 feet in length, and ranges in diameter from 18 to 27 inches.

The main interceptor in Alternative B traverses the same route as that in Alternative A, but ranges in size from 18 to 30 inches. Alternative B differs by the inclusion of two branch interceptors. The East Branch connects to the main at Hendron Road as in Alternative A, but is only 15 inches in diameter and 5,600 feet long, running parallel to Ebright Road. The other (Canal) branch starts near Rager Road and initially runs westward along the Chesapeake and Ohio Railroad. It then turns south, following the old Ohio Canal route until connecting to the main interceptor close to the intersection of Hamilton and Rohr Roads. The Canal Branch Interceptor will be 24 inches in diameter for its entire length of 11,800 feet.

(2) Primary Impacts

The Plant Alternative will involve long-term adverse impacts due to the ongoing commitment of manpower, materials, land, and energy required for the upgrading and expansion of the Groveport WWTP. The retention of the WWTP close to growing residential areas could result in adverse impacts due to odor, noise, and aesthetic degradation.

The northeast interceptor parallel to U. S. Route 33 is common to all three alternatives. It will be constructed through either cleared land or farmland, with little adverse primary impacts expected. The route of the main branch of the Groveport Interceptor is also common to Alternatives A and B. Most of the 11,000 feet of the main interceptor travels through open farmland, occasionally crossing some residential backyards. Four road crossings, including a proposed tunnel under Route 665, will occur along this section of the interceptor. Crossing of Big Walnut Creek will result in short-term surface water degradation due to erosion and turbidity. The remainder of the interceptor length will involve about 1,000 feet of roadway construction along Lambert Avenue and the crossing of Rohr Road in order to intercept flow from the present wastewater treatment plant.

All road crossings (except the proposed tunneling under Route 665) are expected to cause unpleasant short-term impacts in regard to noise, air quality, and aesthetics.

The interceptor proposed in Alternative A for the southern portion of the subarea will collect flow from an elementary and a junior high school. Most of the interceptor route traverses open farmlands, with the exception of the school property and the single crossing of Ebright Road, which may cause some temporary traffic disruption.

Alternative B includes the East Branch and Canal Branch Interceptors. The East Branch traverses the same route as the southern interceptor of Alternative A, but is only 5,600 feet long, terminating prior to a crossing of Ebright Road. Again, little impact is expected from construction through the school property and the cleared farmland. The Canal Branch starts at the existing treatment plant and proceeds along Rohr and Wirt Roads, eventually crossing Groveport Road to meet the main interceptor. This is the only construction in or along a roadway, with the exception of the crossing of Rager Road at the uppermost end of the interceptor. Traffic disruption and inconvenience is expected to occur in these areas for short periods of time.

Construction along Wirt Road passes the Groveport Log House, which is listed on the National Register of Historic Places. No other historic place is known to be in the area.

After crossing Groveport Road, the interceptor route follows the old Ohio Canal right-of-way until reaching the Chesapeake and Ohio Railroad. A number of homes and large trees exist along the Canal. Many of these trees will have to be moved, and construction in this area will negatively impact local residents in terms of noise, air pollution, and aesthetic degradation.

At the intersection of the Chesapeake and Ohio Railroad, the interceptor route follows the southern side of the railroad tracks, traversing open farmland and cleared land until crossing the tracks at Rager Road by means of a tunnel. Little adverse primary impacts are expected to occur as a result of this last section of interceptor construction.

(3) Phasing

Figure III-19 shows the population densities served by the two interceptor alternatives for the Groveport subarea. These Figures indicate that the northeast interceptor need not be constructed until about 1995, but that the main branch of the interceptor should be constructed by 1980. Besides the heavy densities served, another reason for construction of the main interceptor by 1980 is to intercept and transport flows from the present Groveport treatment plant site.

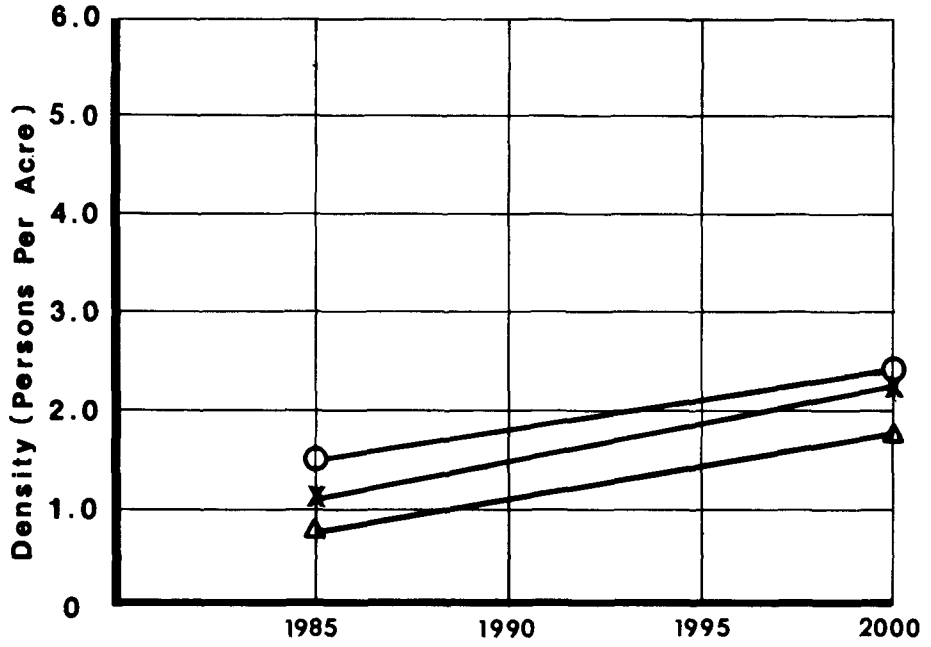
The East Branch in Alternatives A and B may be be required by 1990, and the Canal Interceptor in Alternative B may be needed by 1985.

(4) Costs

The capital cost for an upgraded and expanded plant for the City of Groveport which is able to meet average summer month release standards of 8 mg/l BOD, 8 mg/l SS and 1 mg/l ammonia nitrogen, is estimated to be approximately $3,680,000. The capital cost for the northeast interceptor is $180,000, bringing the total capital cost of the Plant Alternative to $3,860,000. The operation and maintenance cost for the plant is estimated at $350/mg, while the annual O & M for the northeast interceptor is $440.

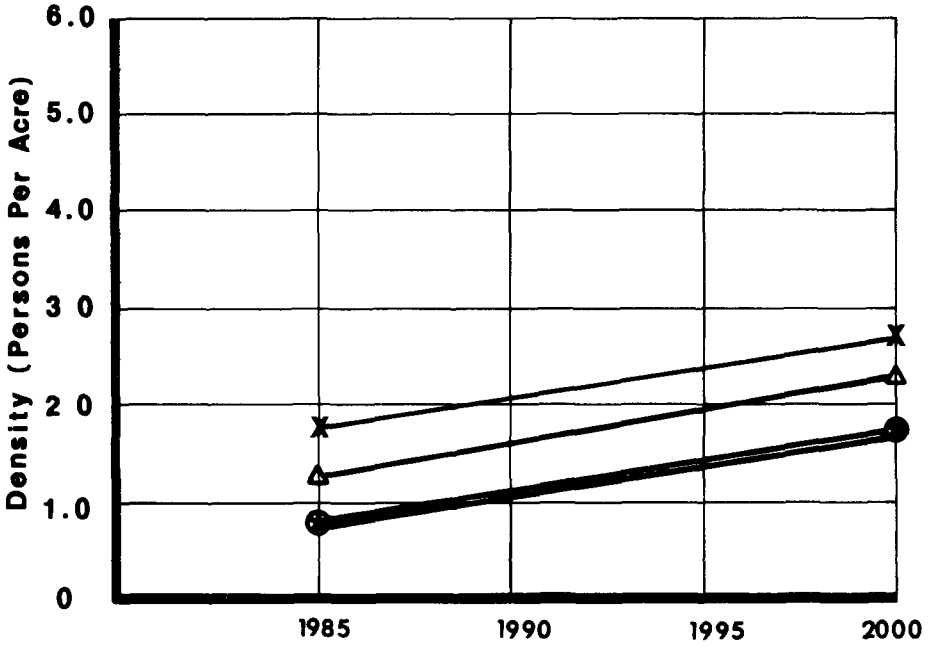
FIGURE III-19

DENSITY TRENDS FOR THE GROVEPORT SUBAREA



Manholes	Code
East Branch	O
Main Branch	X
Northeast Branch	Δ

GROVEPORT INTERCEPTOR (ALTERNATE A)



Manholes	Code
East Branch	O
Canal Branch	X
Main Branch	Δ
Northeast Branch	★

GROVEPORT INTERCEPTOR (ALTERNATE B)

Capital costs for Interceptor Alternatives A and B are estimated as $2,260,000 and $2,050,000, respectively. The O&M costs are $5,600 per year for Alternative A, and $5,100 per year for Alternative B. Treatment costs at the Southerly plant have been included in Alternatives A and B for comparison purposes.

(5) Summary

A summary of interceptor lengths, primary impacts, costs, and present worths for the three alternatives are provided in Table III-10.

The selected plan for the Groveport subarea is Alternative A. This option costs more than Alternative B on a capital basis, but, due to phasing of sections of interceptors, the present worth of A is far less. Alternative A calls for less interceptor length and involves fewer environmental impacts than Alternative B. The Plant Alternative is higher than either interceptor plan in terms of capital costs, O&M costs, and present worth, and commits more long-term resources. Alternative A involves a dollar per person per year cost of $41 using the present population, or $14 per person per year using the projected 2000 population.

Localized facilities planning should be conducted, including an infiltration/inflow analysis, to determine needs prior to implementation of the recommended alternative.

3.2.7 Rickenbacker Air Force Base

The Rickenbacker Air Force Base encompasses some 4,200 acres, and is served by an existing 1.25 mgd trickling filter installation. Currently, this facility receives only sanitary wastewater, and discharges effluent to Little Walnut Creek via an outfall sewer. There are two other small treatment plants on the Base which serve a golf course and a trailer park. Plans call for the abandoning of both small facilities in the near future.

The Department of Defense has decided to deactivate the airbase. Prior to the deactivation decision, an engineering firm had completed the design of a 14-inch force main that follows Alum Creek Drive. This force main would tie into the Big Walnut Interceptor at MH No. 40 instead of MH No. 30.

Table III-10

Alternative Summary for the Rickenbacker Air Force Base Subarea

Item	Alternatives		
		Interceptor	
	Plant	A	B
Length of Sewers (feet)	0	18,200	19,200
Type of Land Traversed (feet)			
Woodland	0	300	0
Open Space (Rural)	0	15,200	15,900
Residential	0	2,700	3,300
Highway R.O.W.	0	18,200	16,400
Stream Crossings	0	3	3
Highway Crossings	0	5	6
Costs (Thousands of Dollars)			
Capital (1980)	$1,500	$1,318	$1,140
Annual O & M (1980-2000)	100.8	52.3	51.8
Present Worth	$2,435	$1,670	$1,517

The following analysis, although completed on alternatives different from the designed alternative, is included in the EIS for the following reasons:

- To show that the designed alternative is similar to Alternative A, and that the designed alternative has environmental impacts that have been evaluated with other alternatives.

- To allow immediate construction of the designed alternative if the base reactivates and Federal funds are requested for the construction.

(1) Alternative Description

The Waste Allocation Report for the Scioto River Basin suggests that the summertime average monthly effluent limitations imposed on the Rickenbacker treatment plant should be 8 mg/l BOD, 8 mg/l SS, 1 mg/l ammonia nitrogen, and 1 mg/l total phosphorus. Since these proposed limitations are not presently being achieved, the No Action Alternative was not considered to be viable.

Three alternatives were analyzed for this subarea, including the retention and upgrading of the treatment plant and two gravity interceptor alternatives. The interceptor alternatives are shown in Figures III-20 and III-21.

The route of Interceptor Alternative A, similar to the designed alternative, does not actually enter the Air Force Base, initiating at a point just above the Base where Route 665 turns to the northeast. At this tie-in point, the interceptor will be some 12 feet deep, enabling easy connection from almost any part of the Air Force Base. The interceptor initially travels westward along Route 665 to Alum Creek Drive. The proposed route then follows Alum Creek Drive northward to Bixby Road, at which point it continues along Bixby to Reese Road near Walnut Creek. The interceptor will then tie into the Big Walnut Creek Interceptor at Manhole 30. The proposed sewer is to be 24 inches in diameter throughout its entire length of 18,200 feet.

The interceptor route of Alternative B begins at the same point as Alternative A. However, the interceptor proposed in this Alternative continues along Route 665 until it reaches Lockbourne Road. At this point it travels

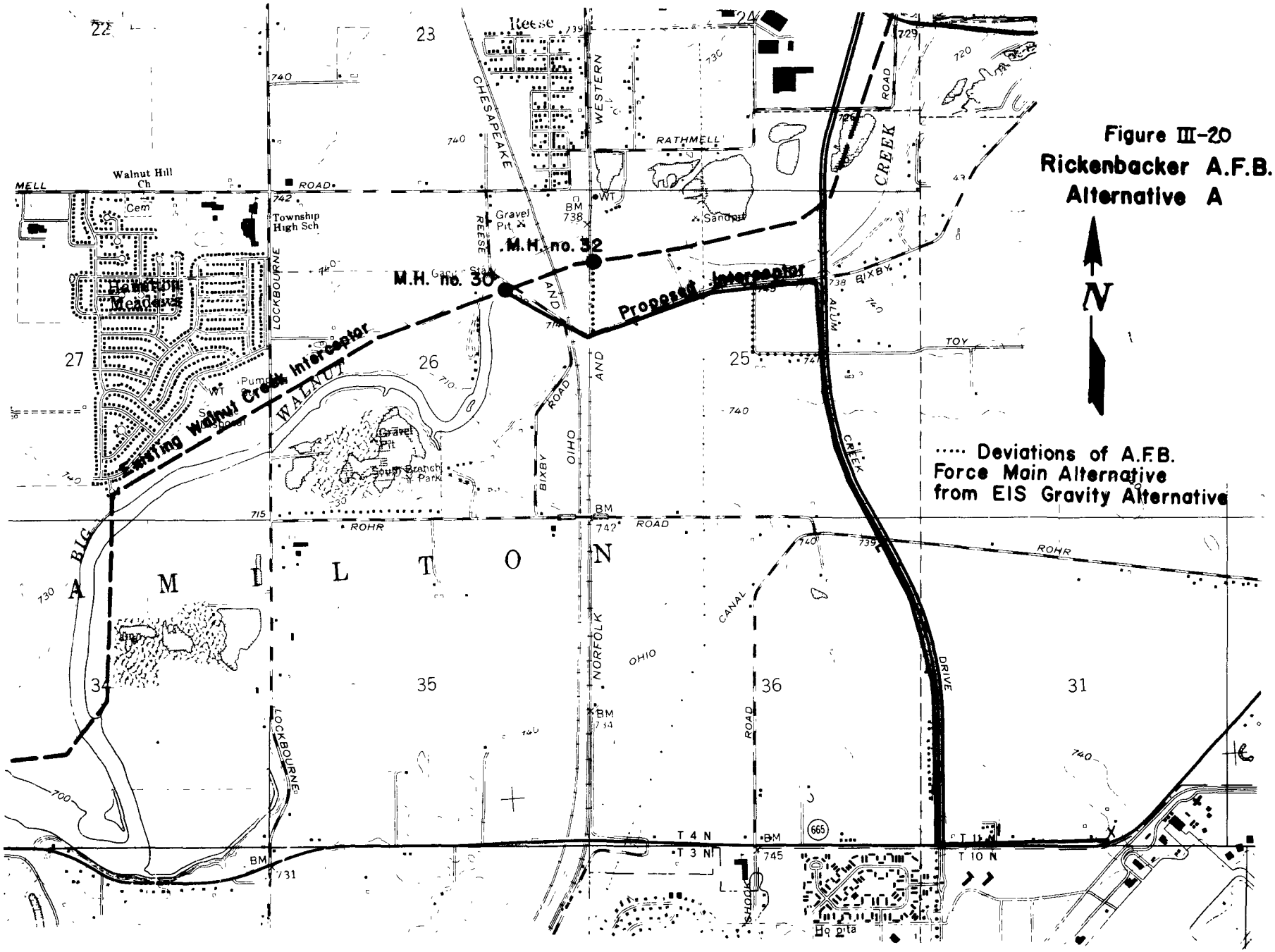


Figure III-20
Rickenbacker A.F.B.
Alternative A
N
..... Deviations of A.F.B.
Force Main Alternative
from EIS Gravity Alternative
M.H. no. 30
M.H. no. 32
Proposed Interceptor
Existing Walnut Creek Interceptor
WALNUT
CREEK
BIG
OHIO
CANAL
ROHR
ROAD
CHESAPEAKE
WESTERN
RATHMELL
REESE
LOCKBOURNE
NORFOLK
BIXBY
TOY
ALUM
DRIVE
Walnut Hill Ch
Cem
Township High Sch
Gravel Pit
Sandpit
Pump Sta
Sewage Treatment Works
South Branch Park
Hamilton Meadows
Reese
BM
WT
T 4 N
T 3 N
T 10 N
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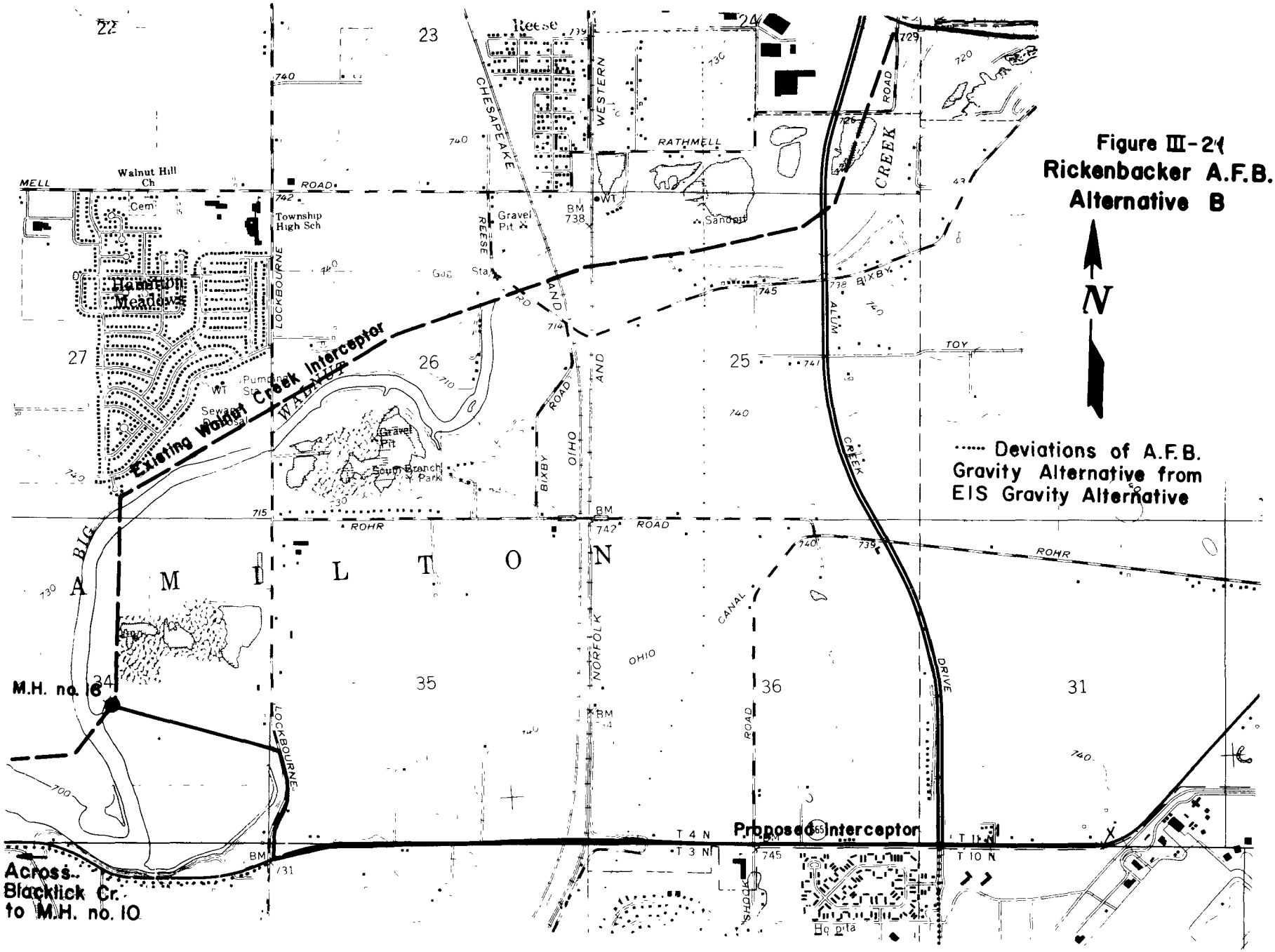
Figure III-21
Rickenbacker A.F.B.
Alternative B
N
..... Deviations of A.F.B. Gravity Alternative from EIS Gravity Alternative
Existing Walnut Creek Interceptor
Proposed Interceptor
M.H. no. 16
Across Blacklick Cr. to M.H. no. 10
AMANDA
CLAYTON
Walnut Hill Ch
Cem
Township High Sch
Gravel Pit
Sand Pit
Gas Sta
Pumping Sta
Sewage Disposal
Hamlet Meadows
South Branch Park
Reese
RATHMELL
CHESAPEAKE
WESTERN
ROAD
CREEK
ALUM
BIXBY
TOY
LOCKBOURNE
REESE
OIHO
NORFOLK
CANAL
ROHR
DRIVE
BIG WALNUT
BM
WT
T 4 N
T 3 N
T 10 N
T 11 N
22
23
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36

northward along Lockbourne for some 2,000 feet, and then runs eastward until tying into manhole 16 of the existing 108-inch Big Walnut Creek Interceptor. The proposed interceptor is again 245 inches in diameter for its entire length of 19,200 feet.

The above sizing took into consideration the fact that the Air Force Base will be the only area served by this interceptor. Therefore, its design assumed full flow in the year 2000, using the Air Force estimated average flow of 0.8 mgd over the entire planning period.

(2) Primary Impacts

The primary impacts associated with the Plant Alternative are the future commitments of manpower, material, and energy required for the upgrading and operation of the facility.

The most significant primary impact of Alternative A is the disruption of the small residential area included in the interceptor route along Route 665. Along Alum Creek Drive, the route is mainly through open farmland, and interceptor construction can be accomplished with minimal traffic disruption. The interceptor will travel along the southern side of Bixby Road in order to avoid the heavily wooded areas to the north. The agricultural land on the south side of Bixby Road continues for the remainder of the route until the existing 108-inch Big Walnut Creek Interceptor is reached. Tunneling will be required within this final portion in order to cross the Norfolk and Western and Chesapeake and Ohio Railroads.

The primary impacts of the route proposed in Alternative B are associated with the disruption of the residential area near Route 665 where the interceptor begins, and with the required construction through wooded areas along Lockbourne Road and Big Walnut Creek. Most of the remainder of the affected area is open farmland. A tunnel is also required for this alternative for crossing the same two railroads mentioned in Alternative A.

(3) Phasing

No density plot is provided for this subarea since no growth is expected to occur during the planning period. Due to the need for abandoning or improving the present treatment plant to meet stringent effluent discharge requirements,

the interceptors for either regionalization alternative considered should be constructed by 1980.

(4) Costs

The costs associated with the Plant Alternative are for construction ($1,500,000), and operation and maintenance ($350/mg). The total present worth of this plan, including salvage values, is $2,435,000.

Alternatives A and B require capital expenditures of $1,318,000 and $1,140,000, respectively. Annual operation and maintenance costs are $3,300 for Alternative A, and $2,900 for Alternative B. The operation and maintenance expenses incurred at the Southerly treatment plant due to the flow from the Base must also be included for a true comparison of the plant and interceptor alternatives on a present worth basis. Construction on the Base and routing of flows to the tie-in point of each Alternative is regarded as an internal matter, and costs have not been included in this analysis.

(5) Summary

Table III-11 gives a summary of the primary impacts and costs for the three alternatives.

Alternatives A and B entail more primary impacts than does the Plant Alternative. The Plant Alternative does involve a long-term commitment of resources and will require double the O&M cost of either interceptor alternative. This cost-effective analysis performed using a 24-inch interceptor illustrates that a regionalization alternative, whether it be A or B, is the preferred method of handling flow from the Air Force Base.

The Base has prepared its own preliminary economic analysis and conveyed the information in a letter dated October 21, 1977. The salient comments are present below.

> Currently, an engineering firm is designing the sewage connection system. The preliminary design calls for a 14-inch force main (route shown on Figure III-20) ro a 21-inch gravity line (route shown on Figure III-21). The exact size of the line will be decided upon after further analysis.

Table III-11

Alternative Summary for the Rickenbacker Air Force Base Subarea

Item	Alternatives		
	Plant	Interceptor A	Interceptor B
Length of Sewers (feet)	0	18,200	19,200
Type of Land Traversed (feet)			
Woodland	0	300	0
Open Space (Rural)	0	15,200	15,900
Residential	0	2,700	3,300
Highway R.O.W.	0	18,200	16,400
Stream Crossings	0	3	3
Highway Crossings	0	5	6
Costs (Thousands of Dollars)			
Capital (1980)	$1,500	$1,318	$1,140
Annual O & M (1980-2000)	100.8	52.3	51.8
Present Worth	$2,435	$1,670	$1,517

- The economic analysis comparing the upgrading and operating of the on-base plant to the construction of a connection line to the City of Columbus has been revised using the new proposed user rates. Results of this analysis showed the present worth of a plant alternative to be $7.8 million dollars; while the cost of a force main alternative was $5.4 million. (These costs assumed an annual inflationary rate of 8 percent. Ignoring inflation, the costs are reduced to $5.9 million and $3.2 million, respectively.) The analysis shows that the connection to the city system is more economical.

- The environmental assessment concerning the connection to the City of Columbus, forwarded by our letter of 18 August 1977, is applicable to either a gravity line or to a force main. Either system, if selected, would be designed and constructed with a capacity to serve the base only, and would be routed along the right-of-way of an existing roadway.

- The City of Columbus has agreed to accept the base's wastewater as noted in their letter to U.S. EPA on 1 March 1977.

Two additional comments should be made concerning the regionalization of the AFB. The first is that, as shown on Figures III-20 and III-21, the routes proposed by the Air Force are similar to those proposed by the EIS and therefore, similar primary impacts would be expected to result. The exception to this is the portion of the route proposed by the AFB for the gravity alternative which crosses Blacklick Creek, a crossing not found in the EIS alternative.

The second comment concerns the fact that no secondary impacts are anticipated to result from any regionalization scheme since the interceptor line would carry only flows from the Rickenbacker AFB.

3.2.8 Sensitivity Analysis

Analyses were performed 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. Table III-12 shows the slopes, sizes,

Table III-12
Design Sensitivity of Selected Alternatives

Subarea	Slope %	Facilities Plan Size Inches	Facilities Plan Capacity mgd	Facilities Plan Cost $1,000	Half Full by 2000 Size Inches	Half Full by 2000 Design Q mgd	Half Full by 2000 Cost $1,000	Full by 2000 Size Inches	Full by 2000 Design Q mgd	Full by 2000 Cost $1,000
West Scioto										
High Level	0.15	48	24.6		42	17.5		30	8.9	
	0.15	54	31.0		42	20.9		30	10.7	
	0.15	60	41.1		42	23.0		30	11.8	
	0.83	72	54.7		42	24.3		36	12.4	
	0.10	72	66.7		48	27.7		42	14.1	
				$5,540			$5,150[2]			$4,190[2]
Big Run										
Alt. A	0.05	30	6.0		18	1.5		15	0.8	
	0.30	30	14.7		18	2.1		15	1.1	
	0.12	36	15.1		21	3.3		18	1.7	
	0.12	42	22.7		27	6.9		21	3.5	
	0.12	48	32.1		27	6.9		21	3.5	
Feder Rd.	0.11	-	-		15	1.4		12	0.7	
Renner Rd.	0.30	-	-		18	2.1		15	1.1	
				$3,040			$2,970			$2,582
Minerva Park										
Int. Alt.	0.80	18	6.1		12	1.2		12	0.6	
	0.80	21	9.1		15	2.5		12	1.3	
	1.00	21	10.2		15	2.7		12	1.4	
	0.80	18	6.1		12	1.7		12	0.9	
				$ 430			$ 380			$ 370
Big Walnut Cr.										
Alt. D	0.10	60	53.2		36	8.9		24	4.6	
	0.10	72	66.7		36	12.5		27	6.4	
				$8,770			$5,390			$4,570

Table III-12 (Cont'd)
Design Sensitivity of Selected Alternatives

Subarea	Slope %	Facilities Plan Size Inches	Facilities Plan Capacity mgd	Facilities Plan Cost $1,000	Half Full by 2000 Size Inches	Half Full by 2000 Design Q mgd	Half Full by 2000 Cost $1,000	Full by 2000 Size Inches	Full by 2000 Design Q mgd	Full by 2000 Cost $1,000
Rocky Fork										
Alt. D	varies	(1)			2-8 FM	3.0		8FM	1.5	
	0.28				18	3.7		15	1.9	
	0.20	36	19.5		24	6.2		21	3.2	
	0.20	48	41.4		27	7.5		21	3.8	
	0.10	60	53.2		36	11.0		27	5.6	
	0.50	48	65.4		36	11.0		27	5.6	
				(1)			$3,930 (2)			$3,050 (2)
Blacklick										
Alt. D	varies	(1)			2-16 FM	12.9		16 FM	6.6	
	1.1				24	12.9		18	6.6	
	1.40	54	80.7		21	5.2		15	2.6	
	0.30	60	92.1		27	10.2		21	5.2	
	0.30	66	119.2		36	19.8		27	10.1	
	0.30	72	149.2		36	21.4		27	10.9	
				$12,070			$8,070			$6,100
Groveport										
Alt. A	0.16 (3)				18	1.8		12	0.9	
	0.16				18	1.8		12	0.9	
	0.12				24	3.8		18	1.9	
	0.15				27	6.9		21	3.5	
NE Int.	0.16				15	1.2		12	0.6	
							$2,260			$1,840
Rickenbacker										
AFB-Alt. B	0.045	(1)				(4)		24	2.8	
	0.045							24	2.8	
	0.045							24	2.8	
										$1,140

(1) Data Not Available from Facilities Plan.
(2) Includes pump station costs.
(3) EIS slope only - sizes are reported in the Facilities Plan.
(4) No sensitivity done, recommended design is for full by 2000.

and costs of the chosen alternatives for each subarea as well as the sensitivity of the design concept of sizing each interceptor at half capacity in the year 2000.

The cost difference between designs using half full by 2000 and full by 2000 vary from 3% to 24%, with the average and median variation around 18%. This demonstrates that, on the average, an 18% increase in cost will permit twice as much intercepted flow at design conditions.

Table III-13 shows the comparison of ultimate density versus the projected design density for the year 2000. The table shows that most of the areas are at or less than 25% of their ultimate density by the year 2000, making designs based on an ultimate population concept uneconomical for the Columbus area.

Table III-13

Year 2000 vs. Ultimate Densities Per Subarea

Subarea	Population Density EIS Year 2000	Facility Plan Ultimate
West Scioto	2.0	10-20
Big Run	0.9	4-4.6
Minerva Park	5.3	7-24
Big Walnut Creek	1.0	4
Rocky Fork	1.8	8
Blacklick Creek	1.1	6-10
Groveport	2.6	7.4
Rickenbacker A.F.B.	1.0 - 1.3	(1)

(1) Subarea not in Facility Plan

COLUMBUS EIS REYNOLDSBURG ANALYSIS
REVISED POPULATION PROJECTIONS

TRAFFIC ZONE	TOTAL COUNTY 1.259 M		TOTAL COUNTY 1.110 M		TOTAL COUNTY 1.025 M	
	MORPC 10/76 PROJECTIONS		EIS 2/78 PROJECTIONS		MORPC.9/25/78 PROJECTIONS	
	TOTAL TRAFFIC ZONE	SERVED IN TRAFFIC ZONE	TOTAL TRAFFIC ZONE	SERVED IN TRAFFIC ZONE	TOTAL TRAFFIC ZONE	SERVED IN TRAFFIC ZONE
2423	527	527	465	465	266	266
2422	432	432	381	381	203	203
2421	994	994	877	877	360	360
2420	636	636	561	561	201	201
2419	1413	141	1246	124	525	52
2418	2082	645	1836	569	740	229
2501	1962	784	1727	690	1727	690
3402	85	85	75	75	53	53
3403	2927	2927	2582	2582	479	479
3404	2283	2283	2014	2014	920	920
3405	1187	1187	1047	1047	202	202
3406	7069	2121	6235	1871	5140	1542
3407	2730	2730	2408	2408	2133	2133
3408	0	0	0	0	0	0
3409	1130	1130	997	997	479	479
3410	4944	4944	4361	4361	3864	3864
3411	5533	5533	4880	4880	2261	2261
3412*	3952	3952	3486	3486	3622	3622
3413	633	633	558	558	500	500
3414*	2922	2601	2577	2294	3137	2792
3415	2731	0	2409	0	2420	0
3416	1863	0	1643	0	905	0
3417*	3798	1785	3350	1574	3964	1863
3418	4167	1083	3675	955	2641	687
3502*	4042	3597	3557	3165	4857	4322
3505*	3974	1590	3497	1309	5447	2179
3507*	883	530	777	466	3469	2082
4409	4200	966	3704	852	990	228

* Traffic zones showing increases in population under revised projections.

ODNR
Ohio Department of Natural Resources
OFFICE OF OUTDOOR RECREATION SERVICES
Fountain Square · Columbus, Ohio 43224 · (614) 466-4974

April 19, 1979

RECEIVED
APR 23 1979
EPA REGION 5
OFFICE OF REGIONAL ADMINISTRATOR

Mr. John McGuire, Administrator
U.S. Environmental Protection Agency
Region V
230 South Dearborn Street
Chicago, Illinois 60604

RE: Wastewater Treatment Facilities for the Metropolitan Area, Columbus, Ohio; Proposed Blacklick Creek Interceptor

Dear Mr. McGuire:

An inquiry has been made by your Ohio Facilities Planning Staff as to whether construction of the above cited interceptor sewer through Blacklick Woods Metropark, Reynoldsburg, Ohio, would result in a Section 6(f) conflict of the Land and Water Conservation Fund Act.

Under two separate projects, Blacklick Woods Metropark has been developed with Land and Water Conservation Fund monies. Granting control or partial control of land within the park for a sewer line would constitute a Section 6(f) conflict.

Any request for a conversion of land use must first be submitted by the Park District to this Department for review and approval. The conversion request must also be reviewed by the Heritage Conservation & Recreation Service and meet the prerequisite for approval of a Section 6(f) conversion request (see attached) before final approval by the Secretary of the Interior.

If you have any questions or need any additional information please do not hesitate to contact my office.

Sincerely,

Donald G. Olson, Chief
Office of Outdoor Recreation Services

DGO:sjd
Attachment
cc: Frank D. Jones, HCRS
Edward F. Hutchins, Metro Parks
Dayton Robbins, City of Columbus
Gene Wojcik, U.S. EPA
Greg Smith, Ohio EPA

Water
R/F
4/23/79

As prerequisites for approval of any 6-f conversion request, it should be determined that:

1. All practical alternatives to the conversion have been evaluated and rejected on sound bases.

2. The fair market value of the property to be converted has been established and that the property proposed for substitution is of at least equal fair market value.

    a. Generally this will necessitate a review of appraisals prepared in accord with Part 675.2.5 for both the property proposed to be converted and that recommended for substitution. However, at the discretion of the Regional Director, a State certification that appraisals of both properties are acceptable and reveal that the replacement property is of at least equal fair market value as that of the property to be converted can be accepted. Exercising this authority should be consistent with the State's review responsibilities with respect to donation appraisals.

    b. Property improvements will be excluded from all fair market value consideration for properties to be substituted. Exceptions are allowable only in those cases where property proposed for substitution contains improvements which directly enhance its outdoor recreation utility.

3. The property proposed for replacement is of reasonably equivalent usefulness and location as that being converted. Dependent upon the situation and at the discretion of the Regional Director, the replacement property need not provide identical recreation experiences or be located at the same site provided it is in a reasonably equivalent location. It must, however, be administered by the same political jurisdiction as the converted property.

4. The property proposed for substitution meets the eligibility requirements for fund-assisted acquisition in the Manual. The replacement property must constitute or be part of a viable recreation area. It should be also noted that public land may not be used for substitution unless it meets the acquisition criteria of Manual Part 670.1.8K.

5. All necessary coordination with other Federal agencies has been satisfactorily accomplished.

6. The guidelines for environmental evaluation enumerated in Manual Part 650 have been satisfactorily completed and considered by the Service during its review of the proposed 6(f)(3) action. In cases where the proposed conversion arises from another Federal action, final review of the State's proposal shall not occur until the Region is assured that all environmental review requirements related to that other action have been met.

7. Clearinghouse review procedures set forth in Manual Part 660.1.1D have been adhered to if the proposed conversion and substitution constitute significant changes to the original Land and Water Conservation Fund project.

8. The proposed conversion and substitution are in accord with the SCORP.

9. Staff consideration of the above points reveals no reason for disapproval and the project files are so documented.

Metro Parks

999 Park Road • P.O. Box 29169 • Columbus, Ohio 43229 • 614/891-0700

Board of Park Commissioners
Michael B. Karr
Everett H. Krueger
Robert M. Zollinger, M.D.

Director-Secretary
Edward F. Hutchins
Deputy Director
John A. Metzker

February 5, 1979

RECEIVED
9 FEB 7 AM 11
WATER QUALITY

Mr. Dale Leucht
Water Quality Planning Branch
USEPA Region V
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Leucht:

I am writing to you about the impacts of the Blacklick interceptor sewer line, as proposed in the Columbus Metropolitan Area Facilities' Plan, on Blacklick Woods Metropolitan Park. While I realize that it is late in the decision-making process for this, I must point out that we were only made aware in mid-December of 1978 of what the approved route might be. On December 19, Mr. John Metzker, Deputy Director of the Metropolitan Park District accompanied Messrs Gregory Smith and Robert Monsarrat of the Planning Division of Ohio EPA on a tour of those areas of the Park through which the pipeline would pass. In bringing these impacts to your attention it is not our intention to cause further delay to the already protracted planning for this needed correction of the Reynoldsburg area's water pollution problems; however, the impacts on Blacklick Woods Metropolitan Park will be extensive and, consequently will have serious detrimental effects on the recreational activities of the 565,000 people who use the Park throughout the year and the 65,000 people who use the Golf Course during its seven- to eight-month season. We feel, regardless of the time factor, serious consideration must be given to mitigating, if not avoiding, these impacts.

The pipeline will cross two major portions of Blacklick Park, the Golf Course, as alluded to above, and a natural area. We do not consider the impacts to one to be greater or less than to the other. The Golf Course is, in actuality, two courses, an 18-hole par-72 course and an 18-hole par-59 course. As the pipeline enters the Park it will divide the greens and fairways 13, 14, 15 from the par-59 course and then will drop south across the par-72 course crossing eight fairways and probably two greens, thus eliminating eight holes from it and separating fairways 12 and 15 from the undamaged remaining eight holes. There is the additional matter of disruption of the complex sprinkler system and the effects of digging on two 26-inch wells. The impact may be analyzed in three ways: damage to the course, loss of revenues, disruption of recreation.

Our landscape staff and the course professional estimate that it will take a minimum of two years for the damaged fairways and greens to be restored to their pre-construction state. Our best estimate of the costs for repairing the direct damages is $15,000 per damaged hole, or a total of $400,000. However, the greatest monetary losses will result from the lost greens fees, currently running $351,000 per year. We have been advised that the time the Park's impacted areas will be unavailable for use will be the better part of a year, since the construction company will have to use the pipeline right-of-way as its major access between Livingston Avenue, the Park's northern boundary, and Interstate 70, its southern boundary.

If the course is unplayable for one season, it will take three years for the number of players, 65,000, who last played the course over the season to reach that number again. However, whether the course can be returned to playability with only one season's loss is dependent on when the construction begins and how long the area is used for construction, so two season's loss is not improbable. Two seasons' loss would require five years for return of the original number of players, thus, without taking inflationary factors into consideration, income losses to the Park District would run between 1 million and 1.5 million dollars. Added to this figure would be the costs of maintenance of those portions of the course not directly impacted by the construction during that period and full maintenance after construction. Those costs are $273,000 per year. If the courses are out of commission for two seasons, the immediate add-on to the loss of fees would be $546,000, with a pro-rata add-on for every year until the greens fees offset these costs. The effect of the lost net gain shown between a year's income from greens fees over course maintenance costs would be felt throughout the Park System since it is used to cover maintenance costs in other areas because tax-generated funds are inadequate for these purposes.

The recreational loss from construction on the Golf Courses is not limited to golf. During the winter, a complete winter sports program of skiing, sledding and skating is conducted here and with the access lost from Livingston Avenue, that program also would be lost to the public.

South of the Golf Course the pipeline will cross a natural area which was just opened to the public last year. It had been closed for over 20 years, after being cleared of former farm buildings, so that it could recover vegetationally and be reoccupied by wildlife. It is appropriate to point out here that the primary function of the Metropolitan Parks is to provide non-consumptive, no-harvest, natural area recreation 365 days a year which, translated into operations, requires the careful nurture of balanced ecosystems. The opening of this natural area followed the completion in the fall of 1978, at a cost of $90,000, of combined jogging and bicycle trail which can also be used for Nordic skiing in winter. The pipeline will bisect the lower loop of this trail, but more damaging to the area will be the impact on the 20-year recovery of vegetation and wildlife habitat. The construction alone will undo 20 years of slow natural recovery, but that will be compounded by the prolonged use of the right-of-way. The effects of machinery noise and concentrated human activity will be disruptive to the wildlife both in this area and in a more delicate and critical area immediately to the west.

The natural area complex based on this delicate ecosystem was dedicated as a preserve under Ohio's Natural Area Preservation statutes. The central feature of this complex is a mature elm-ash-swamp forest association. A pond was constructed to increase habitat diversity; a nature interpretation center, whose primary feature is concealed viewing of wildlife through one-way glass walls, was constructed, together with a nature trail and boardwalk through the swamp. The total cost was $230,712. The natural diurnal and periodic migration of wildlife--deer, foxes, and birds--into this area is dependent on their freedom of circulation between this area and that through which the pipeline and right-of-way will pass. It is that circulation and migration upon which the nature center and trail system depend for their attraction to and use by park visitors. There is no doubt, in our judgment, that the disruption of the area to the east of this dedicated natural area will have a major and moderately long-term negative effect on the natural area and its recreational use.

While the monetary impacts to the Park's Golf Courses and natural areas will be

substantial, the greatest losses will be in the disruption of carefully nurtured natural areas and wildlife habitat and the deprivation of recreational opportunities for substantial numbers of people. In light of these impacts, which are far from being short-range, on Blacklick Woods Metropolitan Park, we would encourage you to give definitive consideration to using the alternate route for the pipeline which lies to the east of the Park and Blacklick Creek along State Route 256 or to one that would proceed west along Livingston Avenue beyond the western boundary of the Park.

Sincerely,

Edward F. Hutchins

Edward F. Hutchins
Director-Secretary

EFH:akw
cc: Regional Director, Heritage Conservation
and Recreation Service
Chief, Division of Recreational Services, ODNR
Chief, Natural Area Preservation Section, ODNR
Director, Region V, USEPA

APPENDIX DD

REVISED APPENDIX B: MATHEMATICAL CHARACTERIZATION OF THE SCIOTO RIVER BELOW COLUMBUS

APPENDIX B

MATHEMATICAL CHARACTERIZATION OF THE SCIOTO RIVER BELOW COLUMBUS

APPENDIX B

MATHEMATICAL CHARACTERIZATION OF THE SCIOTO RIVER BELOW COLUMBUS

B.1 INTRODUCTION

The computer is a valuable tool in the systems analysis approach to comprehensive studies involving stream modeling and alternative evaluation in the development, use, and management of water resources. This study has used a basic dissolved oxygen water quality model to define the impact of point wastewater releases from the Jackson Pike and Southerly wastewater treatment facilities upon the oxygen resources of the Scioto River under a variety of low flow regimes. Effluent loadings were adjusted so as to establish a final load allocation for any modeled pollutant such that a violation of the applicable water quality standard is avoided. Ideally, this provides an optimum situation because the receiving stream can now be used as a final treatment device to the extent that its capability is not taxed to the detriment of the natural environment and indigenous aquatic species.

Obviously, any attempt at future prediction is fraught with difficulty and plagued with controversy. Indeed, the capability for mathematical sophistication via the computer far exceeds the fundamental knowledge needed to establish reasonably correct input parameters. The reader should remember that a mathematical model gives only correct relative results with constant input parameters. Specific, finite results are a desired goal but are rarely achievable.

B.2 DISSOLVED OXYGEN MODEL

Detailed mathematical analysis of the Scioto River revolves around a simplified dissolved oxygen profile. The basic program was produced by the Texas Water Development Board and titled "DOSAG"[1]. This water quality model was then modified by the Georgia Environmental Protection Division to allow the incorporation of a different method of calculating reaeration and to drop flow augmentation considerations.

(1) Simulation of Water Quality in Streams and Canals DOSAG-1, Texas Water Development Board (1970).

The mathematical model was further refined to incorporate instream sheet oxygen demands and assets and reaction rate attenuation as a function of dissolved oxygen concentration or attainment of a set background ultimate carbonaceous oxygen demand. The final form of the dissolved oxygen model is given below.

$$D = \frac{K_1 L_o}{K_2 - K_1} \left(e^{-K_1 t} - e^{-K_2 t}\right) + D_o\, e^{-K_2 t}$$

$$+ \frac{K_3 N_o}{K_2 - K_3} \left(e^{-K_3 t} - e^{-K_2 t}\right) + \frac{BD}{28.3 d K_2} \left(1 - e^{-K_2 t}\right)$$

where D_o = Initial dissolved oxygen deficit (mg/l)
L_o = Initial ultimate carbonaceous oxygen demand (mg/l)
N_o = Initial ultimate nitrogenous oxygen demand (mg/l)
D = Dissolved oxygen deficit (DO saturation - DO stream) at any time t (mg/l)
K_1 = Carbonaceous decay coefficient ($days^{-1}$)
K_2 = Reaeration coefficient ($days^{-1}$)
K_3 = Nitrogenous decay coefficient ($days^{-1}$)
t = travel time, days
BD = Sum of in-stream sheet demands and assets (mg/day/SF)
d = stream depth (ft.)
28.3 = Liters/cubic feet

The following sections describe the development and background thinking that went into the establishment of the input parameters for the model and the waste load allocation activities.

B.3 TEMPERATURE CONSIDERATIONS

The temperature adjustments for K_1, K_2, K_3 and BD are given below:

K_1, K_3 and BD at any T, ^oC = K_1, K_3 and BD at 20^oC $(1.05)^{T-20}$

K_2 at any T, ^oC = K_2 at 20^oC $(1.02)^{T-20}$

These adjustments are well documented in the literature and represent no deviation from the current state of the art.

Temperatures under low flow conditions in the Scioto will likely be relatively high due to the three cooling water releases in and below the City of Columbus. Two of these, Ohio State (not presently operating) and the Columbus Division of Electricity plant, are above Jackson Pike, while the third, Columbus and Southern Ohio Electric Company, is below Southerly. This bracketing of the facilities being modeled pointed toward use of the maximum permissible stream temperature stated in the Ohio Water Quality Standards, 32°C.

The use of this high a temperature will probably remain valid even after the closing of the present City Division of Electricity plant. Plans currently call for the replacement of this facility with another coal and refuse-fired production unit just below Jackson Pike (pending voter approval), a move which will likely continue to produce elevated stream temperatures.

Winter model runs were also conducted for the same segment of the Scioto River. The stream temperature utilized in this effort was 12°C, a value which again reflects conditions resulting from releases of cooling water.

B.4 INSTREAM OXYGEN DEMANDS AND ASSETS

The BD term in the dissolved oxygen model represents the cumulative effect of algal photosynthesis, algal decay, and the oxygen demand associated with any benthic deposits. The first would represent a stream asset, and the other two would be demands.

Algal photosynthesis is, first of all, nutrient dependent. After that, a favorable habitat for algal replication is needed. Algal replication and, in turn, photosynthetic oxygenation, are dependent upon sunlight as an energy source. Where algal photosynthesis occurs algal decay is an inevitable corollary. A field sampling program will usually measure a stream condition exhibiting the maximum net influence of algal photosynthesis since it is most often conducted in the daylight hours. Only those samples taken near dawn will measure the maximum net impact of algal decay on the oxygen resources of the stream. Quantitatively, it is not known if the net 24 hour impact of photosynthesis and decay is positive or negative. Therefore, it was assumed in this study to be self-canceling.

The benthic oxygen demand is highly variable, since it reflects the accumulation of both natural organic debris (such as leaves in the fall), organic settleable solids discharged from point wastewater sources, and the naturally developed sediment load from nonpoint sources. The cumulative impact of these considerations is further reduced to the intangible by storm frequency and intensity as well as stream velocity.

For the purposes of the modeling effort, it was assumed that both of the dischargers were achieving a minimum of secondary treatment equivalency with no settleable solids in their effluent. It was further assumed that the seven consecutive day, ten year low flow regime would precede the fall season and its attendant leaf litter in the streams. These assumptions allowed the use of a zero or insignificant benthic demand in all modeling runs.

B.5 REACTION COEFFICIENTS

B.5.1 Reaeration Coefficient (K_2)

The escape coefficient concept established by Tsivoglou and his co-workers is gaining wide acceptance in stream modeling work for a definition of the reaeration coefficient. The reported relationship is of the form:

$$K_2 = C \frac{\Delta h}{t} \text{ (base e, days}^{-1}\text{)}$$

where: C = escape coefficient, ft.$^{-1}$
Δh = change in stream bed height, ft.
t = time of travel, days.

Historic convention had been to use a constant C of 0.05 throughout the entire flow range with an upward adjustment for clean streams (up to 0.07) and a downward adjustment for grossly polluted streams (down to 0.02). However, a later publication by Tsivoglou and Neal[1] has further refined this relationship to reflect changing values of C with stream flow. This study recommends using an escape coefficient (at 20°C) of 0.05 when stream flows are in excess of 25 cfs. This value was used in all simulation runs.

(1) Tsivoglou, E.C., and Neal, L.A., Tracer Measurement of Stream Reaeration - III. Predicting the Reaeration Capacity of Inland Streams, 48th Annual WPCF Conference, Miami Beach, Florida (1975).

In this modeling effort, the Δh value was established using 7.5 minute USGS quadrangles and establishing a representative stream slope through a measured distance and reported contour lines. The change in elevation was then calculated from the slope over the stream reach. Slope on the Scioto from Columbus to Circleville is fairly uniform, with values ranging from 2.1 to 2.3 feet per mile.

B.5.2 Carbonaceous and Nitrogenous Decay Coefficients (K_1 and K_3)

The establishment of correct K_1 and K_3 inputs for mathematical characterization of a receiving stream is one of the most controversial aspects of river modeling and waste load allocation. Most historic modeling efforts have incorporated K_1 and K_3 rates corresponding to those observed in a standard laboratory BOD determination. Studies by Havens and Emerson[1][2] incorporating field derived K rates have indicated that laboratory values may significantly underquantify actual instream deoxygenation characteristics due to the static nature of the BOD test itself. The values selected as input parameters for the mathematical analysis in this study represent a composite of the rates measured by Havens and Emerson in streams carrying elevated concentrations of oxygen demanding materials. These rates, as shown below, are adjusted as a function of velocity in a very rough approximation of the in-situ measurements. (It is probable that they truly vary as a function of both stream depth and velocity, i.e., a total mixing function.)

Velocity (fps)	K_1 ($days^{-1}$, base e, 20°C)	K_3
≤0.6	0.6	0.3
>1.0	6.0	3.0
>0.6 to 1.0	straight line transition	

(1) Water Quality Assessment and Basin Modeling - Rocky River and Tinkers Creek, prepared for the Three Rivers Watershed District by Havens and Emerson, Ltd. (1974).

(2) Water Quality Assessment and Low Flow Analysis - Muskingum Watershed, prepared for the Ohio EPA by Havens and Emerson, Ltd. (1976).

The critical velocities are those where instream settling (<0.6 fps) and instream scour (≥1.0) are believed to dominate.

Laboratory rates are, generally speaking, approximately an order of magnitude less than the corresponding field rates found in the above referenced studies. As a general rule, it can be safely stated that a laboratory rate will be the lower limit of field rates experienced under any stream condition[1]. Accordingly, modeling runs were conducted at rates one tenth and one-half the above tabulated values in order to "envelope" probable stream conditions and to demonstrate model rate sensitivity. Rate coefficients of one-half of the above tabulated values are considered to be the most probable for the river under the design conditions.

B.6 REACTION RATE ATTENUATION

B.6.1 Dissolved Oxygen

The dissolved oxygen model is only intended to characterize the stream's reaction under aerobic conditions. In recognition of this situation and the fact that aerobic organism activity will become attenuated under low dissolved oxygen conditions, it was necessary to reduce the deoxygenation coefficients associated with carbonaceous and nitrogenous stabilization. A review of several readily available references,[2][3][4] indicated that carbonaceous stabilization rates begin to slow at dissolved oxygen levels on the order of 0.5 mg/l. Similarly, nitrogenous or nitrification rates begin to slow at a dissolved oxygen concentration of about 1.5 mg/l.

(1) "DO Workshop", Federal EPA sponsored Symposium: Rate Constants for Surface Water Modeling, San Francisco, California, April, 1977.

(2) Eckenfelder, W.W., and O'Connor, D.J., Biological Waste Treatment, Pergamon Press, New York, N.Y. (1961).

(3) Process Design Manual for Nitrogen Control, U.S. EPA Technology Transfer (1975).

(4) Hopwood, A.P., and Downing, A.L., Factors Affecting the Rate of Production and Properties of Activated Sludge in Plants Treating Domestic Sewage, Institute of Sewage Purification, 5, 3 (1961).

Figure B-1 shows the rate attenuation employed in the water quality model. The model utilizes the calculated dissolved oxygen at the end of each subreach (each reach is divided into ten equal subreaches) to set the appropriate attentuation factor, if applicable, for K_1 and K_3 in the subsequent subreach.

This adjustment alone would make the dissolved oxygen model limited to aerobic waste stabilization. The predicted rate shutdown upon calculation of zero dissolved oxygen means that the oxygen demanding load will now start to accumulate as new downstream loads are introduced into the stream. Since this load accumulation will act to further suppress modeled stream recovery, any predicted recovery can be totally eliminated when the input is large. In recognition of this fact, a further refinement of the model incorporated a velocity dependent anaerobic decay function of the carbonaceous load when extremely low (<0.1 mg/l) levels of dissolved oxygen are anticipated. Figure B-2 provides a comparison of this anaerobic adjustment with the usual aerobic equation.

B.6.2 Background Carbonaceous Load

A background carbonaceous load attenuation consideration is based upon the observation that some fraction of the ultimate carbonaceous load (L_o) is not readily biodegradable, and thus is stabilized at a much lower rate. The computer handles this by using a reaction rate one-hundredth of the normal value when a preset background ultimate carbonaceous load is calculated at the end of each subreach. A background L_o of 3 mg/l was utilized in all modeling runs.

B.7 PHYSICAL STREAM CHARACTERISTICS

B.7.1 Flow Relationships

Many models of streams start with Manning's equation for velocity of liquids in open channels:

$$V = \frac{1.5}{N} R^{2/3} S^{1/2}$$

where N = Mannings n
R = hydraulic radius, ft.
S = slope, ft./ft.

Figure B-1
Attenuation Factors
for K_1 and K_3

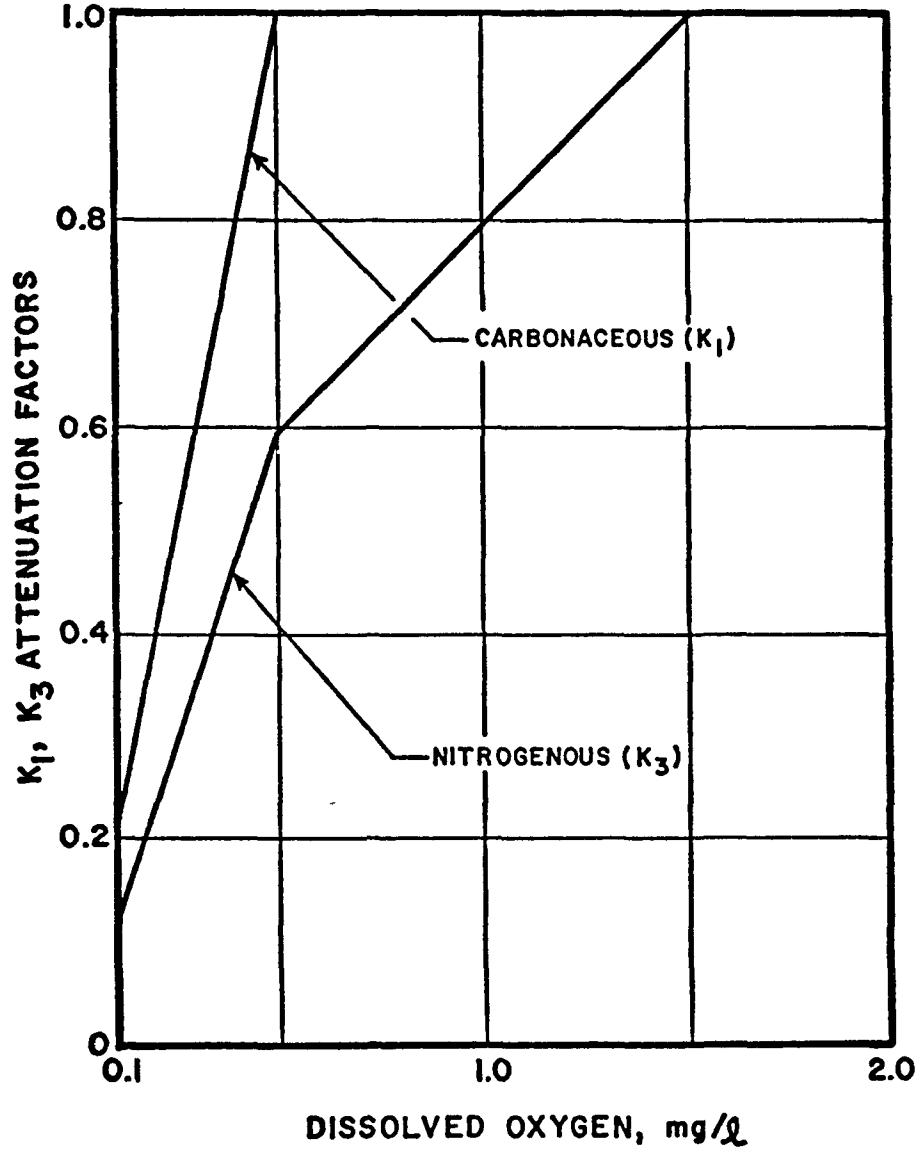
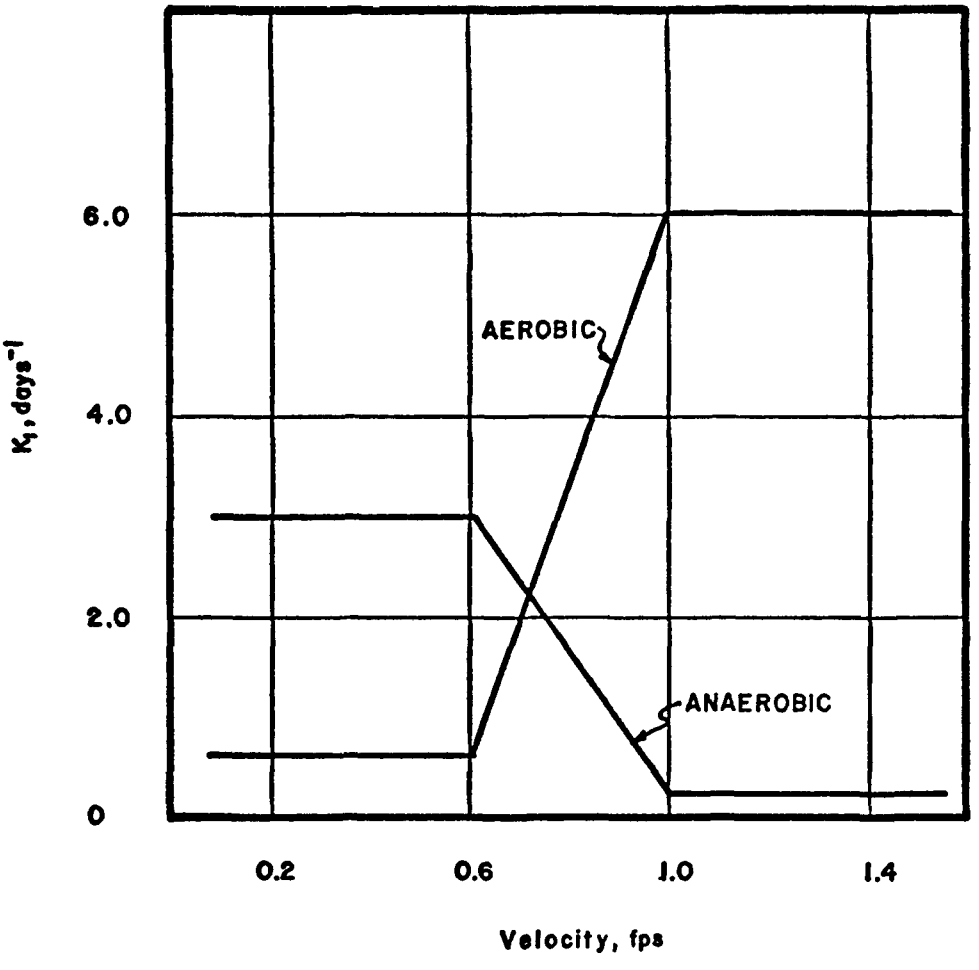


Figure B-2
Anaerobic K_1
Velocity Adjustments



This equation can be solved by trial and error in the computer for a satisfying depth and velocity with a known flow. The major difficulty of using this technique is that it is dependent upon correct Manning's n and stream width assumptions for the flow regime under consideration. Since the detailed measurements and observations necessary to properly define these parameters were not possible in this study, it was thought to be preferable to attempt to define only the stream velocity of the Scioto River in the modeled segments. Characterization of the velocity bypasses intermediate estimates of physical parameters associated with a stream, since velocity is the result of a given physical stream reach experiencing a given flow at a calculated slope. Several methods were employed to estimate reasonable instream velocities for this study.

The first technique employed for velocity estimation was a statistical correlation of stage discharge relationships provided by the United States Geological Survey for gaging stations within the study area. Equations of the form $y = aQ^b$ can be developed from this data, with y equal to velocity, width, or depth such that the expression for hydraulic continuity ($Q = VA$) is satisfied. Data obtained in this manner in the study area is, to a large extent, site specific, since many stations experience upstream flow regulation; a phenomena which precludes the application of coefficients and exponents derived to other stream points which are similar physically but nonregulated.

Only three stations on the Scioto were within the modeled portion of the River: the USGS gage at Columbus (RM 27.0), a point between Shadeville and Southerly (RM 16.5), and at U.S. Route 22 in Circleville (RM 0.0). Coefficients relating stream flow to velocity at these points are 0.381, 0.009, and 0.055, respectively. Exponents on flow were found to be 0.232, 0.646, and 0.379, respectively.

Estimates of stream velocities in the Scioto River have also been made by the Ohio Environmental Protection Agency as a part of their 303e waste load allocation responsibilities. Values were obtained through a mathematical technique which adjusted a measured set of cross sectional data to predicted low flow cross sections and their attendant stream velocities.

Cross sectional measurements were also taken by consultants to the State of Ohio in 1962 as a part of a flood plain study for the Columbus area. Using the mean daily flow at the USGS Scioto River at Columbus gage on the dates of each measurement, a rough approximation to the stream velocity can be made. Table B-1 lists both the Ohio EPA and the 1962 velocity estimates as a function of Scioto River mile along with the predicted velocity at stream points where the coefficient and exponent method is applicable. The flow input for the treatment plants under the OEPA and gaged approximations cause overall flow in the stream to be near that noted in 1962, which was at somewhat higher background values with a lower plant input.

Table B-1 reveals a consistent velocity trend - a relatively slow stretch below Jackson Pike after which the River speeds up and gradually tapers off to a fairly steady velocity. A visual survey of USGS maps and the Scioto itself indicated likely points for these general velocity regimes to exert themselves due to either natural or artificial considerations acting upon channel geometry and side conditions. Again, in an effort to envelope actual future conditions, model sensitivity runs were conducted at velocities $\pm$33 percent of the predicted values.

B.8 FLOW INPUTS

Effluent flows from the two Columbus wastewater treatment facilities were assigned the (1995) dry weather values attributed to them in the Environmental Assessment of the Columbus Metropolitan Area Facilities Plan. Jackson Pike was modeled at 100 million gallons per day (mgd), while Southerly was modeled at 85 mgd. Other present wastewater releases in the planning area were not modeled, since they will most likely be contributory to one of the larger plants by the design year. The proposed Delaware County plant on the Olentangy River is the exception to this, and is assumed to contribute its design flow to the stream above the study area. Cooling releases to the Scioto River are assumed to be an intake and once through arrangement, with no net stream flow addition or subtraction.

Background stream flows are unusually hard to define for the study area due to the regulated nature of many of the streams. The Scioto River is especially affected by regulation and withdrawals for water supply.

Table B-1
Predicted Velocity Comparison

River Mile	Velocity, fps		
	OEPA	X-SECT	GAGE
26.8	0.24	0.47	0.74
25.4	0.24	1.36	
24.0	0.80	0.49	
23.7	1.14		
23.2	1.14	0.33	
22.9	0.52		
21.6	0.52	0.59	
19.9	0.52	0.50	
18.5	0.34	0.34	
17.4	0.34	0.39	
17.1	0.36	-	
16.5	0.36	-	0.38
15.1	0.23	0.22	

River Mile	Velocity, fps		
	OEPA	X-SECT	GAGE
13.7	0.26	0.19	
12.5	0.26	0.50	
11.2	0.26	0.34	
9.4	0.26	0.12	
8.4	0.26	0.35	
7.3	0.19	0.23	
6.3	0.22	0.19	
4.5	0.22	0.47	
3.1	0.22	0.31	
2.3	0.22	0.10	
1.5	0.21	-	
1.0	0.23	-	
0.0	0.24	-	0.50

At least three low flow regimes on the Scioto below Columbus are possible and can be supported by some form of documentation. One flow assumption would be that the Scioto River above the Olentangy actually goes dry due to the withdrawals experienced, and that the Olentangy flows are those dictated by the low flow release schedule from the Corps of Engineers dam at Delaware Lake, as follows:

Period	Discharge, cfs
July 1-10	10
July 11-20	25
July 21-31	35
August 1-20	40
August 21-31	35
Sept. 1-Oct. 31	20
Minimum Release	5

Communications with the USGS have indicated that a flow regime which incorporates the minimum release from Delaware Lake in conjunction with a zero flow in the Scioto above the Olentangy is in fact far more severe statistically than the usually modeled low flow that persists for 7 days with a ten year recurrence (7-10)[1].

Another possible low flow regime is that which was used by the OEPA in arriving at their waste load allocations for the Columbus treatment facilities. This value, 18.2 cfs, attempted to strike a balance between the minimum permissible reservoir release and the normal low flow discharge schedule.

The USGS also maintains a computerized file for each of their stream gaging stations which will permit the calculation of a 7-10 (or any other statistically significant) flow. Since upstream regulation was instituted, the 7-10 flow reported to exist just above the Jackson Pike facility is 122 cfs. This value seems high, and model sensitivity runs were made to show whether or not such a flow would cause a significant difference in load allocation conclusions.

Flows from streams tributary to the Scioto were input on the basis of a USGS - specified 7-10 low flow or on a cfs/square mile transfer of those flows to similar streams on a direct drainage area ratio basis.

(1) Personal Communication, Richard Swisshelm, Ohio District, USGS.

Wintertime flows were arrived at by analyzing seven consecutive day cold weather low flows which have actually been recorded at the Scioto River at Columbus USGS gage over the past ten years. A value of 222 cfs, which was observed in January, 1971, was selected as representative of a low wintertime flow regime. This is not to be confused with a cold weather statistically correct 7-10 low flow - it is merely intended to provide an approximation to such a value.

Table B-2 provides a summary of significant inputs to the stream model in terms of river mile. The velocities and deoxygenation coefficients tabulated are those at the median and probable field conditions, respectively. Deoxygenation rates are base e at 20°C. The listed reaeration rate is that which results from a median velocity consideration.

B.9 WASTE LOAD ALLOCATION

National Pollutant Discharge Elimination System (NPDES) permits have been issued to both of the Columbus wastewater treatment plants. Limitations significant to a simplified stream modeling effort are those on dissolved oxygen (6.0 mg/l average), BOD_5 (8 mg/l monthly average), and NH_3-N (1.0 mg/l summer and 2.5 mg/l winter monthly averages). These values correspond to the Ohio EPA definition of BACTEA (Best Available Control Technology Economically Achievable). Since DOSAG operates on the basis of ultimate BOD (L_o) and ultimate nitrogenous demand (N_o), an adjustment to the NPDES permit values was required. In accordance with past Ohio EPA practice, L_o was defined as 1.5 x BOD_5 and N_o as 4.0 x NH_3-N. These release levels, along with an effluent DO of 6.0 mg/l, were used as a starting point for all model runs.

Table B-3 provides a summary of stream response to effluent loadings from Jackson Pike and Southerly at NPDES permit release levels. Model sensitivity to upstream flow, stream velocity, and deoxygenation coefficients is tabulated; as is the seasonal variation in the stream response to the applied load. Figures B-3 and 4 provide a visual representation of the DO profile in the Scioto River for the various sensitivity runs in summer and winter, respectively.

Two striking facts may be observed from a perusal of the Table and Figures. The first of these regards the "tightness", or lack of significant variation exhibited by the DO profiles under the various sensitivity runs. Such a phenomena indicates that many of the uncertainties associated

Table B-2
Model Input Summary

Input	River Mile	Q(1) cfs	ΔH ft.	Velocity fps	K_1 day^{-1}	K_3 day^{-1}	K_2 day^{-1}
Scioto River	26.8	Varies/221					
Jackson Pike WWTP	26.8	155	1.29	0.3	0.6	0.3	0.69
Kian Run	26.2	0.1/0.2	4.30	1.0	6.0	3.0	2.28
Scioto Big Run	24.2	0.3/0.5	2.80	1.0	6.0	3.0	2.29
Republican Run	22.9	0.4/0.7	3.01	0.5	0.6	0.3	1.14
Grant Run	21.5	0.4/0.7	6.45	0.5	0.6	0.3	1.14
Plum Run	18.5	0.2/0.4	0.46	0.5	0.6	0.3	1.22
Southerly WWTP	18.3	132	2.76	0.3	0.6	0.3	0.73
Big Walnut Creek	17.1	16/29	1.84	0.3	0.6	0.3	0.73
C & SO Electric	16.3	-	6.90	0.3	0.6	0.3	0.73
Peters Run	13.3	0.3/0.5	3.70	0.3	0.6	0.3	0.73

Table B-2 Continued
Model Input Summary

Input	River Mile	$Q^{(1)}$ cfs	ΔH ft.	Velocity fps	K_{1-1} day^{-1}	K_{3-1} day^{-1}	K_{2-1} day^{-1}
Grove Run	11.7	0.2/0.4	0.69	0.3	0.6	0.3	0.73
Tributary	11.4	0.1/0.2	4.37	0.3	0.6	0.3	0.73
Tributary	9.5	0.1/0.2	2.30	0.3	0.6	0.3	0.73
Tributary	8.5	0.1/0.2	2.53	0.3	0.6	0.3	0.73
Van Meter Run	7.4	0.1/0.2	2.76	0.3	0.6	0.3	0.73
Walnut Creek	6.2	2.7/4.9	1.38	0.3	0.6	0.3	0.73
Tributary	5.6	0.1/0.2	1.84	0.3	0.6	0.3	0.73
Tributary	4.8	0.1/0.2	3.68	0.3	0.6	0.3	0.73
Dry Run	3.2	0.2/0.4	5.06	0.3	0.6	0.3	0.73
Big Darby Creek	1.0	5.3/9.6	1.61	0.3	0.6	0.3	0.73

Table B-2 Continued
Model Input Summary

Input	River Mile	Q[1] cfs	ΔH ft.	Velocity fps	K_1 day^{-1}	K_3 day^{-1}	K_2 day^{-1}
Hargus Creek	0.3	0.2/0.4	0.69	0.3	0.6	0.3	0.73

(1) Summer/Winter

Table B-3
Stream Summary At
NPDES Release Levels (1)

Season	Upstream Q	Stream Velocity	K_1, K_3 Rates	Minimum DO below Jackson Pike		Minimum DO below Southerly		DO @ US 22
	cfs	% of Median		mg/l	Miles (2)	mg/l	Miles (2)	
Summer	122	100	100	0.33	2.2	3.18	3.2	6.53
		100	50	1.30	3.9	4.13	4.4	6.48
		100	10	4.93	3.9	5.80	Mix	6.21
		133	100	0.69	2.7	3.54	4.1	6.53
		67	100	1.78	3.9	2.49	2.3	6.51
	18.2	100	100	0.00	1.6	2.34	2.0	6.27
		100	50	0.31	3.5	3.52	4.4	6.19
		100	10	4.50	3.9	5.64	Mix	6.02
		133	100	0.00	2.7	2.82	4.4	6.27
		67	100	0.49	3.9	1.48	2.6	6.31
Winter	221	100	100	3.41	4.0	5.42	1.2	8.38
		100	50	5.36	3.9	6.41	Mix	7.35

Table B-3 Continued
Stream Summary At
NPDES Release Levels (1)

Season	Upstream Q	Stream Velocity	K_1, K_3 Rates	Minimum DO below				DO @ US 22
				Jackson Pike		Southerly		
	cfs	% of Median		mg/l	Miles (2)	mg/l	Miles (2)	
Winter	221	100	10	7.52	Mix	7.88	Mix	9.45
		133	100	4.24	3.9	5.35	Mix	8.43
		67	100	5.60	6.5	4.74	5.2	8.06

(1) DO = 6 mg/l; L_0 = 12 mg/l; N = 4 mg/l summer, 10 mg/l winter

Q = 100 mgd at Jackson Pike; 85 mgd at Southerly

(2) Miles below Jackson Pike (Mile 26.8)

Miles below Southerly (Mile 18.3)

Figure B-3
Model Sensitivity
at Summer NPDES
Release Levels
$O_0 = 6$ mg/l ; $L_0 = 12$ mg/l .
$N_0 = 4$ mg/l

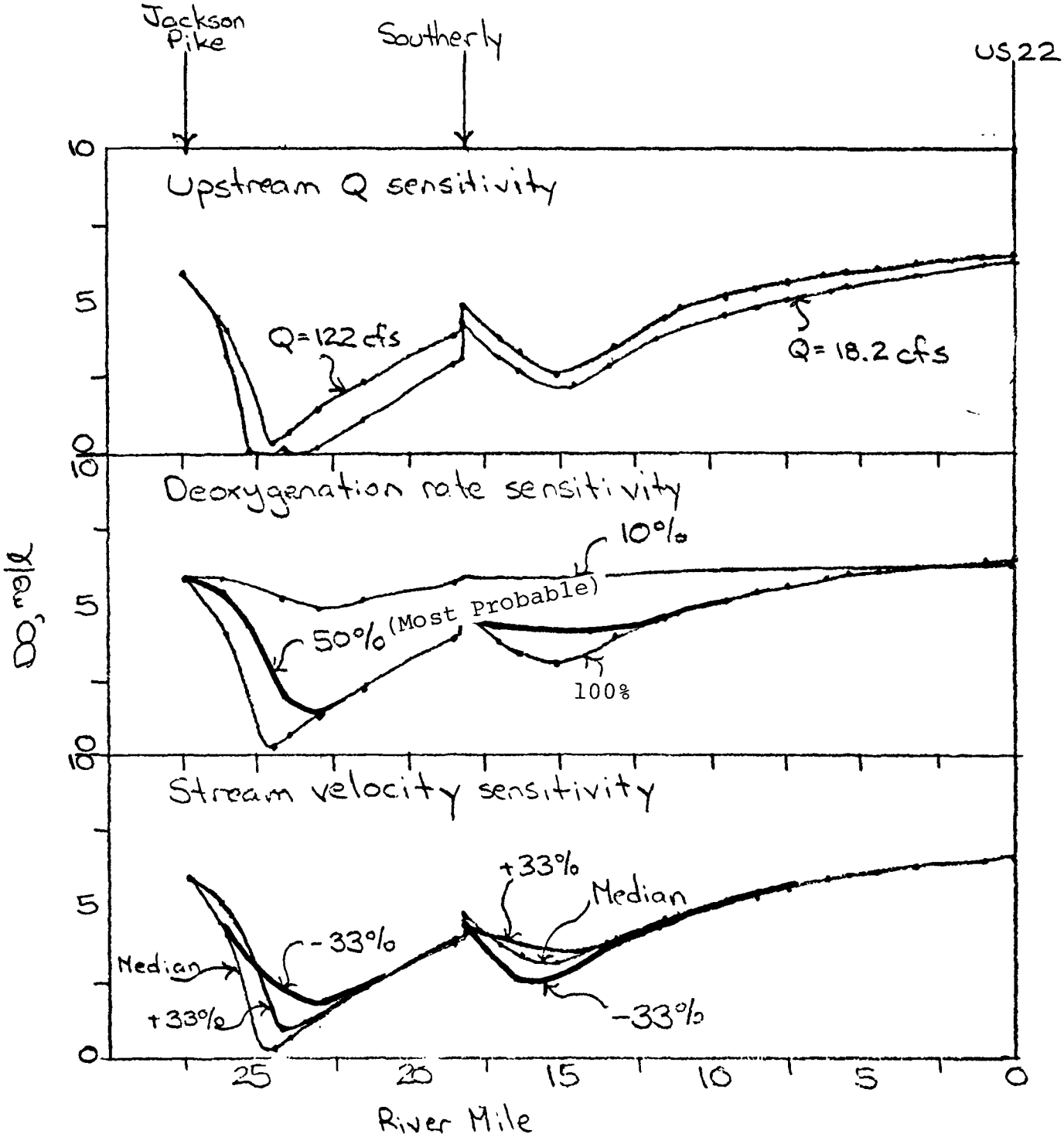
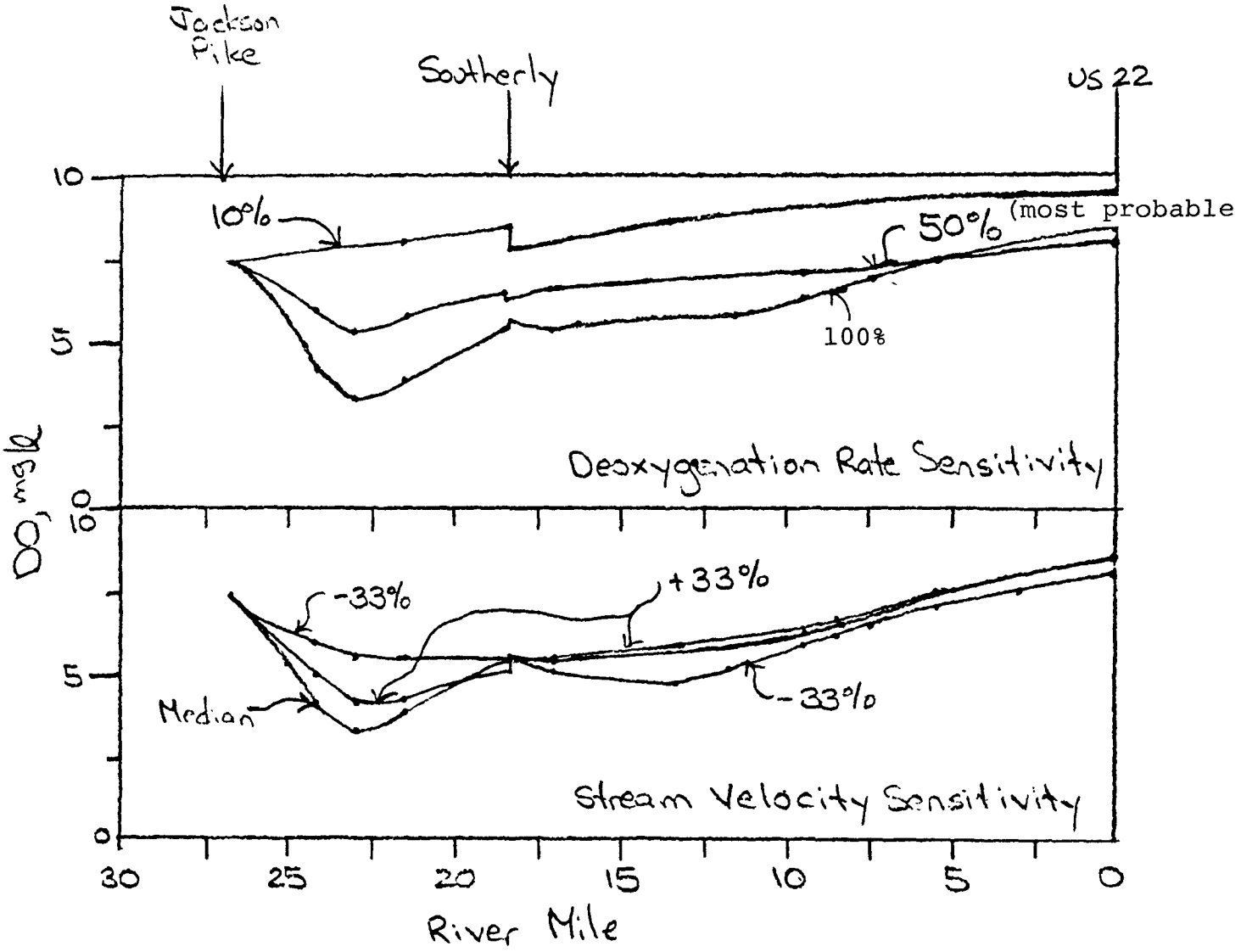


Figure B-4
Model Sensitivity
at Winter NPDES
Release Levels
$DO = 6\ mg/l$; $L_o = 12\ mg/l$;
$N_o = 10\ mg/l$



with the prediction of the parameters which were allowed to vary are relatively insignificant. Even the parameter which showed the greatest sensitivity, deoxygenation rates, produces a summer minimum DO below Jackson Pike which is still slightly below 5.0 mg/l at the lowest rate investigated.

The second consistent output from all modeled runs at NPDES release levels is the small variance of stream DO at the end of each run at Circleville (6.02 mg/l - 6.53 mg/l summer). Since Circleville is the next significant discharger of wastewater in the Scioto River basin, such a reduced upstream DO and instream pollutant load (in relation to current conditions) will allow allocation requirements at this facility to be established without regard to stream sag problems caused by the Columbus releases.

Overall, the output obtained for summer conditions would indicate that the decision is proper to require the Columbus facilities to upgrade to their final NPDES levels rather than to levels which are predicted to maintain present water quality standards. Despite probable continued dissolved oxygen violations below each release, conditions in the Scioto will improve immensely. Evidence has indicated a slowing of deoxygenation rates in streams that undergo substantial load reductions - a fact which points to the need for detailed observation and sampling of improved stream conditions before passing judgement on any water quality maintenance release levels.

Winter stream response upon receipt of NPDES allowable loads were modeled to determine the impact of the higher nitrogen releases allowed under nitrogenous stabilization rate limiting conditions resulting from colder temperatures. Again, violations or near violations of instream DO levels were shown on four of the six sensitivity runs, with only greatly reduced deoxygenation rates allowing the stream to carry the release loads without noticeable impact. Instream oxygen levels at Circleville are uniformly high under all modeled winter conditions.

Although the decision to require the present NPDES release levels from the Columbus plants appears to be sound, some indication of probable allocations to achieve water quality standards is also in order. Table B-4 presents the allocated values for the various sensitivity runs in both summer and winter for the Jackson Pike facility. Table B-5 provides the same information for Southerly.

Table B-4
Jackson Pike WWTP
Waste Load Allocation Summary
(Effluent Flow = 100 mgd)

Season	Upstream Q	Stream Velocity	K_1, K_3 Rates	Effluent					Instream		
				DO	L_o		N_o		N_o Max	Minimum DO	
	cfs	% of Median		mg/l	mg/l	lb/day	mg/l	lb/day	mg/l	mg/l	Miles (1)
Summer	122	100	100	6	4	3,340	0	0	0	4.91	1.0
		100	50	6	4	3,340	0	0	0	4.80	1.8
		100	10	6	12	10,010	4	3,340	2.2	4.93	3.9
		133	100	6	4	3,340	0	0	0	4.96	1.2
		67	100	6	4	3,340	0	0	0	4.82	1.6
	18.2	100	100	6	4	3,340	0	0	0	4.91	1.0
		100	50	6	4	3,340	0	0	0	5.05	1.6
		100	10	6	9	7,510	4	3,340	3.49	4.91	3.9
		133	100	6	4	3,340	0	0	0	4.95	1.2
		67	100	6	4	3,340	0	0	0	5.1	1.2
Winter	221	100	100	8.8	9	7,510	10	8,340	4.07	4.88	3.6
		100	50	6	12	10,010	14	11,680	6.51	4.95	3.9

Table B-4 Continued
Jackson Pike WWTP
Waste Load Allocation Summary
(Effluent Flow = 100 mgd)

Season	Upstream Q	Stream Velocity	K_1, K_3 Rates	Effluent					Instream		
				DO	L_o		N_o		No Max	Minimum DO	
	cfs	% of Median		mg/l	mg/l	lb/day	mg/l	lb/day	mg/l	mg/l	Miles(1)
Winter	221	100	10	6	45	37,530	24	20,016	9.76	6.53	3.9
		133	100	8.8	12	10,010	10	8,340	4.07	5.04	3.9
		67	100	8.8	9	7,510	10	8,340	4.07	5.05	13.2

(1) From release point at River Mile 26.8

Table B-5
Southerly WWTP
Waste Load Allocation Summary
(Effluent Flow = 85 mgd)

Season	Upstream Q(1)	Stream Velocity	K_1, K_3 Rates	Effluent					Instream		
				DO	L_o		N_o		N_o Max	Minimum DO	
	cfs	% of Median		mg/l	mg/l	lb/day	mg/l	lb/day	mg/l	mg/l	Miles(2)
Summer	122	100	100	6	9	6,380	4	2,840	1.27	4.87	2.3
		100	50	6	12	8,510	4	2,840	1.27	5.27	4.4
		100	10	6	45	31,900	12	8,510	5.11	4.92	9.8
		133	100	6	9	6,380	4	2,840	1.27	5.07	2.9
		67	100	6	6	4,250	4	2,840	1.27	5.34	0.8
	18.2	100	100	6	6	4,250	4	2,840	1.69	5.33	2.0
		100	50	6	9	6,380	4	2,840	1.69	5.01	5.5
		100	10	6	30	21,270	10	7,010	3.49	5.13	9.8
		133	100	6	6	4,250	4	2,840	1.69	5.36	2.0
		67	100	6	6	4,250	4	2,840	1.69	5.04	1.1
Winter	221	100	100	6	12	8,510	36	25,520	10.92	5.09	6.6
		100	50	6	30	21,270	40	28,360	13.89*	5.13	9.6
		100	10	6	45	31,900	24	17,010	12.96	7.09	Mix

Table B-5 Continued
Southerly WWTP
Waste Load Allocation Summary
(Effluent Flow = 85 mgd)

Season	Upstream Q(1)	Stream Velocity	K_1, K_3 Rates	Effluent					Instream		
				DO	L_o		N_o		N_o Max	Minimum DO	
	cfs	% of Median		mg/l	mg/l	lb/day	mg/l	lb/day	mg/l	mg/l	Miles(2)
Winter	221	133	100	6	12	8,510	48	34,030	13.99*	5.03	7.5
		67	100	8.8	12	8,510	24	17,010	8.20	5.05	4.7

(1) Above Jackson Pike

(2) From release point at River Mile 18.3

* Toxicity Limited

Summertime modeling runs for Jackson Pike indicate the high degree of treatment required at this facility under all conditions. Releases of nitrogenous oxygen demand are reduced to zero under all but the least stringent (10%) rate condition. Such an effluent limitation would require substantial additional processes at the facility, such as a break-point chlorination and dechlorination capability. Equally significant costs would be involved in reducing the carbonaceous load to the levels tabulated, which approach background stream concentrations.

Winter conditions at Jackson Pike indicate that it is possible to release levels of nitrogenous demand equal to or greater than that specified by the cold weather permit requirement in all runs. Carbonaceous levels are more variable, with two runs indicating the need for more stringent control than the NPDES limits, and one allowing release up to a secondary treatment equivalency. Differences in allowable DO release levels tabulated are intended to take advantage of higher oxygen solubility at lower temperatures, with effluent DO values of 6.0 mg/l indicating no need for post-aeration at the plant.

Summertime allocations for the Southerly treatment facility (Table B-5) are less stringent than those for Jackson Pike under all modeled conditions. Nitrogenous releases are never required to be less than permit values, while carbonaceous levels vary from 6 to 12 mg/l for eight of the ten conditions investigated.

Winter conditions allow nitrogenous releases to increase substantially from Southerly, with two of the five modeled runs limited by instream ammonia toxicity rather than oxygen demand and sag. Instream nitrogen levels were assumed to be toxic in accordance with the 1972 EPA Water Quality Criteria which sets an upper limit for un-ionized ammonia of 0.02 mg/l. The total ammonia exhibiting this un-ionized fraction will vary depending upon temperature and pH conditions. If one assumes a wintertime pH of 7.5 and a stream temperature of 12^{o}C, toxic conditions will exist when the total nitrogen demand exceeds 14 mg/l. Carbonaceous winter allocations are always equal to or less stringent than NPDES requirements, with reduced deoxygenation rates again allowing higher release levels.

A few modeling runs, which are not tabulated, were also done to see whether or not it would be advantageous to treat a portion (50%) of the Jackson Pike flow at Southerly. Results consistently indicated little, if any change, in release requirements at Jackson Pike, while forcing Southerly to obtain more stringent effluent levels due to the combination of higher process flow and lower upstream dilution. It was concluded that such a treatment and release scheme would offer no overall benefits in terms of either environmental quality or cost savings.

The results of the modeling indicate that the following release levels are appropriate for maintenance of stream quality below the Columbus wastewater releases:

Table B-6
Required Release Levels (mg/l)

	DO	L_o	N_o
Summer:			
Jackson Pike	6.0	4	0
Southerly	6.0	9	4
Winter:			
Jackson Pike	8.8	12	14
Southerly	6.0	30	40

Facilities design activities summarized elsewhere in this Impact Statement were predicated on these effluent levels.

United States Department of the Interior

GEOLOGICAL SURVEY
Water Resources Division
975 West Third Avenue
Columbus, Ohio 43212

GDS GEM JLB
SAS LBB CEL
GMS RMK
RWS LJP
MCM MEH

May 10, 1978

RECEIVED
MAY 15 1978
HAVENS & EMERSON, INC.
CLEVELAND

Mr. David L. Klunzinger
Havens and Emerson, Inc.
Bond Court Building
1300 East 9th Street
Cleveland, Ohio 44114

Dear Mr. Klunzinger:

This is in response to your letter of April 26, 1978. Hopefully, we can clarify some of the apparent confusion regarding the flow at Station 03227500, Scioto River at Columbus, Ohio.

The flow measured and published at most U.S.G.S. gaging stations including Station 03227500, is the water flowing past the actual gage control. The low-water control for a gage is always somewhat downstream from the gage structure. If the amount of water flowing past the gage control can be accurately measured, the gage record is considered good. That flow record is then utilized in any flow frequency analysis which is conducted for that station. Please note that the frequency analysis is not dependent upon the source of water passing the gage control. It is important, however, that the record be homogeneous. As an example, for a regulated stream only record collected after regulation was initiated should be used rather than using record collected both before and after regulation was initiated.

An adjustment of any flow characteristic for the effects of frequency characteristics of inflows or diversions can be quite difficult. This is especially true for low-flow characteristics. The inflow or diversion record must be available and must be subjected to a frequency analysis if it is to be accurately used as an adjustment to the low-flow characteristic derived from the regular flow record Only flow values of identical recurrence interval should be added or subtracted. If as an example, the 7-day, 10-year low-flow of a station was 200 cfs and the 7-day, 10-year low-flow of an inflow upstream from that station was 50 cfs, the adjusted low-flow could be calculated to be 150 cfs. If, however, the 50 cfs was an estimated mean inflow rather than a 10-year recurrence interval value, it should not be utilized with much confidence as an adjustment factor.

The primary reason for the lack of confidence is that the inflows or diversions would probably be at their greatest difference or deviation during a significant period of drought.

It is my understanding that the flow at the Scioto River at Columbus gage station does include flow from the Frank Road Treatment Plant but does not include the flow from the Shadeville Treatment Plant. A discharge measurement was made on the Scioto River above the influence of the Frank Road Treatment Plant and another discharge measurement was made on the same day at the control for the gage, which is below the influence of the sewage effluent from the Frank Road Treatment Plant. Those two measurements were made on July 22, 1978. The flow above the influence of the Frank Road Treatment Plant was 57 cfs. The flow downstream from the Plant effluent at the gage was 213 cfs.

We hope that this clarifies the flow statistics at the Scioto River at Columbus gage. If you have any further questions, please do not hesitate to contact us.

Sincerely yours,

Arthur O. Westfall
Acting District Chief

RVS/jw

APPENDIX EE

COLUMBUS METROPOLITAN AREA GROWTH POTENTIAL 1977-1985

DEVELOPMENT COMMITTEE FOR GREATER COLUMBUS
TWO HUNDRED EAST TOWN STREET COLUMBUS, OHIO 43215 614/221-7871

September 7, 1978

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H. Clifford Taylor
Phillip W. Tefft
Richard L. Tully
Charles G. Vath
Edward F. Wagner
Willis C. Welch
Ralph R. Widner

Warren J. Cremean
Executive Director

Mr. Valdas Adamkus
Acting Regional Administrator
Region V
United States Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Adamkus:

I appreciated receiving a copy of your letter of August 29, 1978 to Mayor Moody concerning the Environmental Impact Statement for the Columbus Sewer System Plan.

We were very pleased that Mr. Wojcik could spend some time on August 23rd with us and discuss further the concern which was generated by the document entitled Columbus Metropolitan Growth Potential, 1977-1985. It did appear that there was some conflict between points made in our presentation on August 8, 1978 at our meeting in Chicago and the projections indicated in the Growth Potential document.

I think interpretation of the Growth Potential document has been unfortunate. It represents some planner's concept of what will happen in a time span which is relatively short as related to years of service for our area-wide sewer system and, importantly, it reflects opinions of City of Columbus planners, not those who do the planning for suburban communities. It would only be natural for the City of Columbus to want all new development to take place inside its boundaries and such a document as we are considering would reflect that.

During our meeting with Mr. Wojcik it was suggested that in other Federal programs there has been a precedent here in Ohio for over 25 years when there is a difference of opinion on type and/or size of facilities built for local communities on Federal projects. Whenever, the local community felt it was justified to build a larger size or different type of facility than the Federal agency would approve, an estimate was made for both plans and Federal participation limited to that amount which would have been eligible under their criteria. This has been done many times in many projects throughout the State of Ohio and seems to be completely rational; the Federal

original: Water

agency does not participate financially beyond that which they feel is justified and the local community has the freedom of decision on what they believe will be needed for the future.

If City officials are so confident they are right and are willing to bear the additional cost this, indeed, seems to be a reasonable and equitable arrangement.

We are fully aware of the limitations a Federal agency has in applying criteria and standards for a wide range of conditions which exist in different states and in different systems. We realize the reluctance of Federal agencies to deviate from standard procedures but we feel strongly that application of their programs should permit flexibility when local governments demonstrate local conditions differ from other areas.

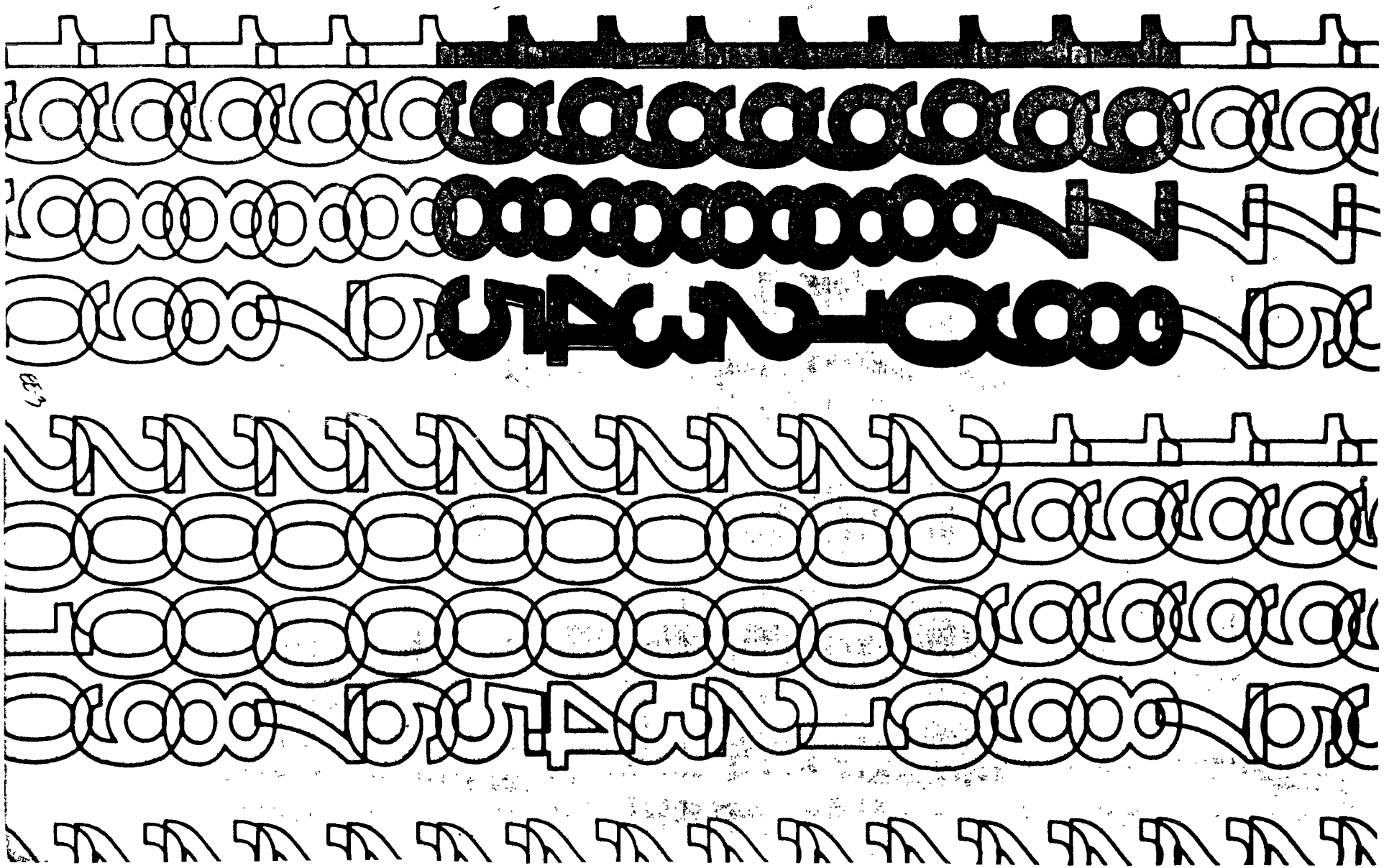
If we can furnish any other information or assist in resolving this issue we would be glad to do so. Thank you for your consideration of our position.

Sincerely,

W. J. Cremean
Executive Director

WJC/lb
cc: Dr. Edward Q. Moulton
A. G. Cochran
Mayor Tom Moody
Robert Parkinson
Jack N. Huddle
Dayton Robbins
William Habig

Columbus Metropolitan Area Growth Potential



COLUMBUS
THE CITY OF OHIO

Mayor Tom Moody

Department of Development

LeVeque Tower
50 West Broad Street
Suite 401
Columbus, Ohio 43215

Director N. Jack Huddle

614-222-7763

October, 1978

To The Citizens of Columbus

The Department of Development respectfully submits the second annual Growth Statement for the City of Columbus.

This planning report is not a no-growth statement nor does it state where growth should or should not occur. Rather, it is an appraisal of where and to what extent growth is most likely to occur and discusses those factors that affect growth or may alter growth in the future. The value of the growth statement is that it attempts to define the total impact of various aspects of growth rather than discuss each factor individually. The statement brings together Federal policies, national growth trends and local decisions or peculiar practices which will shape future metropolitan growth.

The purpose of this report is twofold. First, it is an attempt to identify and discuss issues that may affect the future growth of the Columbus Metropolitan Area. The statement provides long term projections of population changes and household formations and an inventory of underdeveloped land. These facts along with the characteristics of growth will provide an information base for functional planning activities such as sewer, water, parks, and transportation planning. Secondly, the growth statement provides a framework for preparing and processing the Capital Improvements Program. This program is a schedule of public physical improvements for the City of Columbus over a six year period. The schedule of programs is based on need, priorities, and the City's financial standing. The growth statement will identify the long term needs and thereby influence priorities for funding projects.

Because this report is associated with the Capital Improvements Program, it is updated and published annually. The constant updating will provide a current barometer reading of changing conditions and their potential long term implications. If you have questions or comments regarding this report, please contact Lin Carver at 222-8172.

Very truly yours,

N. Jack Huddle

N. JACK HUDDLE, DIRECTOR
DEPARTMENT OF DEVELOPMENT

COLUMBUS METROPOLITAN AREA

GROWTH POTENTIAL

1978 - 1985

October, 1978

The preparation of this report was financed in part through a Comprehensive Planning Grant from the Federal Department of Housing and Urban Development, under the provisions of Section 701 of the Housing Act of 1954, as amended.

TABLE OF CONTENTS

I. INTRODUCTION

Local Policies Determine Distribution of Growth..... 2
Columbus Growth Has Been Unique..... 3

II. GROWTH POTENTIAL OF COLUMBUS METROPOLITAN AREA

Geographical Limits..... 5
Capacity of Existing Development Area..... 7
Capacity of Expanded Planning Area..... 9
Population and Household Projections..... 13
Annexation Activity 19
Accommodating Growth..... 19

III. "UNKNOWNS" AFFECTING GROWTH

School Desegregation..... 22
Future Energy Supply Is Uncertain..... 22
Dangerous Precedent Being Set By U.S.E.P.A. 23

IV. GROWTH PROJECTIONS

Active Growth Areas..... 25
Limited Growth Areas..... 30

V. SUMMARY STATEMENT

Regional Goals..... 33
Opportunities..... 33
Summary of Recommendations..... 36

INTRODUCTION

The essence of the first growth statement of the City of Columbus, Columbus Metropolitan Area Growth Potential 1977-1985, was that current growth characteristics are significantly different from those generally experienced during the previous twenty-five years and that the City of Columbus, as well as other communities, may have to make adjustments in order to accommodate these changes. The conclusion of the first growth statement was that the anticipated lull in growth at least for the next few years provides an opportunity for the City of Columbus to concentrate on improving the quality of existing development.

The primary objective of the second annual growth statement is to update information provided in the first statement with particular emphasis on the geographical distribution of population and household growth for the year 2000; unfortunately, similar figures are not available for 1985. This document is to provide a framework for the preparation of the 1979-1984 Capital Improvements Program. The projections and growth characteristics ideally should be for 1985. However, because of the low growth rates anticipated through 2000 and the fact that many functional planning activities require a planning period of ten to twenty years prior to construction, the year 2000 geographical projections should provide a reliable indication of future development needs. Because this report is the prelude to the annual Capital Improvements Program, it will be updated and published annually. In anticipation of bond issues to finance future capital improvements being submitted to the voters of Columbus in November of 1979 or 1980, a comprehensive growth statement will be issued prior to July 1979.

It was stated in the first growth statement that one of the most significant factors that could alter Columbus' future growth characteristics was the impact of federal policies, particularly those of the U.S. Environmental Protection Agency relative to the City's sanitary sewer system. In early 1978, the U.S.E.P.A. published its Environmental Impact Statement (E.I.S.) on the City's Metropolitan Facilities Plan [1] and the worst of the City's fears were realized. The U.S.E.P.A., prompted by the fact that it finances 75% of major sewer projects at the local level, is not only dictating many aspects of the upgrading and development of the sewer system, but is also using the expansion of the sewer system as a means of directing local growth. While this action has proven to be highly provocative and is obviously a dangerous precedent, much of the problem has been a lack of public understanding of development objectives and policies for the metropolitan area. This void must be considered as partially the cause for the U.S.E.P.A. in going as far as it did in superimposing its own development objective on the E.I.S.

It is the intent of these growth statements to clarify the position of the City of Columbus and provide a vehicle by which the City will not only identify its future growth characteristics, but also propose policies the City should pursue in order to accommodate changes in growth. An underlying assumption of these statements is that the best way to counter and minimize unnecessary federal influence is to publicly state on a regular basis the City's development objectives. This approach should provide a consistent and current basis for evaluating all growth and development related programs, thereby providing a much stronger basis to influence federal decisions which affect local development.

---

[1] The Columbus Metropolitan Facilities Plan is a twenty year capital improvements program for upgrading and expanding the city's sewer system.

The publication of the E.I.S. highlighted some general misunderstandings about growth at the local level and the means by which local growth can or cannot be manipulated. The following discussion of the nature of Columbus' growth should provide a better understanding of how functional planning can impact on or accommodate growth.

Local Policies Determine Distribution of Growth

There is a distinction that must be made concerning growth. First, there is the overall growth, or growth potential, of the metropolitan area (Mid-Ohio Region). This growth refers to the overall change in population or economic growth over time. This overall growth is primarily determined by national and regional (east north central economic region) trends.[2] The components of change, whether it be net natural increases or net migration resulting in population changes or unemployment changes reflecting overall economic growth, are primarily subject to national and regional trends. In the case of population, for example, it is highly unlikely that Columbus, regardless of how attractive it is as an individual community, can continue to grow substantially if the region as a whole is in a decline. Therefore, generally speaking, the trends at the national and regional levels will have the greatest impact on overall growth.

The second aspect of growth to be considered is the distribution of local growth within the metropolitan area. While it is true that there are several factors that contribute to urban growth patterns including such abstractions as "area attractiveness" and quality of schools which are based on individual value judgements, it is virtually impossible for an area to urbanize without the availability of sewer, water and transportation facilities. Local officials cannot control natural amenities of an area nor an individual's value judgements; but, they can and do determine which area gets what facilities and when. In fact, most factors that a potential urban dweller would evaluate when considering an area of a community in which to live are the direct result of the availability of an urban service provided by local government and comes about as a result of the availability of the traditional "growth shapers", transportation, water and sewer facilities (the relative importance of these three is discussed on page 5). Therefore, local attitudes concerning the geographical distribution of growth and local policies concerning the availability of these basic facilities is of prime importance in the distribution of growth. The importance of local decisions is obvious from the fact that the success of Columbus' growth, as compared to other central cities, during the past twenty years is directly attributable to the city's geographical expansion through annexations. This expansion was the result of local policies on annexation and utility line extensions that were discussed extensively in the last year's growth statement.[3]

---

[2] The U.S. Census Bureau has divided the country into economic divisions and regions. Columbus is located in the east division of the North Central Region. The North Central and Northeast Regions are often referred to jointly because of their similar economic problems relative to competition with the "Sunbelt" states.

[3] Department of Development, City of Columbus, Columbus Metropolitan Area Growth Potential, 1977-1985, November, 1977, p. 1.

Columbus' Growth Has Been Unique

Columbus has received considerable attention during the past few years at the state and national levels concerning its recent evidence of growth. Columbus has been identified as "the healthiest of all Ohio's major urban areas and healthier than most of the nation's 85 largest cities.[4] Most recently, Columbus has been singled out as "bucking" a statewide trend of population decline as well as "leading the Pack" among 13 major midwest cities in terms of growth.[5] Equally significant is Columbus' absence from lists of "cities in trouble." Columbus is not identified as a city in trouble by at least six different sets of criteria summarized in an article published by the Academy For Contemporary Problems.[6]

In terms of the socioeconomic well being of cities, Columbus has fared even better when compared to other large metropolitan areas across the nation and is consistently better off than any of the north-central and northeastern cities. This point is emphasized by a research exercise conducted by the National Planning Association which categorized the 40 largest cities as either (1) declining and vulnerable, (2) declining but basically healthy, and (3) growing.[7] Columbus was the only city within the northeast and northcentral economic regions that was listed as a growing city.

The basis for these reports vary considerably. However, they are generally related to the fiscal well being of the city or they are an analysis of census related population figures that apply to the entire Standard Metropolitan Statistical Area (SMSA). For example, the comments referring to Columbus bucking the statewide trend of population decline is a survey of growth from 1970-1976 of 13 SMSA's in the Midwest with population over 750,000; this survey is based on the latest U.S. Census figures issued in December, 1977. It should be noted that although the Columbus S.M.S.A. (which contains the five counties of Delaware, Fairfield, Franklin, Madison, and Pickaway) experienced the highest net growth in population during this time period, it also experienced a loss of 3,400 residents as a result of migration; Franklin County alone suffered a loss of 22,200 residents as a result of migration. Previous estimates by the Census Bureau shows Columbus experiencing significant losses through migration which exceed natural gains due to favorable birth to death rates. The accuracy of these figures depicting losses due to migration are considered highly questionable by local officials. As a result of this concern, local agencies have jointly developed their own estimates which are discussed on page 14 of this report. These local estimates also show losses due to migration since 1974, however, it is not as extensive as that shown by census information. Regardless of the figures used, there does appear to be a leveling off of local growth as a direct result of regional and national trends, the difference in figures lies in the estimate as to when the growth began to level off.

---

[4] Curtin, Michael, "City Healthiest of 7 in Ohio, Study Reveals". The Columbus Dispatch, February 22, 1977.

[5] Staff Writer, "Columbus Bucking Ohio Trend of Shrinking Metropolitan Areas." The Columbus Citizen Journal, January 1, 1978

[6] Stanley, David T., "Cities in Trouble," Academy for Contemporary Problems, December, 1976.

[7] Ibid p. 4.

When compared to the balance of the S.M.S.A., Columbus as a central city begins to show some weaknesses. A "hardship index" prepared by the Brooking's Institute, for the purpose of comparing cities based on "long term socioeconomic decline," indicates that Columbus is not much better off than most other central cities in its ability to compete with its suburban areas. It also ranks relatively high in average annual operating expenditures (for the years 1973-1974) and in the number of local government employees per 1,000 residents, two criteria that are characteristics of declining central cities with fiscal problems. While it is highly debatable that these criteria are meaningful measures of a city's fiscal well being, they do serve to highlight the fact that Columbus' potential growth problems may be directly related to intraregional movement and thereby associated more with local policy decisions.

These qualifications are being made in order to place Columbus' future growth potential in perspective, which is a primary focus of this report. The fact that local policies are instrumental in the distribution of local growth makes it necessary that we understand the significance of where growth is occurring locally. Hence, the clarification of Columbus' growth versus growth of the S.M.S.A. Equally significant is an understanding that Columbus' growth has been an exception to the rule. It apparently has not conformed to the growth patterns of the north-central and northeast economic regions. While this is encouraging, it also raises the issue as to how long Columbus can continue to "buck these trends." It is the conclusion of this report that Columbus can anticipate a positive growth rate over the next twenty years although it will be significantly lower than that experienced during the fifties, sixties, and early seventies. This lower growth rate occurring in combination with a georgraphical area several times larger than the area in question in the early 1950's, will result in development characteristics significantly different than those encountered in the previous twenty years. These chainging characteristics must be considered in decisions concerning future capital improvements and fiscal policies.

Several policy decisions will be made in the near future concerning such issues as the regionalization of the sewer system, annexations, bond issues for financing future capital investments, changes in utility rates and energy conservation. Many of these factors can, as in the past, work as disincentives to the redevelopment of Columbus' innercity. Given the fact that the future growth of Columbus is somewhat at the whim of national trends and a declining regional economy, it is imperative that Columbus exercise considerable caution in these future decisions which affect the distribution of local growth.

Columbus' greatest challenge, as the central city of a large metropolitan area, is to maintain a positive growth rate and remain fiscally healthy in an otherwise statewide declining economy. The major emphasis of this report is on the physical growth and development of the City of Columbus. [8] However, it is becoming more and more evident that the nature and extent of urban growth has its greatest impact on the fiscal well being of the city and thereby the quality of life it can provide its residents. Therefore, much of the discussion of the implications of physical growth will, out of necessity, be in terms of fiscal impacts. Whereas this statement concerns itself more with the geographical distribution of growth and the ability of the city to physically accommodate this growth, future statements, in anticipation of capital improvements bond issues, must address the fiscal implications and the city's ability to afford growth.

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[8] Growth for the purpose of this report refers to residential growth and, therefore, the physical expansion of the Columbus Metropolitan Area to accommodate population increases (increases in households). The use of the terms "growth and development" refer to development of an urban character: residential subdivisions of a density in excess of one dwelling unit per acre.

GROWTH POTENTIAL OF THE COLUMBUS METROPOLITAN AREA

Traditionally, there have been three factors that promote or allow development to occur on an urban scale: transportation, water, and sewer facilities. The freeway system within the Columbus Metropolitan Area is for all practical purposes complete and, therefore, will have little additional impact on development distribution over the next twenty-five years. The two remaining freeway proposals, SR 315 and IR 670, are the result of existing development or anticipated growth that will occur for the most part regardless of the availability of these facilities. Arterials, within the surface street system, are generally not constructed or upgraded until development is well underway and the resulting traffic justifies their need. Consequently, the role of transportation (accessibility) in determining the location and intensity of future growth is somewhat limited.

The water system also plays a lesser role in determining growth because of the City's policy to relate it to the availability of sewers. [9] The supply of water will not limit growth through the year 2000. However, the cost of providing water will have an impact on growth although the impact will probably not be felt until after 1985.

Hence, for the purpose of this statement, an initial discussion of the growth potential of Franklin County can be accomplished through an analysis of the existing and proposed service areas of the City's sewer system.

Geographical Limits

There are no major physical barriers limiting the geographical expansion of the Columbus Metropolitan Area. There are, however, practical limits that should be used in discussing the potential for the future development of Columbus. These limits are defined by the drainage areas (watersheds) of six major streams that approximate the boundaries of Franklin County. These boundaries, the expanded planning area delineated in Figure 1, are also the designated planning area for the Columbus Metropolitan Facilities Plan (201 Facilities Plan), a twenty year capital improvements program for updating and expanding the City's sewer system, prepared for the U.S.E.P.A. in accordance with P.L. 92500. The U.S.E.P.A. finances 75% of the major sewer projects at the local level; future projects will be financed in accordance with the final 201 Facilities Plan.

These boundaries reflect the two major constraints to Columbus' geographical expansion: economic realities and political considerations. The designated planning area recognizes the infeasibility of expanding to the east beyond the Blacklick Creek watershed and to the west beyond the Hellbranch-Darby Creek watershed. The cost of building pumping stations or additional treatment facilities as part of the Columbus system cannot be justified at this time.

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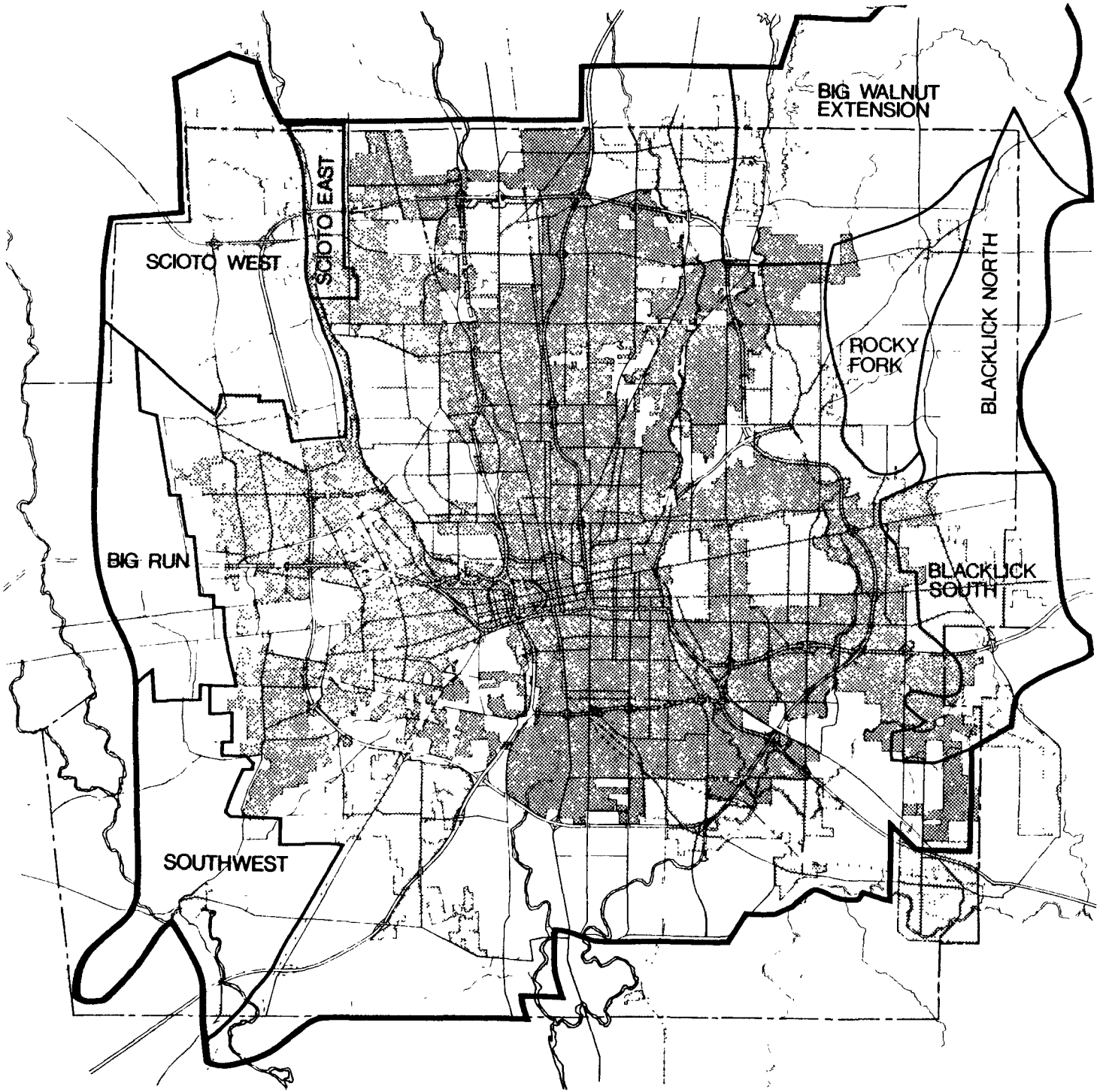
9 Department of Development, The City of Columbus, Development Policies Statement, December, 1973, p. 6.



Columbus Ohio
Mayor Tom Moody
Department of Development
N Jack Huddle Director

Division of Planning

COLUMBUS
OHIO

City of Columbus
Other Municipalities

Expanded Planning Area
Sewer Interceptor Expansion Areas

0 2 mi
0 3 22 km

Expanded Planning Area Figure 1

July 1978

The fact that the northern boundary of the planning area basically follows the county line recognizes the limited potential of annexing into another county; it is also an acknowledgement of the 201 facilities planning program in southern Delaware County. In the southeastern portion of Franklin County, there is a third 201 facilities planning effort (Canal Winchester - Pickerington Facilities Plan) that complicates the possibilities of expanding political jurisdictions beyond the Franklin County line.

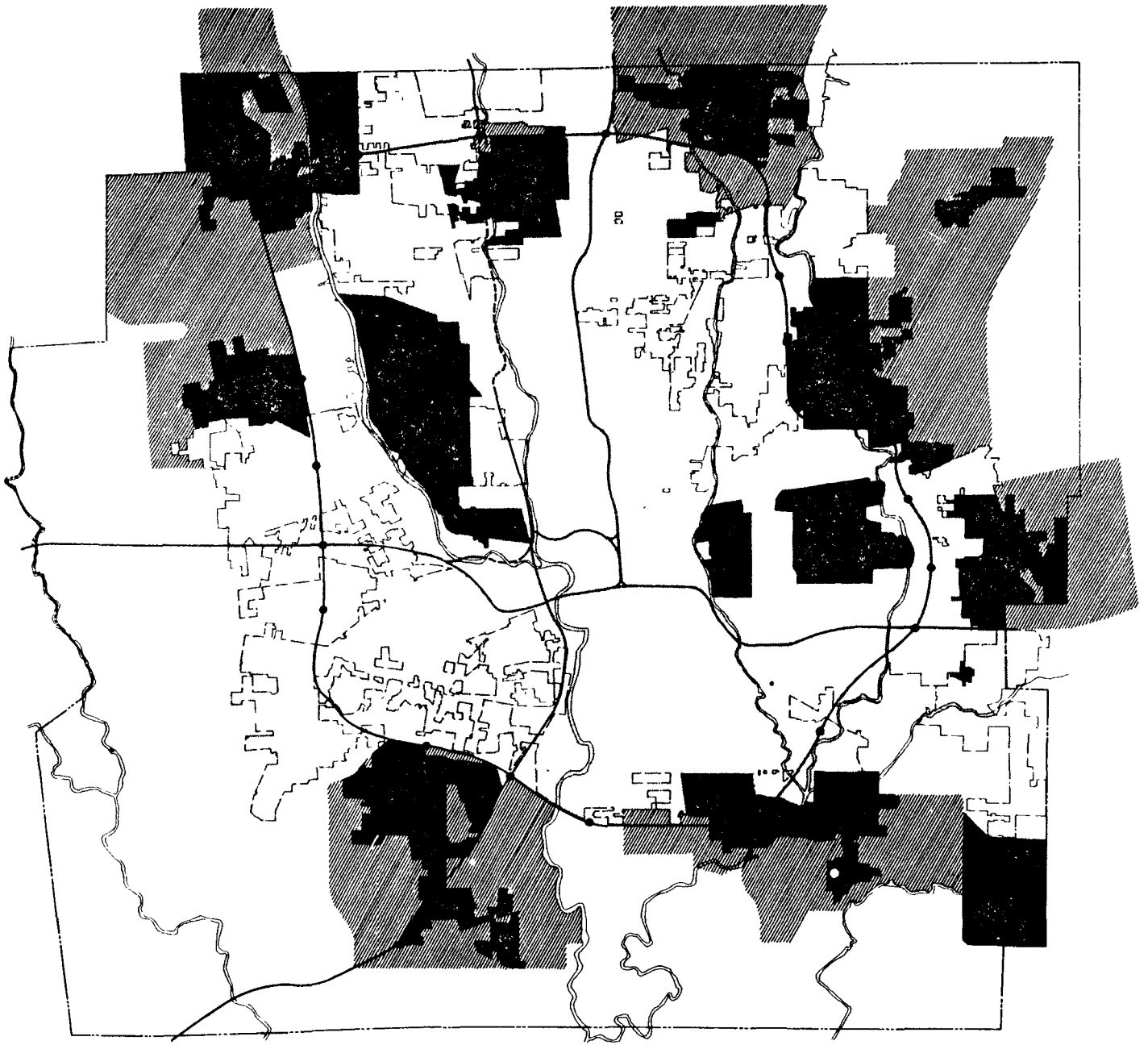
The planning area of the Columbus 201 Facilities Plan, therefore, defines practical geographical limits within which to discuss the potential growth of the Columbus Metropolitan Area.

Once the planning area is designated, it is possible to determine the capacity of the area to accommodate future growth. In order to place Columbus' growth potential in perspective, the approach herein is to consider the present potential for accommodating growth based on existing utilities, in the ground or otherwise committed, referred to as the existing development area and then project a reasonable growth potential for the expanded planning area shown on Figure 1.

Capacity of Existing Development Area

The existing development area consists of those areas where sewers are existing or committed through a legally binding agreement, if and when such service is needed. The existing development area is delineated in Figure 2 and consists of the serviced and unserviced portions of the City of Columbus and the incorporated suburban municipalities under contract with Columbus and the unincorporated areas that lie within these contract areas. The twenty suburban municipalities identified in Table 1 have contracted with the City of Columbus which has agreed to accept and treat the flow of sewage generated within these contract areas. The serviced portion of Columbus and suburban municipalities is that defined by the Infiltration/Inflow Analysis Report which is part of the Columbus Metropolitan Area Facilities Plan. [10] The remaining incorporated area of all municipalities is assumed to be underdeveloped with the capacity for intense development of an urban character. The remainder of the development area, the unincorporated portions of the sewer contract areas, is guaranteed sewer services upon annexation to a municipality. It is assumed that these areas are undeveloped.

[10] Malcom Pirnie, Inc., Infiltration/Inflow Analysis, Columbus Metropolitan Area Facilities Plan, July, 1975, Plate 1.



Columbus Ohio
Mayor Tom Moody
Department of Development
N Jack Huddle Director

Division of Planning

COLUMBUS
OHIO

City of Columbus
Other Municipalities
Sewer Contract Areas

0 2 mi
0 3 22 km

Existing Development Area
Figure 2

August 1977

THIS ANALYSIS ASSUMES THAT THE EXISTING DEVELOPMENT AREA IS PRESENTLY GUARANTEED THE NECESSARY FACILITIES THAT WOULD ALLOW, AND INDEED PROMOTE, MORE INTENSE DEVELOPMENT THAN WOULD BE POSSIBLE IN AN UNINCORPORATED, NONCONTRACT AREA.

Tables 1 and 2 provide a breakdown of the developed and underdeveloped acreage within each of these sub areas. The resulting figures are conservative estimates and an accurate representation of the degree of development that exists as of April, 1976. The results indicate the availability of 187.5 square miles of underdeveloped land in our defined existing development area of the Columbus sewer system. Seventy-eight (78.1) square miles of underdeveloped land exist within the City limits of Columbus; approximately 31.25 square miles are within the serviced area defined by the Infiltration/Inflow Analysis report. Thirty-nine (39.1) square miles remained undeveloped within the suburban corporation limits, and there are an additional 70 square miles within the sewer contract areas that are yet to be incorporated.

There are several observations that can be made concerning this undeveloped land. First, with the exception of Westerville, all suburban municipalities, not already surrounded by Columbus, have sufficient land in the contract areas to at least double their present size. The fact that Westerville has "urbanized" approximately 80% of its incorporated area is indicative of its rapid growth rate over the past decade. Secondly, there is an even distribution of undeveloped land throughout the analysis area (development area). Of the incorporated undeveloped land, approximately one-third is within Columbus' serviced area, one-third is in the recently annexed areas, and one-third exists within the suburban incorporated areas which for the most part has been recently annexed. Third, in the unincorporated areas, the contract areas (acreage) vary in size in proportion to the current size of the particular community: the bigger the municipality, the bigger the contract area for expansion purposes.

IN SUMMARY, FROM THE STANDPOINT OF AVAILABLE LAND, THERE APPEAR TO BE NO RESTRICTIONS OR LIMITATION ON ANY PARTICULAR MUNICIPALITY OR GEOGRAPHICAL AREAS AS FAR AS FUTURE EXPANSION POSSIBILITIES WITHIN THE EXISTING DEVELOPMENT AREA.

Capacity of Expanded Planning Area

The expanded planning area, as defined earlier, approximates the boundaries and area of Franklin County. The area within which the Columbus Metropolitan Area can reasonably expect to expand, then, is in the vicinity of 500 square miles. This expanded planning area is an increase of about 234 square miles (180%) over the previously discussed development area. Table 3 breaks this land area down on a sewer interceptor basis which reflects possible extensions of the sewer system as proposed by the facilities plan. There is some overlap between the existing contract areas and the proposed expansion areas as shown by Figure 3. Therefore, Table 3 distinguishes between those portions of the watershed (expansion area) that fall within contract areas and the remaining land in the designated area.

Table I
Underdeveloped Land By Political Jurisdiction
April 1976

Municipality/ Village	Incorporated Area (Sq. Miles)	Percent Underdeveloped (%)	Underdeveloped Land Under Sewer Service Obligations: Underdeveloped Incorporated Area (Sq. Miles)	Unincorporated Contract Area (Sq. Miles)	Total
Dublin	15.0	75.0	11.25	12.00	23.25
Gahanna	8.9	65.0	5.78	9.22	15.00
Grove City	9.3	65.0	6.05	14.95	21.00
Groveport	5.0	85.0	4.25	9.50	13.75
Hilliard	7.5	25.0	1.88	4.50	6.38
New Albany	2.3	85.0	1.95	6.70	8.65
Obetz	2.8	55.0	1.54	2.20	3.74
Reynoldsburg	6.9	55.0	3.80	4.10	7.90
Westerville	6.8	20.0	1.35	7.53	8.89
Other*	26.5	8.0	2.05		2.05
Suburban Totals	91.0	34.2	39.90	70.71	110.61
Columbus	173.0	46.0	79.25		79.25
Totals	264.0	45.1	119.15	70.71	189.86

*These are the communities completely surrounded by Columbus and include - Bexley, Brice, Grandview Heights, Marble Cliff, Minerva Park, New Rome, Riverlea, Upper Arlington, Valley View, Whitehall, and Worthington.

Source: Update and expansion of undeveloped land data presented in the Appendices of the Infiltration/Inflow Analysis, Columbus Metropolitan Area Facilities Plan through an analysis of 1976 aerial photographs of Franklin County.

Table 2
Undeveloped Land By
Subareas of Urban Area

Subarea		Square Miles
Columbus		78.1
Serviced	31.2	
Unserviced	46.9	
Suburban Municipalities		39.1
Serviced		
Unserviced		
Contract Areas		70.3
Unincorporated		
Totals		187.5

Source: Update and expansion of undeveloped land data presented in the appendicies of the Infiltration/Inflow Analysis, Columbus Metropolitan Area Facilities Plan through an analysis of 1976 Aerial Photographs of Franklin County.

In addition, there is a significant amount of unincorporated land that does not fall within these interceptor areas. This land is available for rural development or subject to annexation to Columbus and thereby available for urban development. Either way it will accommodate some degree of development. The figure in Table 3 represents the land necessary to account for the remainder of the acreage within the 550 square mile expanded planning area.

AGAIN THE MAJOR OBSERVATION THAT CAN BE MADE IS THAT THE EXPANDED PLANNING AREA IN NO WAY RESTRICTS OR FAVORS ONE AREA OF THE COUNTY OVER ANOTHER.

Table 3
Square Miles In
Expanded Planning Area

Interceptor Service Area	Total Square Miles	Square Miles Within Existing Contract Areas	Square Miles Beyond Contract Areas
Big Walnut	32.81	2.34	30.47
Rocky Fork	17.86	8.48	9.38
Blacklick North	25.00		25.00
Blacklick South	26.16	10.54	15.62
Groveport	8.20	8.20	
Southwest	44.74		44.74
Big Run	20.20		20.20
Scioto West	38.02	31.25	6.77
Scioto East	7.42	7.42	
Brookside	3.90	2.34	1.56
Subtotals	224.31	70.57	153.74
Remaining Unincorporated Area			78.13
Total Area			231.88

Source: Environmental Assessment, Columbus Metropolitan Area Facilities Plan, Table 40, Population and Area Data, Page 169, July 1976.

POPULATION, HOUSEHOLDS AND HOUSING

The Year 1974 Was A Critical Point In Local Growth

Some progress has been made during the past six months in clarifying the population picture in the Mid-Ohio region. The major problems associated with projecting future population were the lack of understanding of what has happened at the local level since the 1970 census and the need for a reliable estimate of the current population. To remedy this situation, a task force composed of representatives of the Mid-Ohio Regional Planning Commission, the Columbus Area Chamber of Commerce, the O.S.U. City and Regional Planning Department, the City of Columbus, and the Ohio Department of Transportation was formed to develop a methodology for estimating local population. The findings of this Population Task Force suggest that dramatic changes in the demography of Columbus and Franklin County have occurred since 1970.

As Table 4 below illustrates, the population of Columbus in January 1978 was 581,664 and the population of Franklin County was 904,175. Although these figures indicate a 7.8 percent and a 8.5 percent increase since the 1970 census in Columbus and Franklin County, respectively, an examination of the yearly changes in population demonstrates that most of these increases occurred between April 1970 and January 1974.

Table 4 Population and Household Estimates, 1970-1978
City of Columbus and Franklin County

	City of Columbus		Franklin County	
Date of Estimate	Population	Households	Population	Households
April 1960	471,316	142,378	682,962	200,763
April 1970	539,677	173,056	833,249	259,321
Jan. 1971	540,601	174,949	846,308	265,662
Jan. 1972	551,289	181,663	861,811	275,007
Jan. 1973	558,669	186,820	878,885	284,123
Jan. 1974	573,252	195,395	896,850	295,376
Jan. 1975	575,100	198,909	899,975	300,811
Jan. 1976	576,935	202,522	897,058	304,347
Jan. 1977	578,338	206,082	901,640	309,765
Jan. 1978	581,664	209,641	904,175	315,182

Source: Franklin County 1975 Population Estimates and Methodology, prepared by a joint committee composed of representatives from the Columbus Department of Development, the Mid-Ohio Regional Planning Commission, the Columbus Area Chamber of Commerce, the O.S.U. City and Regional Planning Department, and the Ohio Department of Transportation, Revised November 21, 1977.

The City of Columbus grew by 33,575 people between April of 1970 and January 1974 (average: 8,953 people per year) and by only 8,412 people between 1974 and 1978 (average: 2,103 people per year). Similiarly, Franklin County increased by 63,601 people between April 1970 and January 1974 (average: 16,960 people per year) and by only 7,325 people between 1974 and 1978 (average: 1,831 people per year). The dramatic change in local growth patterns is further illustrated in Figure 3 which charts annual changes in growth indicators for all of Franklin County.

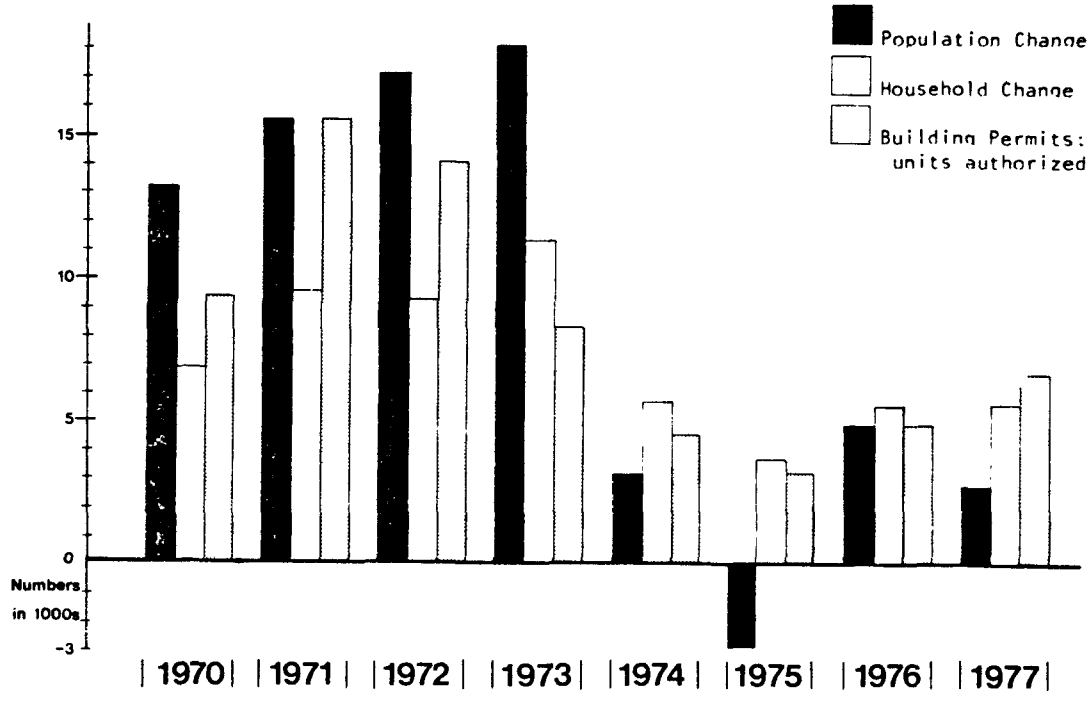


Figure 3 Indicators of Growth Franklin County 1970-1977

Source: Franklin County 1975 Population Estimates and Methodology, November 1977.

Thus, 80 percent of the growth in Columbus and 90 percent of the growth in Franklin County between 1970 and 1978 occurred in the first half of this period. Only 20 percent and 10 percent of this increase in Columbus and Franklin County, respectively occurred after 1974. It is obvious, then, that 1974 was a critical point in local population change. An examination of the components of population change (births, deaths, and migration) shows that net migration was the determining factor of the area's net growth as the net natural increase has been stable since 1970. Prior to 1974 both Columbus and Franklin County experienced a net inmigration, but after 1974 both experienced a net outmigration resulting in a similar pattern for net population change (Figure 4).

It is also evident from these figures that Columbus has, at a minimum, kept pace with county growth and has even increased when county population showed an absolute decline. Between 1975 and 1976, for example, Franklin County had an absolute decrease of 2,917 people while the City of Columbus grew by 1,835 people.

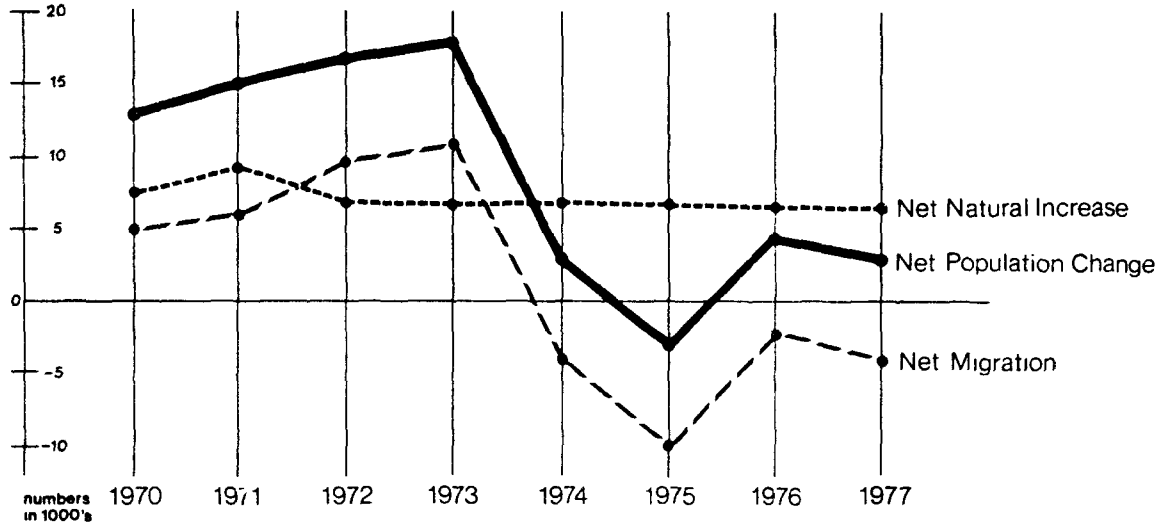


Figure 4 Components Of Population Change, Franklin County 1970-1977

Source: Franklin County 1975 Population Estimates and Methodology, November 1977.

Household Growth Has Not Leveled Off As Sharply

Population increases in both the City of Columbus and Franklin County declined after 1974. Household increases, although following a similar trend, did not level off as sharply. While the population of Columbus increased by an average of 2,103 persons per year between 1974 and 1978, households increased at an average of 3,562 households per year during this same period. The high rate of household growth in relation to population growth is primarily a reflection of changing living patterns as indicated by a declining average household size. Declining household size, a characteristic of national as well as local trends, is partially a function of the falling birth rate, reflected in the decreasing average numbers of persons under 18 years old in households and the increasing proportion of one and two person households as reflected by the increasing numbers of people who choose to live alone, the increasing numbers of people who have postponed marriage, the increasing numbers of divorced people and the increasing proportion of persons over age 65.

Local Forecasts Show Area Growth

The significance of these demographic changes in Columbus and Franklin County lies in the implications which may be drawn for both long and short-term growth projections.

In the long-run, even under optimistic assumptions about the growth of local employment, declining fertility rates, as reflected in the U.S. Census series II forecasts, will somewhat limit the potential of population and household growth in the Columbus and Franklin County area. Although recent projections by Battelle Memorial Institute suggest that Franklin

County's population will remain relatively stable over the next 22 years, the Population Task Force has established a more optimistic, interim forecast of 1,025,800 people in Franklin County by the year 2000 (Figure 5). This interim forecast assumes an average annual rate of growth of 0.57 percent, a substantial increase over the 0.20 percent average annual rate of growth experienced in the County between 1974 and 1978. If both birth and death rates follow recent trends, the 0.57 percent average annual growth rate implies continued out-migration, but at a rate below that experienced during the 1974-1978 period. In fact, the forecast would imply an average increase in Franklin County's population of 5,528 people per year for the next 22 years.

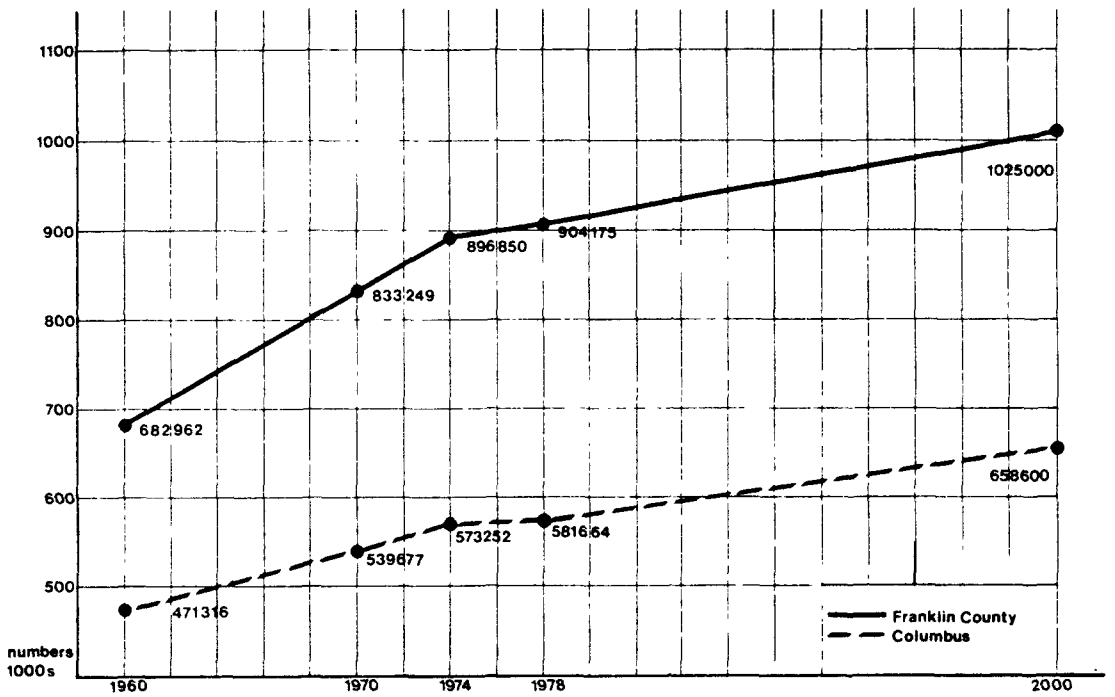


Figure 5 Population Trends And Year 2000 Forecast

Source: City of Columbus, Department of Development

In the short-run, through 1985, the increases in total households relative to a stabilized population, reflected in a declining household size, should continue the demand for new construction and rehabilitation of housing units. The demand for new housing units in the City during this period should be accompanied by an equal demand for utility hook-ups such as sewer, water, gas and/or electricity and telephone. Consumption of these services, however, can be expected to decline slightly as the number of people per household declines.

A straight line breakdown of the household forecast by five year increments, based on the year 2000 control totals of 396,500 and 264,200 for the county and city, are shown in Table 5 and Table 6. These forecasts indicate a reduced, but steady rate of household growth which will continue the demand for new housing construction in Columbus and Franklin County.

Table 5 Population and Household Forecast, 1978-2000
City of Columbus, Ohio

Year	Total Households	Household Size	Population in Households	Population in Group Quarters	Total Population
1978	209,641	2.64	553,452	28,212	581,664
1980	214,600	2.59	555,814	28,300	584,114
1985	227,000	2.46	558,420	28,800	587,220
1990	239,400	2.40	574,560	30,000	604,560
1995	251,800	2.39	601,802	30,000	631,802
2000	264,200	2.38	628,600	30,000	658,600

Table 6 Population and Household Forecast, 1978-2000
Franklin County, Ohio

Year	Total Households	Household Size	Population in Households	Population in Group Quarters	Total Population
1978	315,172	2.76	869,875	34,300	904,175
1980	322,574	2.71	874,176	35,000	909,176
1985	341,054	2.58	878,919	35,000	914,919
1990	359,534	2.52	906,026	35,000	941,026
1995	378,014	2.51	948,815	35,000	983,815
2000	396,500	2.50	990,800	35,000	1,025,800

Household Growth Creates a Demand for New Housing

Net household growth between 1978 and 1985 is forecast to average 2480 and 3696 households per year for Columbus and Franklin County respectfully. The net demand for housing is estimated to be 2,730 new units in Columbus and 4,071 new units in Franklin County as a whole each year for the next seven years (Table 7).

Table 7 Basic Factors in New Housing Production, 1978-1985
Columbus and Franklin County, Ohio

	City of Columbus			Franklin County		
	Total Units	Single-Family	Multi-Family	Total Units	Single Family	Multi-Family
A. Household Growth	17,360			25,872		
B. Tenure Split [1]	17,360	7,482	9,878	25,872	14,178	11,694
C. Replacement Factor [2]	1,747	818	929	2,625	1,412	1,213
D. Net Demand	19,107	8,300	10,807	28,497	15,590	12,907
E. Average Annual Demand	2,730	1,186	1,544	4,071	2,227	1,844

[1] Based on 1974-1978 new construction averages

[2] Based on normal losses of 0.1% per year

The impact of changing demographic conditions in Columbus and Franklin County can be seen in the related forecast of new housing demand. If the assumptions guiding the forecast are realized, the average annual demand for new housing construction will be below that experienced between 1970 and 1973 and even below that experienced between 1974 and 1977 (see Table 8), the period of low construction activity.

Table 8 Units Authorized by Permit and Demand Forecast
Columbus and Franklin County, Ohio

	City of Columbus			Franklin County		
	1970-'73	1974-'77	1978-'85	1970-'73	1974-'77	1978-'85
Total Permits	35,476	12,846		48,149	19,067	
Avg. Annual	8,869	3,212		12,037	4,767	
Demand Forecast			19,107			28,497
Avg. Annual			2,730			4,071

Annexations Increase City's Size By 5 Square Miles

Through the first half of 1978, the City of Columbus has increased its geographical area one and a half (1 1/2) square miles, from 174.5 to 176.1 square miles. An additional 4.7 square miles (3000+ acres) has been approved for annexation to Columbus by the County Commissioners and it is anticipated that these annexations will be accepted by City Council. Thus, by the end of the third quarter of 1978, the geographical area of the City of Columbus will be in excess of 180 square miles.

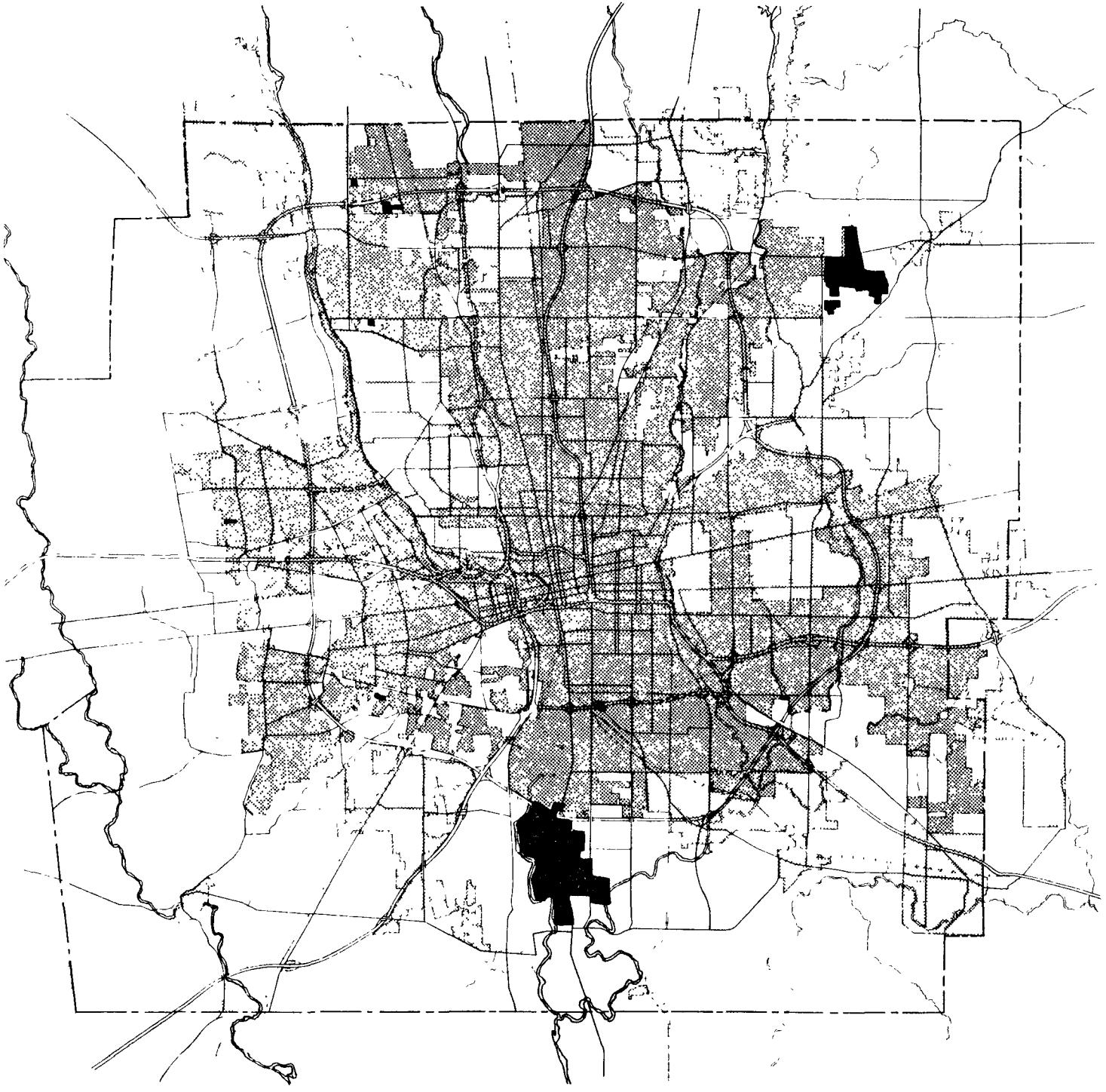
These figures represent a significant upswing in the number of annexation applications as well as number of acres over the previous two years. This increase in activity probably reflects the recovery from the economic recession experienced from 1974 through 1976.

One of the largest annexations in several years, the Hartman Farms, is located in south central Franklin County, an area that was previously defined as a relatively inactive growth area. This annexation is the culmination of many months of preparation and ground work with little significance associated with the timing. It is not anticipated that the area will pick up significantly in development activity through 1985 as a result of this annexation or any other activity in the area.

The most interesting and significant development relative to annexations occurred in the northeastern portion of the city and county, an area previously defined as an active growth area. The annexation activity in the northeast, which included two relatively large annexations in the vicinity of 500 acres each, does not reflect a sudden development potential in Columbus; rather they are reactions to an attempt to contain urban expansion in this area. Residents of Plain Township initiated a referendum, which appeared on the June ballot, that would permit the City of New Albany to pursue the annexation of the remaining unincorporated area within Plain Township. The referendum was narrowly defeated. This effort and its near success indicate a desire by many residents in the vicinity of New Albany not to take on an urban character. Therefore, the probability of the entire sewer contract area of New Albany experiencing urban development through the year 2000, as previously thought, is somewhat remote. Figure 6, defining active growth areas, has been revised to reflect that annexation potential through 1985, and development potential through the year 2000 will be limited to west of New Albany Road.

Accommodating Growth

The ability of the existing and anticipated city limits to accommodate growth is extensive. Based on the methodology utilized by the MORPC report entitled "Potential Residential Development: Columbus and 20 Adjacent Municipalities," and updating the information to reflect the Columbus corporate limits of 180 square miles (refer to the previous section) and the enclosed population projections, it can be shown that there is now sufficient residential acreage available to accommodate growth through the year 2030. Similarly, on a metropolitan basis the updated information presented in this report indicates that the existing development area could accommodate projected growth through the year 2025. The existing development area is therefore, capable of accommodating over 50 years of anticipated growth.



COLUMBUS OHIO

Mayor Tom Moody

Department of Development
N. Jack Huddle Director

Division of Planning

City of Columbus

Other Municipalities

New Annexations

0 2 mi
0 3 22 km

Annexations to the City of Columbus (as of October, 1978) Figure 6

July 1978

Considering the expanded planning area as the future metropolitan or urban area and applying the above methodology, there could be in excess of 164 square miles (105,000 acres) that would develop residentially. This acreage would accommodate conservatively 1,500,000 people. It is difficult at this point in time, based on current growth patterns, to perceive when, if ever, Franklin County will reach a population of 1,500,000.

"UNKNOWNS" AFFECTING GROWTH

There are three other major factors that may have a substantial impact on the future growth and development patterns of the City of Columbus: the Columbus school desegregation suit, the "energy crisis", and federal policies. The full impact of these issues is unknown at this point. However, it is the purpose of this report to anticipate and account for any impacts that may occur to the greatest extent possible.

School Desegregation

There will be some impact on the City's growth potential within the first five years of the implementation of the school desegregation plan. The possible impacts consist of: a more pronounced outmigration from the inner city; less new development (filling-in) of the inner city; and a lessening of property values of the inner city. Therefore, we should anticipate a temporary increased outmigration from the inner city. This migration should be tempered by the increased costs of housing in suburban areas, thereby further reducing the mobility and housing opportunities of middle income families, reinforcing a trend that already exists. The temporariness of this shift is also due to the initial uncertainty of the desegregation plan. Within a reasonable period of time the situation should stabilize at which time this issue will have a minimal impact on demographic trends in Franklin County. THEREFORE, THE DURATION AND INTENSITY OF THE IMPACT OF THE DESEGREGATION PLAN WILL BE TEMPORARY AND LIMITED.

Future Energy Supply Is Uncertain

The most confusing factor continues to be the potential impact of the "energy crisis" on growth of the Columbus Metropolitan Area. One certainity, however, that can now be anticipated, is the heavy involvement of federal and state government. The City of Columbus recently submitted an application for a federal grant in order to, among other things, define the nature of the energy crisis in Central Ohio and to determine what, if any, action can be taken by local governments to adjust to potential energy impacts.

The Columbus Metropolitan Area has encountered various energy related problems during the past few years. In addition to the effects of the international oil embargo, this area has witnessed shortages and interruptions in the supply of natural gas and electricity. The results have varied from inconveniences to residential homes to permanent loss of jobs and future employment opportunities. It is assumed that such interruptions and shortages will continue to be experienced in the future. It is further assumed that these "energy crises" have a lasting impact on the region's economy. A recent study published by the Academy for Contemporary Problems concluded that the loss of manufacturing and associated employment opportunities was primarily due to a high death rate of firms and the inability to replace these firms, rather than an actual migration of firms to the "sunbelt." [11] It appears that the

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[11] Jusenius, Carol L. and Ledebur, Larry, The Migration of Firms and Workers in Ohio, 1970-1975, Academy of Contemporary Problems, p. 14

shortages and interruptions in the supply of natural gas and electricity over the past few years has been instrumental in an excessive death rate of industries. The availability and cost of energy may be a major factor in the lack of establishing new industries. The energy crisis, then, appears to have an existing impact on economic growth and employment opportunites.

Therefore, energy, its availability, accessibility, and cost, is a key factor in local growth. On a regional basis, the supply is the major energy problem as the overall growth of the metropolitan area is dependent upon national and regional trends. Within the metropolitan area cost is very significant in the spatial distribution of development which in turn has tremendous implications on requirements for capital improvements and city services.

It is anticipated that the cost of energy will continue to rise. This increased cost will, within five to ten years, have significant impacts on the pattern of development in the metropolitan area. First, the shortage will continue to limit the growth potential for the Mid-Ohio region resulting in a continuation of the lower growth rates through the year 2000. Second, the increased costs of transportation (automobile) will discourage continued wide spread low density residential patterns while encouraging "filling-in" of the existing urban area. Third, the increased cost of utilities will make it substantially more expensive to maintain a residence in the rural areas of the county.

Dangerous Precedent Being Set By U.S.E.P.A.

The policies of the Federal government continue to be the one element that could have the most significant impact on local growth, at least in the immediate future. Federal policy is the one factor that can have a significant impact on both national trends that influence local growth potential and the distribution of growth at the local level. The publication of the U.S.E.P.A.'s Environmental Impact Statement (E.I.S.) emphasized the potential level of involvement that could be expected of the Federal government. The U.S.E.P.A. has obviously chosen to use the fact that it pays for 75% of the major sewer projects in the Columbus Metropolitan Area to attempt to manipulate local development and growth. This is not only a dangerous precedent, but it is based on a highly questionable study.

Generally, the summary of secondary impacts of the E.I.S. reflect the characteristics of Central Ohio's existing and anticipated growth. The most significant point is the final assumption which states that, "The ability of the area's economy to support additional population and the adequacy of water supplies may be more significant determinants of population growth and development patterns than availability of public sewer services." [12] The fact is that the sewer system as well as the water distribution system will have little if any impact on the region's growth potential. It could, however, significantly affect the distribution of future growth. With this recognition, the E.I.S. proceeds to use the

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[12] U.S.E.P.A., Region V, Draft Environmental Impact Statement, Wastewater Treatment Facilities for the Metropolitan Area, Columbus, Ohio, February, 1978, p. VII-2.

expansion of the sewer system as a means of manipulating local growth. This is being done with a minimal understanding of the local area's economy (economic growth potential) and with very selective and arbitrary concerns about why growth should or should not occur in any particular subarea.

The population and area densities are the most serious shortcomings of the E.I.S. relative to the secondary impact analysis. The population control figure of 1.11 million is acceptable as being "within the range" of population control figures being used by this statement for the Columbus Metropolitan Area. However, the breakdown of this control number by the eleven subareas is highly questionable. First, there is no documentation as to how they accomplish this breakdown. It is apparently, at best, a guess. Secondly, these subarea estimates are inconsistent with the disaggregation of population presented in this document. The most obvious area of concern is in the Blacklick watershed subarea. The E.I.S. relates to the entire watershed whereas the Facilities Plan basically programmed a sewer for only the southern half. It is important to realize that there is a significant difference between the northern half and southern half of the watershed relative to growth potential. The year 2000 population projection of 41,800 presented in the E.I.S. is comparable with the allocation used by this document. However, over 90% of the projected population falls within the southern portion of the Blacklick watershed, from Reynoldsburg on downstream. The resulting densities for the lower half, then would be in excess of 2 persons per acre which appears to be a critical criterion used in the E.I.S. to justify a sewer line. This report identifies southeast Columbus as a major growth area over the next twenty years, particularly that portion of the Blacklick watershed downstream of Reynoldsburg. It is the conclusion of this report that the best alternative for providing immediate relief for Reynoldsburg is a continuation of the Blacklick interceptor as proposed in the Facilities Plan; this approach will also address the long-term needs of southeast Columbus.

The most significant point that should be made is that the City of Columbus is in a position to make the best determination as to the potential and location of its future growth. The local concern is for as comprehensive an understanding and anlysis as possible. Specifically, at the local level, Columbus must consider the concerns of various other Federal programs from HUD, Department of Energy, Department of Transportation, etc. In addition, there are several additional local forces and issues that must be considered, the least of which are the impacts of a school desegregation suit and the long term fiscal implications of providing a wide spectrum of services in addition to the sewer system. The U.S.E.P.A. through this E.I.S. has expressed a concern for only a few aspects of growth, some of which are questionable such as the urbanization of agricultural land. It is also highly questionable that the heavy reliance upon a centralized sewer system at very low densities (2 persons/acre) is consistent with energy conservation and growth management objectives.

In conclusion, there appears to be considerable doubt as to the reliability of the E.I.S. secondary impact analysis. Based on this concern, the tone of the E.I.S. that a Facilities Plan should be used by a Federal agency to manage local growth is highly suspect and inherently dangerous. The City of Columbus is far more capable of determining and dealing with its own growth potential. Considerable thought should be given to the implications of this very fundamental relationship between the Federal Government and local jurisdictions.

GROWTH PROJECTIONS

The intent of this section is to identify where growth is presently occuring and likely to continue through 1985 in order that the City can properly plan its capital improvements. The projections and recommendations pertain only to the City of Columbus and areas within which it is likely to experience annexation pressures.

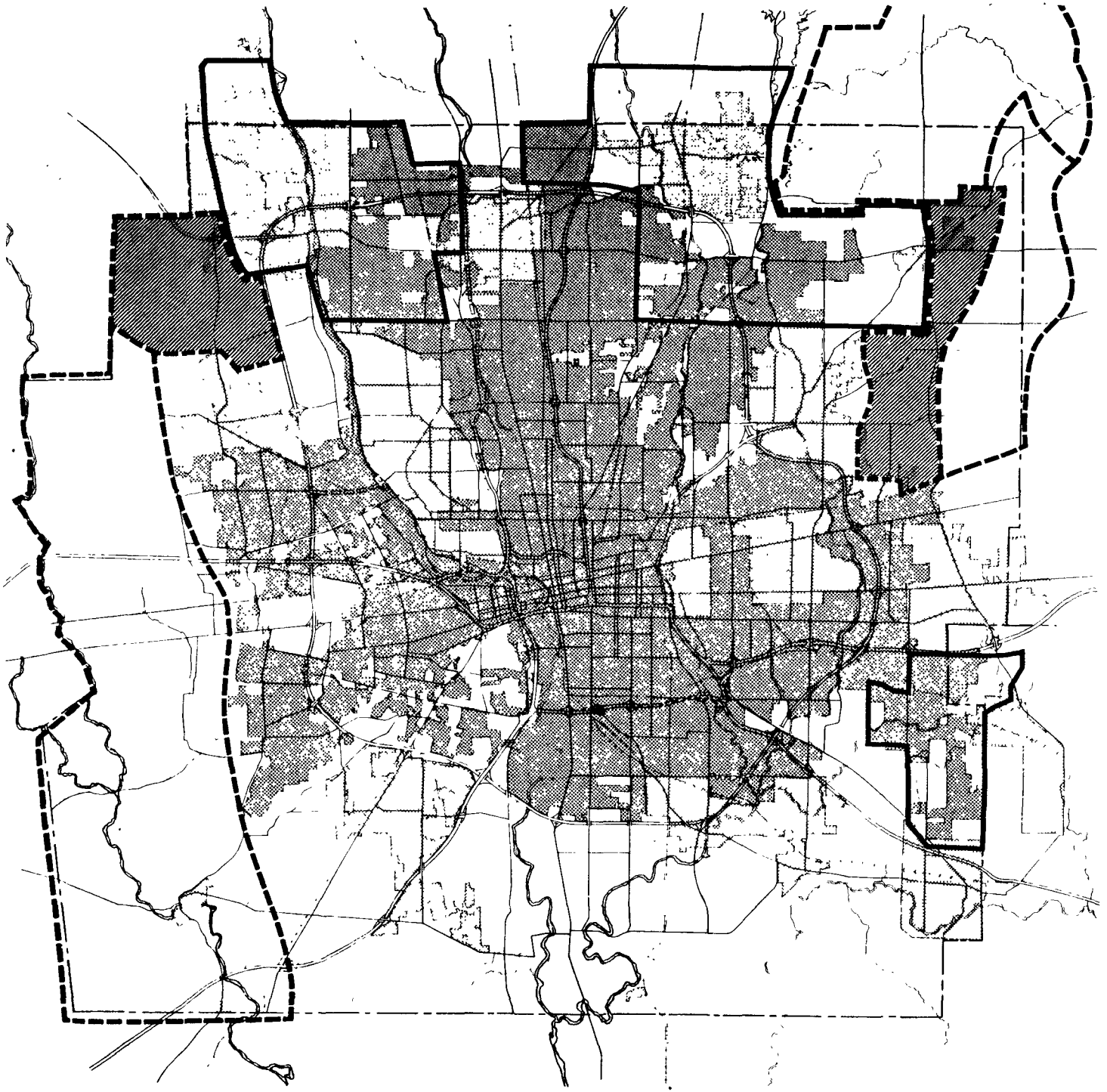
Active Growth Areas

THE GROWTH AREAS OF THE COLUMBUS METROPOLITAN AREA THROUGH 1985 WILL CONTINUE TO BE IN THE NORTHERN PORTIONS OF THE COUNTY AND SOUTHEAST COLUMBUS.

Development in the northwest and southeast will primarily occur within the Columbus city limits (Refer to Figure 7). Northeast development will center around Westerville and northeast Columbus. By 1985, development will shift almost entirely to the City of Columbus. Westerville, with no apparent intent to expand its city limits, is rapidly utilizing its developable land. This fact in combination with the "anti-urban development" atmosphere of Plain Township necessitates that urban development occur within the City of Columbus. It is anticipated, therefore, that significant annexation pressure will continue in the area between S.R. 161 and Central College Road west of New Albany. The City recently rezoned 100 acres of land in the vicinity of S.R. 161 and Hamilton Road to accommodate a future regional shopping center. This was an effort to establish similar zoning previously held in the county thereby protecting the area's future commercial development potential. Development of this regional facility is not anticipated for several years until sufficient residential growth warrants such a facility. Extensive residential growth within Columbus' city limits beyond the outerbelt (I-270) is not anticipated before the mid 1980's.

The key to actual development of land within the Columbus City limits is the availability of sewers. The anticipated growth in the area can be easily accommodated by the first phase of the Rocky Fork interceptor as proposed by the Columbus Metropolitan Facilities Plan. This phase would also accommodate anticipated annexations in the area as well.

The southeast continues to show a great deal of promise for development activity in the future. Major rezoning activity is occuring in the area which will support development for several years into the future. Initial development will primarily consist of single family units. The area, with extensive flood plain areas resulting in permanent open space and excellent accessibility via the freeway system and major arterials, lends itself to multi-family, medium density development. The major question relative to future multi-family development is the area's location relative to downtown and other employment centers.



COLUMBUS OHIO

Columbus Ohio
Mayor Tom Moody
Department of Development
N Jack Huddle Director

Division of Planning

City of Columbus
Other Municipalities
Active Growth Areas
Limited Growth Potential
Inactive Growth Areas

0 2 mi
0 3 22 km

Columbus Metropolitan Growth Areas 1978–1985 Figure 7

July 1978

Table 9 presents a summary of population and dwelling unit [13] growth for the year 2000 on a planning area basis which in turn are grouped by quadrants. The figures shown are only for those portions of the planning areas that fall within the Columbus city boundaries anticipated for the year 2000 (Figure 8). A characteristic of these figures that is immediately apparent is the impact of the reduced household size. While every planning area shows growth or maintains the existing number of dwelling units, nearly a third of the planning areas (eight) reflect an actual loss in population. Thus, many of the developed areas of the inner city, while not experiencing an overall loss in total dwelling units will experience substantial losses in population. The hardest hit areas are the near north and near east sides which are the most intensely developed.

There are some figures in Table 9 that are in conflict with other statements in this document. Planning Areas 7 and 26 stand out as being exceptionally high and tend to distort the overall growth picture at the quadrant and county levels. Presently, there is very little development activity on the west side and particularly in these two planning areas. It is the contention of this statement that the west and particularly the southwest portions of the city will remain relatively inactive through 1985 and probably through the year 2000. One explanation for these high figures is that the control totals for the county and city (1,025,000 and 658,600 respectively) may be excessive

The combination of the above two factors also distorts the relative growth potential on a quadrant basis. The southwest quadrant is shown gaining a substantially higher percentage of new growth than the southeast quadrant. This is due to the excessively high rate of growth in Planning Area 26 as well as the relatively high population loss (15,000) in the inner city portions of the southeast quadrant.

The most appropriate step for overcoming these discrepancies would be to determine a more acceptable control total and to make the necessary adjustments to redistribute the population more accurately. However, the present commitment to the county total of 1,025,000 and the lack of opportunity to rerun the distribution of the population necessitates that, for the purpose of this report, the available figures be used and qualified where necessary.

Table 9, therefore, should be qualified such that Planning Areas 7 and 26 (within the Columbus city limits) show a gain of only 8,500 and 5,000 respectively. The results would show the northwest and northeast gaining nearly equal amounts of future growth and the southwest quadrant receiving the least amount of new growth. This change would also result in Planning Areas 25, 6, 2 and 12 gaining the greatest amount of new growth. These distribution figures would more accurately represent the anticipated future growth picture.

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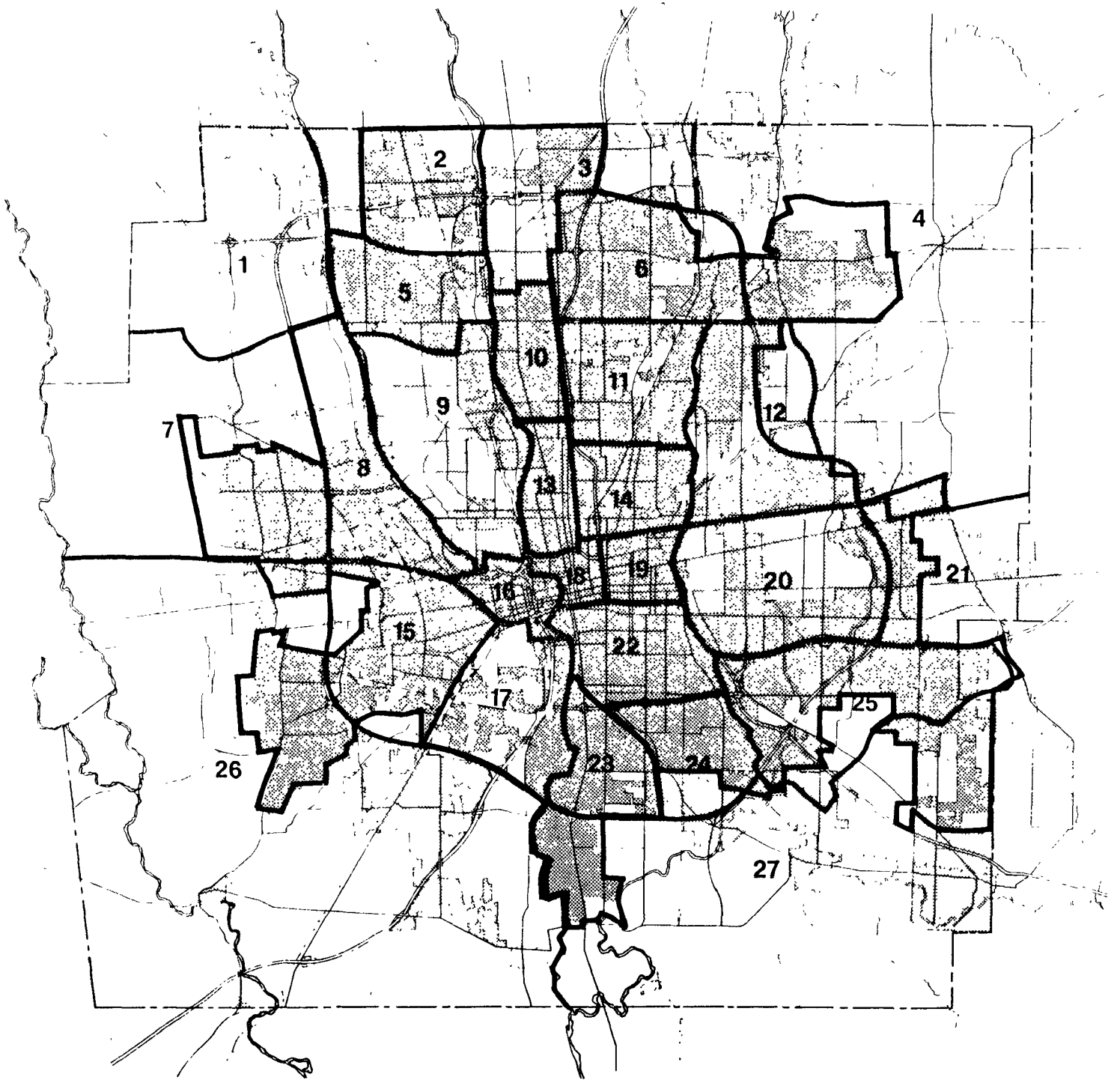
[13] Dwelling units (equivalent to the housing stock) include both occupied housing units (equivalent to households) and vacant housing units (assumed to be 4.0 percent of the housing stock).

Table 9 Population and Dwelling Unit Distribution City of Columbus

		Population				Dwelling Units			
Northeast Quadrant	Planning Area	1974	2000	Change	% of Total	1974	2000	Change	% of Total
	3	892	5,075	4,183	4.0	355	2,060	1,705	2.4
	4	2,254	10,791	8,537	8.2	861	4,674	3,813	5.2
	6	44,672	57,507	12,835	12.3	14,135	22,952	8,817	12.1
	11	65,240	59,188	-6,052	-	22,306	23,260	954	1.3
	12	11,280	23,769	12,489	12.0	3,865	9,381	5,516	7.6
	14	34,329	30,886	-3,443	-	12,040	12,311	271	0.4
	Total	158,667	187,216	28,549	27.4	53,562	74,638	21,076	28.8
Northwest Quadrant	Planning Area	1974	2000	Change	% of Total	1974	2000	Change	% of Total
	2	4,661	17,350	12,689	12.2	1,319	6,729	5,410	7.4
	5	12,697	17,350	4,653	4.5	4,818	7,548	2,730	3.7
	7	1,673	20,330	18,657	17.9	554	8,128	7,574	10.4
	8	4,426	14,364	9,938	9.5	1,529	5,854	4,325	5.9
	9	24,700	27,759	3,059	2.9	10,256	11,772	1,516	2.1
	10	38,476	33,905	-4,571	-	13,471	13,471	0	0
	13	81,264	78,973	-2,291	-	33,793	34,655	862	1.2
	Total	167,897	210,031	42,134	40.5	65,740	88,157	22,417	30.7
Southwest Quadrant	Planning Area	1974	2000	Change	% of Total	1974	2000	Change	% of Total
	15	67,585	69,571	1,986	1.9	22,161	27,352	5,191	7.1
	16	16,293	14,844	-1,449	-	5,941	6,259	318	0.4
	17	10,356	12,811	2,455	2.4	3,595	5,218	1,623	2.2
	26	3,821	18,927	15,106	14.5	1,253	7,637	6,384	8.7
	Total	98,055	116,153	18,098	17.4	32,950	46,466	13,516	18.5
Southeast Quadrant	Planning Area	1974	2000	Change	% of Total	1974	2000	Change	% of Total
	19	40,434	37,105	-3,329	-	16,275	16,275	0	0
	20	58,711	52,104	-6,607	-	19,763	20,159	396	0.5
	21	9,033	12,053	3,020	2.9	3,331	5,060	1,729	2.4
	22	58,491	53,938	-4,553	-	21,978	21,978	0	0
	23	15,083	17,139	2,056	2.0	4,828	6,394	1,566	2.1
	24	8,966	10,678	1,712	1.6	2,975	4,137	1,162	1.6
	25	15,755	28,839	13,084	12.6	5,700	12,524	6,824	9.3
	27	621	5,989	5,368	5.2	210	2,411	2,201	3.0
	Total	207,094	217,845	10,751	10.3	75,060	88,938	13,878	19.0
Downtown	Planning Area	1974	2000	Change	% of Total	1974	2000	Change	% of Total
	18	6,787	11,464	4,677	4.5	3,570	5,740	2,170	3.0
	Total	6,787	11,464	4,677	4.5	3,570	5,740	2,170	3.0
Area Totals		638,500	742,709	104,209		230,882	303,939	73,057	
	Less Unincorporated *	80,069	84,109	4,040		27,346	28,730	1,384	
City Total		558,431	658,600	100,169		203,536	275,209	71,673	

*Includes:
Perry Township - Planning Areas 2 & 5
Sharon Township - Planning Area 3
Clinton Township - Planning Areas 9 & 11
Mifflin Township - Planning Area 12
Franklin Township - Planning Areas 15 & 17

Source: Department of Development; Adapted From MORPC's Trip Generation Variables For The Year 2000, May 1978.



Columbus, Ohio
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Department of Development
N. Jack Hoddle, Director

Division of Planning

COLUMBUS
OHIO

City of Columbus
Other Municipalities
14 Planning Area
Columbus City Limits Year 2000

0 2 mi
0 3.22 km

Anticipated Columbus City Limits for Year 2000

Figure 8

July, 1978

Limited Growth Areas

More significant perhaps are the areas that will experience little urban development or that should not be developed in the near future. It is important to identify those areas where there is minimal growth potential overall in order to prevent piecemeal commitments that could in the long run commit the City to costly and widespread capital improvements and urban services.

THE MOST OBVIOUS AREA THAT SHOULD BE DISCOURAGED FROM DEVELOPING IN AN URBAN CHARACTER IS THE BIG DARBY-HELLBRANCH WATERSHED IN THE FAR WESTERN PORTION OF THE COUNTY. Extensive development of this area will eventually require costly pumping facilities in order to tie the area into the Columbus system or a separate collection system and treatment facility. Secondly, the area has extensive drainage problems that must be resolved before development occurs. Finally, the western half of the county is presently the least active growth area overall. There already exists sufficient incorporated area to accommodate projected growth. Therefore, there is no justification for any municipality in the foreseeable future to annex into this drainage basin and thereby encourage urban development. Development should be limited to sparsely settled patterns where drainage, water quality, and water supply can be handled on an individual basis.

TWO ADDITIONAL AREAS THAT SHOULD NOT BE ENCOURAGED TO DEVELOP TO AN URBAN CHARACTER ARE THE BIG WALNUT AND NORTH BLACKLICK AREAS IN THE EXTREME NORTHEAST PORTIONS OF THE COUNTY. The growth potential for these areas is not great in the near future and the availability of sewers would probably not change the character and type of growth significantly. The following reasons are given for this conclusion:

(1) These areas are somewhat removed from the existing urban area with half of the area lying outside of Franklin County;

(2) Annexation to either Westerville or New Albany is unlikely. Westerville's eastern boundary for "annexable area" is Big Walnut Creek; New Albany's expansion will be accommodated within the Rocky Fork drainage area;

(3) They are the least accessible of all the expansion areas being considered herein;

(4) There is a great deal of undeveloped land in the adjacent and "closer-in" urban areas of Columbus, Gahanna, and Westerville; and,

(5) With the availability of sewers in south-central Delaware County, it is unlikely that portions of Big Walnut and Blacklick areas that lie within Delaware County will develop as extensively or as rapidly.

Urban development would necessitate the extension of the Big Walnut and Blacklick interceptors. Based on the above factors this investment cannot be justified through the year 2000. Therefore, piecemeal and scattered urban development and annexations should be discouraged.

The publication of the E.I.S. by the U.S.E.P.A. did serve to highlight a potential need for a sanitary sewer. The E.I.S. proposed delaying the construction of the Big Walnut Interceptor Sewer along the east side of the Hoover Reservoir, a recommendation made in the first growth statement. In response to the E.I.S., the City Division of Sewerage and Drainage noted that, "This decision seriously endangers the City's present and future drinking water supply by increasing the probability of contamination by untreated sewage." [14] A review of the area indicates that there may be as many as 700 septic tanks and eight package treatment plants operating in inadequate soil conditions. The area, however, is not anticipated to grow significantly. There is, therefore, a question raised as to the need for a central sanitary sewer for purposes of water quality rather than to serve anticipated urban development. The issue raises several questions. On the one hand, will the availability of a sewer tend to increase growth in the area (thereby attracting it from another "sewered area") resulting in a continuation of metropolitan wide sprawl at low densities. On the other hand, if growth does not occur, as predicted, who will pay for the installation of the sewer? And finally, is it even possible to force existing area residents on to the system in order to resolve the ground water contamination problem?

There appear to be no answers to these questions at this point in time. Before a decision is made to build or not build the Big Walnut Interceptor extension, a comprehensive study should be made to include: an analysis of the ability of the proposed sewer to solve the existing problem; the costs to specific groups of tax payers; and, secondary impacts on growth distribution.

In addition to the availability of utilities a major indicator of the likelihood of growth in a particular area can be its ownership pattern. The ownership pattern of two areas within the existing development area, the extreme northwest, west of I-270 between Dublin and Hilliard, and the area immediately east of Gahanna, stands out because it indicates no evidence of growth pressures. Unlike the southeast and New Albany areas where the anticipation of a sanitary sewer interceptor has encouraged major developers to purchase land thereby enhancing its development potential, the above areas have not experienced similar activity. BECAUSE OF THESE FACTORS, THE UNAVAILABILITY OF SEWERS (OR OTHER UTILITIES) AND THE ABSENCEOF DEVELOPMENT PRESSURE AS THE RESULT OF LAND INVESTMENTS, THESE TWO AREAS WILL NOT EXPERIENCE URBAN DEVELOPMENT THROUGH THE YEAR 1985. If sewers were constructed, it is likely that interest and investment in the area would follow. Therefore, sewer construction should not be considered through 1985 and it is likely that the need for sewers cannot be justified through the year 2000.

Finally, it should be noted that within the existing urban area that is serviced (within incorporated boundaries), the western and southern portions will continue to exhibit a minimum amount of development activity similar to what has been experienced over the past few years. Although a great deal of residential platting and zoning activity has occured, it is not anticipated that actual development will pick up significantly.

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[14] Department of Public Service, City of Columbus, Review of U.S.E.P.A. Region V, Draft Environmental Impact Statement, Wastewater Treatment Facilities for the Metropolitan, Area Columbus, Ohio, March 1978, p. 3.

In summary it should be reemphasized that these growth projections are primarily for the purpose of assisting capital improvements programming through 1985. References to the year 2000 are made where the short term trend is expected to continue. Obviously, a reevaluation of needs for 1985 through 2000 should be made in the early 80's that would consider 1980 census information and the current economic growth potential.

SUMMARY STATEMENT

Regional Goals

It is the intent of this report that the policy recommendations for Columbus be developed within a regional context.

Since 1965 seventeen publications have been prepared in an attempt to establish goals directing the future growth and development of the Mid-Ohio region. The vast majority of these attempts at goal identification were the result of staff efforts at MORPC and DOD. There was however, a significant effort in 1965 to obtain citizen input through the County's "Blue Plan"; [15] there have also been two recent efforts to update and pursue additional citizen input, MORPC's Year 2000 Goals and Objectives and Columbus' Overall Economic Development Plan. A comparison of these efforts over a ten year period provides rather interesting results. First, there is a great deal of consistency over the ten year period. And second, these efforts have done very little to provide direction (state priorities) for the establishment of policies and programs. One reason contributing to both of these factors is that a goal is merely a generalized statement of a desired end. It is seldon specific enough to provide direction or comparison. Furthermore, the primary concern for widespread citizen participation forces a product that runs the gamut of general ideas. It is obvious, however, that over a period of time peoples' ideas do not change significantly. It is for these reasons that the policies identified in this report are felt to be reflective of citizens general desires at the regional level.

Opportunities

The various efforts at goal identification do appear to have an underlying theme:

> To achieve a better way of life for all people living in the region, assuring access to opportunities for personal development and for participation in community affairs. [16]

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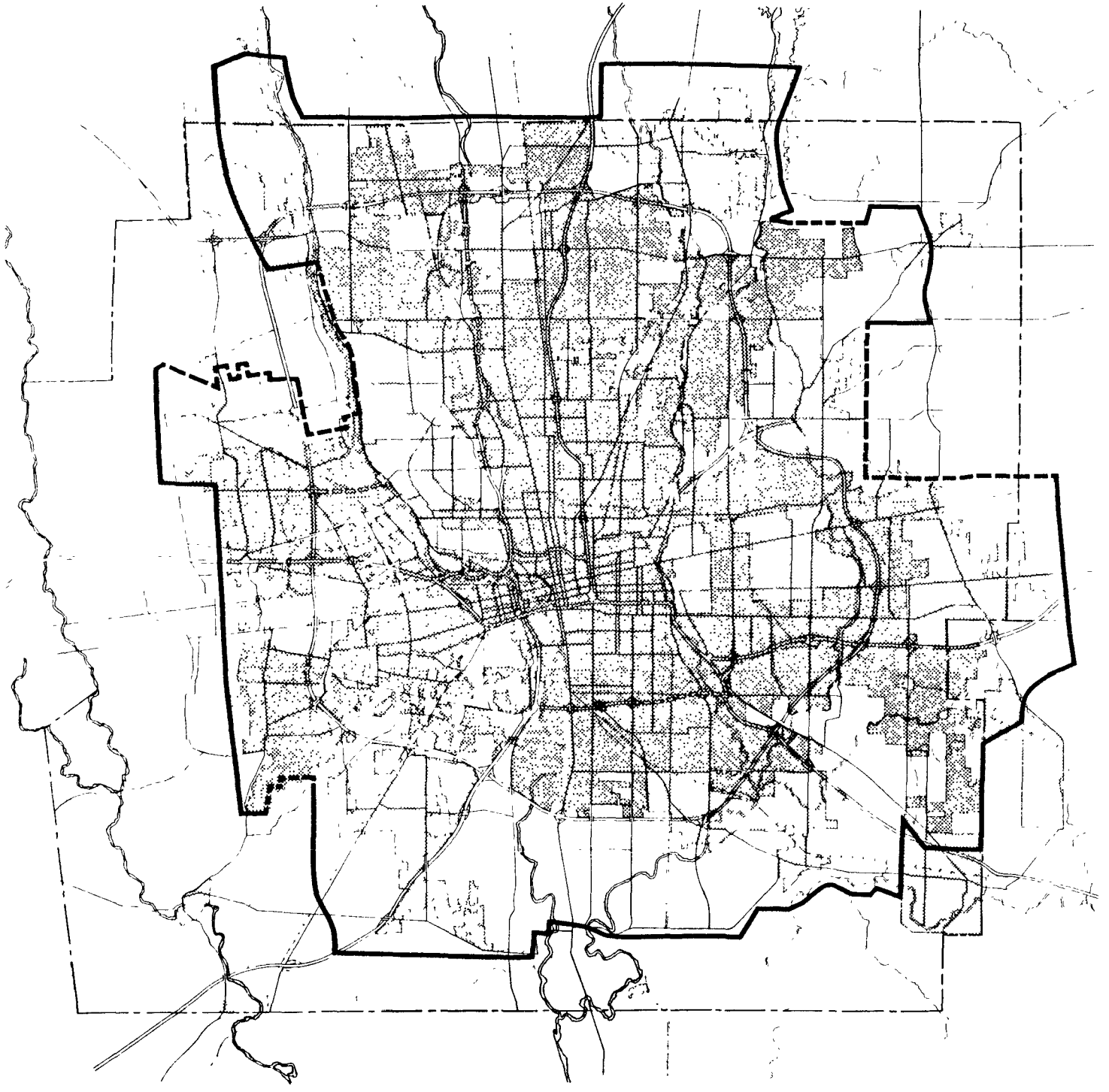
[15] Franklin County Regional Planning Commission, Summary of Columbus Seminars for the Blue Plan, July, 1965.

[16] Franklin County Regional Planning Commission, Summary of Columbus Seminars for the Blue Plan, July, 1965, p. 8.

If in fact the overriding goal of the citizenry of this region is to improve the quality of life, the major conclusion of this report is that THE NEXT TEN TO TWENTY YEARS OFFERS AN EXCELLENT OPPORTUNITY TO IMPROVE THE QUALITY OF WHAT EXISTS. There will be no tremendous pressures or demands on the existing sewer, water and transportation systems. Growth potential is limited: the looming energy crisis will probably further limit and at least concentrate future development. Given these expectations, the following recommendations reflect the need to reaffirm those policies of the past and to articulate new policies that direct the City's efforts toward improving what we have and encouraging future growth to occur within reasonable and manageable urban boundaries.

To this end, it is necessary to define reasonable boundaries for accommodating growth through 1985. Figure 9 delineates the area that should approximate the service limits of the Columbus Metropolitan Area: the area within which urban development through 1985 should be encouraged and will most likely occur. The dashed boundaries indicate that annexation and urban development beyond these areas is appropriate only if it can be accomplished without the eventual construction or extension of an interceptor or subtrunk sewer. Piecemeal development should be permitted only if it doesn't commit the City to substantial capital improvements and costly urban services. It is further assumed that within this boundary the entire area (including and specifically the contract areas in the southern portion of the County) can be serviced without further expansion of interceptors and subtrunks beyond those identified in the 1979-1984 Capital Improvements Program.



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Mayor Tom Moody
Department of Development
N. Jack Huddle Director

Division of Planning

COLUMBUS
OHIO

City of Columbus
Other Municipalities
Metropolitan Area 1985
Boundaries Subject to Expansion

0 2 mi
0 3.22 km

Columbus Metropolitan Area 1985 Figure 9

July 1978

SUMMARY OF RECOMMENDATIONS

I. All development of an urban nature should occur within an incorporated municipality that is within the defined 1985 Urban Area. The concept of a "sewer freeze" should be continued whereby Columbus requires annexation of a parcel of land to the City or a municipality under contract to the City as a prerequisite for access to the sewer and water system.

II. Future urban development should not be encouraged outside of the 1985 urban area.

A. Utility lines (sewer and water) should definitely not be extended into the following drainage areas at least through 1985:

(1) The Hellbranch - Big Darby Watershed;
(2) The Blacklick Watershed north of the Penn Central Railroad.

B. No parcel of land should be annexed nor any suburban sewer contract written that would necessitate the extension of sewer interceptors except for the following:

(1) The Blacklick interceptor from Brice Road to Reynoldsburg; and
(2) The first phase of the Rocky Fork interceptor. [b]

C. The Scioto West and Rocky Fork (second phase) interceptors will not be needed at least through 1985. [b]

D. Water lines should be programmed for construction in coordination with anticipated needs for future sewers.

III. Within the 1985 urban area, Columbus should strive for a healthy balance between redevelopment and continued expansion.

A. Columbus should give increased attention to improving, revitalizing and conserving development within the existing city limits.

B. Columbus should continue to accept land for annexation within the 1985 urban area that is likely to develop to an urban character.

IV. Columbus should consider the total impact of various sewer related issues on its ability to maintain its share of future metropolitan growth. These issues include:

(1) Equitable surcharges for suburban municipalities;
(2) Metropolitanization of the sewer system;
(3) The removal of the prerequisite for annexation to an incorporated municipality prior to gaining access to the sewer and water system, and
(4) The potential of two additional sewer facility plans within the area influenced by Columbus' growth.

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[a] A substantial ground water pollution problem may already exist, threatening Hoover Reservoir a major source of drinking water. Therefore, a sewer may be necessary to alleviate the existing pollution problem. The necessity of such a sewer should be based on a detailed study of the primary and secondary impacts of the construction of a sewer in the area.

[b] A description of the first and second phases for servicing the Rocky Fork Watershed is available on page 115 of the Cost Effectiveness Analysis, Columbus Metropolitan Area Facilities Plan.

APPENDIX FF

SECONDARY AIR IMPACT ANALYSIS

SECONDARY AIR IMPACT ANALYSIS FOR COLUMBUS, OHIO

The Environmental Protection Agency, Region V, has expressed concern that the Federal action of awarding sewage system construction grants might contribute to community growth which in turn could adversely affect air quality in the so-called non-attainment areas. This report is an analysis of the effects of expanding the present sewage treatment facility of Columbus, Ohio on the total emission of hydrocarbons and particulates in Franklin County, Ohio in the year 2000.

The two primary objectives of this study are to:

- Determine differences in emissions of Total Suspended Particulates (TSP) and non-methane hydrocarbons (HC) corresponding to two population growth patterns for the year 2000 in Franklin County, Ohio.
- Determine the effect of the emissions on the attainment strategies.

This report is organized in the following five parts:

- Population distribution
- Vehicle miles travelled (VMT)
- Hydrocarbon emissions
- Particulates emissions
- Effect on attainment strategies.

Each of the above parts is described below.

1. POPULATION DISTRIBUTION

A population projection for Franklin County, Ohio of 1.025 million people by the year 2000 was analyzed for two population distributions:

- Urban sprawl
- Infill

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* "Infill" refers to the concentration of new development upon vacant land remaining within the urban area, as opposed to new development in virgin or relatively undeveloped suburban or rural areas.

The urban sprawl population distribution pattern by traffic district within Franklin County is shown in Figure 1 as a percentage change in growth from 1974. The percentage change in population for the infill pattern by traffic district is shown in Figure 2. These two population distribution patterns form the basis of the analysis of air quality of Franklin County, Ohio in the year 2000 under two different growth patterns.

The urban sprawl population distribution is assumed to be consistent with the City of Columbus' sewer plan. The infill population distribution is assumed to be consistent with the sewer plan proposed by the U.S. EPA and represents controlled growth. In the remainder of the report the two population distributions will be distinguished by the terms "sprawl option" and "infill option."

2. VEHICLE MILES TRAVELLED (VMT)

Hydrocarbon emissions result primarily from motor vehicles; therefore, the first step in analyzing emissions for Franklin County involves an analysis of vehicle miles travelled (VMT) under each population growth pattern.

Several methods for calculating VMT were analyzed in developing a method best suited to the data that were available. These methods are summarized below.*

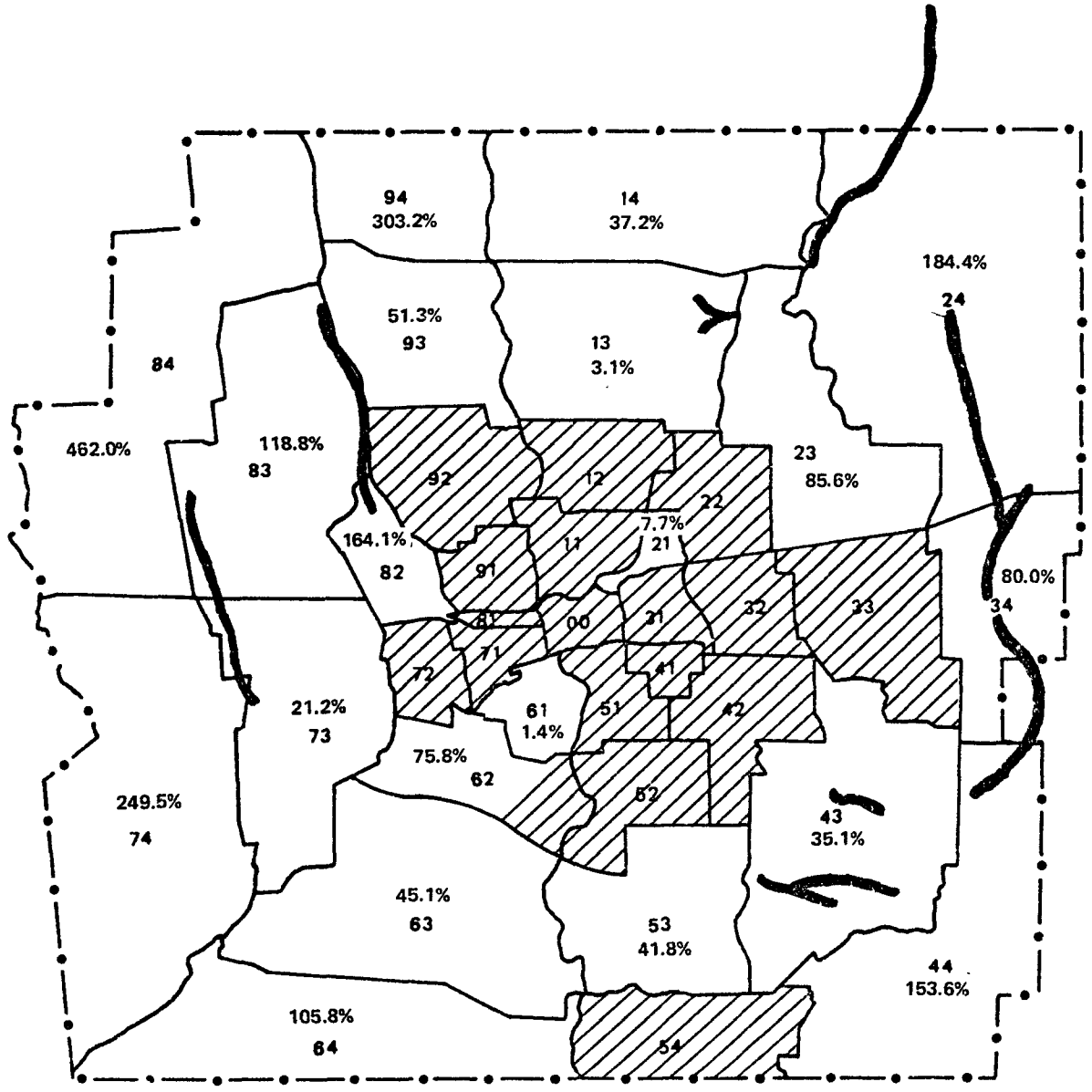
- Method A—Estimating VMT using "broad-brush" statistics pertaining to roadway mileage, automobile ownership and average VMT per vehicle. This method was not used since it is not sensitive to population distribution.

- Method B—Allocating county-wide VMT to subareas within the county by utilizing county or state highway traffic flow maps and roadway inventory data. Insufficient data were available to use this method.

- Method C—Calculating VMT based on land use and demographic characteristics of the county. This method is a simplification of the comprehensive transportation planning process and involves establishing trip generation and attraction rates; volume of travel between subcounty areas, between these areas and external locations; and the average

* Booz, Allen & Hamilton, "Methodologies for the Analysis of Secondary Air Quality Impacts of Wastewater Treatment Projects Located in Air Quality Maintenance Areas," prepared for U.S. EPA, Region II, March 1976.

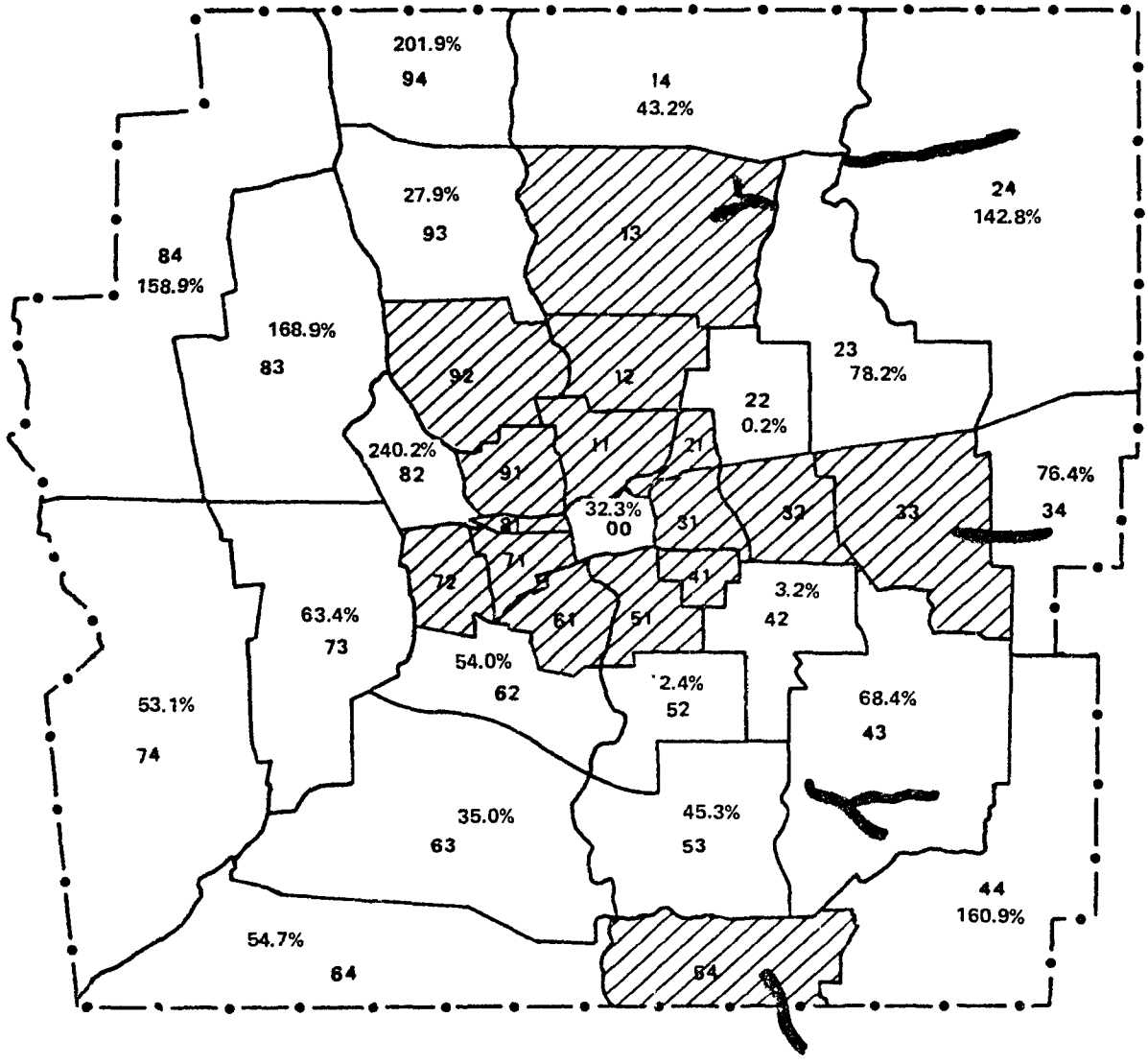
FIGURE 1
Projected Population Distribution by
Traffic District for the Sprawl Growth
Pattern in 2000 in Franklin County, Ohio



Legend:

- Heavy lines indicate proposed sewer lines
- Shaded area denotes loss in population
- The numbers within the traffic district show traffic district number and percent increase in population over 1974.

FIGURE 2
Projected Population Distribution by Traffic District for the Infill Growth Pattern in 2000 in Franklin County, Ohio



Legend:

- Heavy lines indicate proposed sewer lines
- Shaded area denotes loss in population
- The numbers within the traffic district show traffic district number and percent increase in population over 1974.

trip length. MORPC* has calculated VMT by traffic district for the base year 1974 using the Gravity Model, which uses this type of analysis. The results of the Gravity Model approach were used in this study.

VMT in Franklin County were calculated for the year 2000 under the sprawl and infill options by the analysis of the number and length of motor vehicle trips using both historic and projected data.

The first step was to determine the number of vehicle trips for each year, 1964, 1974, and 2000. Since the total population was the same under the year 2000 sprawl and infill options, the total number of vehicle trips was assumed to be the same for each of the two projected population distributions. Two assumptions were made in determining the number of vehicle trips for each year:

- The auto occupancy factor for 1974 was applied to the 1964 and 2000 data. The factor was 1.528 persons per car.
- Two percent of the vehicle trips were attributed to mass transit.

The vehicle trips by trip type

- Internal auto
- Internal truck
- Internal taxi
- Internal/external auto
- Internal/external truck

are shown in Column 4 in Table 1. It can be seen that the number of vehicle trips increase with population.

The next step in calculating VMT involves determining average trip length (in minutes) by trip type for each year under analysis. Trip lengths for 1964, 1974, and 2000 (infill) were obtained from the trip generation data provided to us by the Mid-Ohio Regional Planning Commission (MORPC). The trip length for the sprawl option was determined by linearly extrapolating the 1964 and 1974 average trip lengths, assuming that the sprawl option represented a continuation of the population growth pattern between 1964 and 1974 to 2000. Average trip lengths in minutes for each year under analysis, by trip type, are shown in Column 6 of Table 1. These data show that the average trip length for internal-external trips has increased under the 2000 sprawl option when compared to the 2000 infill option.

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* Mid-Ohio Regional Planning Commission.

TABLE 1
Vehicle Miles Travelled
Franklin County, Ohio

Year	Population	Trip Type	Average Number of Vehicle Trips/Day[1]	Hours of Travel/Day	Average Trip Length (Minutes)	Average Trip Length[2] (Miles)	Average VMT/Day
1964	700,000	Internal Auto	1,220,833	390,944	12.323	7.455	9,101,310
		Internal Truck	170,295	36,414	12.829	7.761	1,321,659
		Internal Taxi	27,164	5,920	13.076	7.910	214,867
		Int/Ext Auto	111,528	44,955	24.184	14.631	1,631,766
		Int/Ext Truck	20,768	8,426	24.343	14.727	305,850
1974	890,000	Internal Auto	1,620,904	530,068	12.584	7.613	12,339,942
		Internal Truck	241,344	52,055	12.941	7.829	1,889,482
		Internal Taxi	33,958	7,834	13.841	8.373	284,330
		Int/Ext Auto	170,805	61,904	21.745	13.155	2,246,939
		Int/Ext Truck	32,438	12,233	22.627	13.689	444,043
2000, Infill	1,025,000	Internal Auto	1,969,715	663,131	12.959	7.840	15,442,565
		Internal Truck	300,405	66,096	13.201	7.986	2,399,034
		Internal Taxi	37,946	8,731	13.805	8.352	316,924
		Int/Ext Auto	305,760	106,950	20.987	12.697	3,882,234
		Int/Ext Truck	56,601	20,688	21.930	13.267	750,925
2000, Sprawl	1,025,000	Internal Auto	1,969,715	-	13.262	8.023	15,803,023
		Internal Truck	300,405	-	13.232	8.005	2,404,742
		Internal Taxi	37,946	-	15.830	9.577	363,408
		Int/Ext Auto	305,760	-	15.403	9.318	2,849,071
		Int/Ext Truck	56,601	-	18.165	10.989	621,988

[1]Using an auto occupancy factor of 1.528 persons per car and mass transit usage of 2 percent of the total person trips.
[2]Assuming average speed of 36.3 miles per hour.

Average trip length for internal/external trips, on the contrary, has decreased under the 2000 sprawl option when compared to the 2000 infill option. This is attributed to businesses moving into suburban areas and more shopping malls in suburban areas.

The average trip length in minutes was then converted to trip length in miles, as shown in Column 7 in Table 1 by assuming an average speed of 36.3 mph based on the data obtained from MORPC.

We then calculated average daily VMT by trip type as shown in Column 8 in Table 1. A comparison of the estimated VMT under the two growth patterns in 2000 is shown in Table 2.

Internally generated VMT increase under the sprawl option by 2.27 percent compared to the 2000 infill option. This results from longer trip lengths for internal trips as the population is spread over a larger area.

The VMT generated by internal/external trips, on the contrary, decrease under the sprawl growth pattern, compared to the infill growth pattern. This may be attributed to shorter trip lengths resulting from businesses, including shopping malls, moving out to the suburban areas.

Because of the greater reduction in the internal/external VMT under the sprawl option compared to the reduction in the internal VMT under the infill option, the total VMT is seen to be slightly greater under the infill option than that under the sprawl option.

One must be cautious, however, in drawing conclusions from these results since the percentage differences in VMT between the two population projections is less than the expected error in the data.

3. HYDROCARBON EMISSIONS

Hydrocarbon emissions are calculated by multiplying appropriate emission factors by VMT.

U.S. EPA has developed a method for determining emissions of various pollutants from six vehicle classes and all modes of vehicles in grams per mile. The methodology is described in detail in "Mobile Source Emission Factors."* Emission factors can be calculated from tables based on national

* U.S. EPA, "Mobile Source Emission Factors," Final Document, EPA-400/9-78-006, March 1978.

TABLE 2
Projected Average Daily VMT in
the Year 2000 Under Two Growth Patterns

Trip Type	Average Daily VMT		Difference in VMT (Sprawl-Infill)	Difference in VMT as a Percentage of Total VMT Under Sprawl
	Under Sprawl	Under Infill		
Total Internal	18,571,173	18,158,523	412,650	1.87%
Total Internal/External	3,471,059	4,633,159	-1,162,100	-5.27%
Total	22,042,232	22,791,682	-749,450	-3.4%

data or from a computer program developed by EPA called MOBILE-1. In this study, emission factors for non-methane hydrocarbons were determined by the MOBILE-1 computer program. The inputs specific to the study area required to run the program are:

- Average annual temperature, which was 52°F for Columbus, Ohio
- Average speed, which was 36.3 mph for Columbus, Ohio
- Calendar years.

Total non-methane hydrocarbon emissions were calculated by multiplying emission factors generated from the MOBILE-1 computer program by the VMT determined in this study. They are shown in Table 3. As seen from the results presented in this table, the hydrocarbon emissions will be reduced significantly from 1974 to 2000 under both the sprawl and the infill growth patterns because of the reduction in the emission factor. The difference in the emissions between the two growth patterns resulting from the difference in VMT under the two growth patterns is within the range of error expected in the available data.

4. PARTICULATE EMISSIONS

The objective of this subtask was to estimate existing and future emissions of total suspended particulates (TSP) from residential space heating in Franklin County. TSP emissions from residential space heating result from onsite fuel combustion, and in the case of electrically heated homes, they result from fuel combustion at the electrical power generating station. The quantity of county-wide TSP emissions depends upon the number and type of dwelling units and the type of fuel used for space heating. Since these factors are not likely to vary significantly under the two growth patterns, the county-wide TSP emissions would be the same under the different growth patterns. The estimates of TSP emission given here, therefore, apply to both the infill and sprawl growth patterns. The TSP emissions from onsite and offsite fuel combustion are described separately below.

(1) Onsite TSP Emissions from Residential Space Heating

The onsite TSP emissions from residential space heating in Franklin County in 1975 were obtained from the PEDCo report* and were projected to the year 2000

* PEDCo Environmental Specialists, Inc., "Impact of Future Development upon Particulate Air Quality in Franklin County, Ohio," November 1975.

TABLE 3
Estimated Hydrocarbon Emissions from
Motor Vehicles in Franklin County, Ohio

Year	Population	Composite Emission Factor[1] (gm/mile)	Emissions (tons/year)		Total
			From Internal Trips	From Internal/ External Trips	
1974	890,000	7.05	41,168	7,632	48,801
2000 (Infill)	1,025,000	1.22	8,913	2,274	11,187
2000 (Sprawl)	1,025,000	1.22	9,115	1,704	10,819

[1] Nonmethane hydrocarbons

by using data from the same report. The method for estimating the onsite TSP emissions consisted of estimating the number of dwelling units using different types of fuels for space heating in Franklin County, determining the fuel usage, and multiplying the fuel usage by the appropriate TSP emission factors.

Four types of fuels are used for residential space heating in Franklin County: bituminous coal, fuel oil, natural gas, and LPG. Based on the census data for 1960 and 1970 for Franklin County, the use of coal for residential space heating is declining rapidly and the use of fuel oil and LPG is declining slowly, whereas the use of natural gas is increasing slowly. Assuming that the decline or growth in the number of dwelling units using the four types of fuels is logarithmic, the historic trend was extrapolated to determine the number of dwelling units using these fuels in 1975 and 2000. The following logarithmic relationship was used:

$$(DU)_{x+n} = (DU)_x e^{nr}$$

where $(DU)_x$ = number of dwelling units in the base year
$(DU)_{x+n}$ = number of dwelling units in x + n year
r = rate of change in dwelling units per year

Based on the census data for 1960 and 1970, the value of r was found to be -0.197 for coal, -0.00035 for fuel oil, -0.00735 for LPG, and +0.00087 for natural gas. The estimated number of dwelling units based on the above equation is shown in Columns 2 and 3 in Table 4.

The amount of the four types of fuels used for residential space heating in Franklin County was calculated by multiplying the number of dwelling units by the average fuel usage per dwelling unit per year. The latter was calculated by using the following data:

- Number of degree days in 1975 in Franklin County: 5153
- Heating requirement factor per dwelling unit per degree day: 0.0012 ton coal, 0.18 gal. fuel oil, 26.18 cubic foot natural gas, and 0.2935 gal. LPG.

TABLE 4
Emission of Total Suspended Particulates (TSP)
from Residential Space Heating in Franklin County

Fuel	No. of Dwelling Units Using the Fuel		Fuel Usage/Yr		TSP Emission Factor	TSP Emissions tons/yr	
	1975	2000	1975	2000		1975	2000
Bituminous Coal	795	6	4,916 tons	37 tons	20 lbs per ton of coal	49.16	0.37
Fuel Oil	14,541	14,414	$13,487 \times 10^3$ gal	$13,369 \times 10^3$ gal	10 lb/10^3 gal of oil	67.43	66.84
Natural Gas	275,135	281,184	$37,117 \times 10^6$ ft^3	$37,993 \times 10^6$ ft^3	10 lb/10^6 ft^3 of gas	185.58	189.96
LPG	2,260	1,880	$3,418 \times 10^3$ gal	$2,843 \times 10^3$ gal	1.85 lb/10^3 gal	3.16	2,63
Total						305.33	259.80

The estimated fuel usage is shown in Columns 4 and 5 in Table 4.

The TSP emission factors were obtained from AP-42* and are shown in Column 6 of Table 4. The estimated TSP emissions for 1975 and 2000 are shown in the last two columns of Table 4.

(2) Offsite TSP Emissions from Residential Space Heating

The offsite TSP emissions from residential space heating in Franklin County were estimated by assuming that the electrically heated homes in the county would be supplied electricity from a coal-fired power plant. The number of electrically heated homes in Franklin County is increasing as most new homes are built with electrical heating systems. Using the data on the total number of dwelling units in Franklin County in 1975 and 2000 obtained from MORPC and subtracting the number of dwelling units using onsite fuel combustion for space heating given in Table 4 from the total, the number of electrically heated dwelling units was estimated to be 23,425 in 1975 and 115,591 in 2000.

Assuming that an average dwelling unit in Franklin County requires 26,000 BTU of heat per degree day** the annual heating requirement per dwelling unit in Franklin County, which had 5153 degree days in 1975, is estimated to be 13.4×10^6 BTU. Further, assuming that the overall energy conversion, generation, transmission, and distribution efficiency of a coal-fired power plant is approximately 30 percent, the annual heat input requirement per dwelling unit at the power plant is estimated to be 44.86×10^6 BTU. Finally, assuming that the coal-fired power plant is equipped to control the TSP emissions to meet the New Source Performance Standard of 0.1 lb per 10^6 BTU heat input,

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* U.S. Environmental Protection Agency, "Compilation of Air Pollutant Emission Factors," Publication No. AP-42, April 1975.

** Based on the heating requirement factor for onsite fuel combustion, discussed earlier.

the TSP emissions attributable to supplying electricity for residential space heating in Franklin County in 1975 and 2000 are estimated to be 52.55 tons and 259.00 tons respectively.

* * * *

Thus, based on the above analysis, the TSP emissions from onsite fuel combustion for residential space heating in Franklin County are expected to reduce from 305.33 tons in 1975 to 259.80 tons in 2000, whereas those from a coal-fired power plant supplying electricity for space heating in Franklin County are expected to increase from 52.55 tons in 1975 to 259.00 tons in 2000.

5. EFFECT ON ATTAINMENT STRATEGIES

The hydrocarbon emissions from motor vehicles in Franklin County were projected to the year 1982* and 1987* by linearly scaling the VMT between 1974 and 2000 and multiplying the VMT by the emission factors calculated by using the MOBILE-1 program. The results of these calculations, shown in Table 5, indicate that the difference in the emissions under the two growth patterns is less than 1.23 percent in 1982 and 2.1 percent in 1987, well within the range of expected error in the available data. Thus, the effect of one growth pattern relative to the other on the attainment of ambient air quality standards for photochemical oxidants in the metropolitan Columbus area would not differ significantly.

The TSP emissions from onsite residential space heating in 1982 and 1987 were estimated using the method discussed earlier and are shown in Table 6. Since the total number of dwelling units under the two growth patterns would be the same, the residential space heating requirement and hence the resulting emissions of total suspended particulates under the two growth patterns would not differ significantly. Thus, the effect of one growth pattern relative to the other on the attainment of ambient TSP standard would not differ significantly.

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* According to the Clean Air Act Amendments of 1977, those areas that failed to attain the national ambient air quality standards by July 1977 must attain these standards by December 31, 1982. A five year extension to 1987 may be obtained for attaining the photochemical oxidants and carbon monoxide standards, if certain conditions are met.

TABLE 5
Estimated Hydrocarbon Emissions*
in Franklin County, Ohio

Year	Average Daily VMT	Composite Emission Factor (gm/mile)	Emissions (tons/year)
1982			
Infill	18,923,796	3.288	25,034
Sprawl	18,693,196	3.288	24,729
1987			
Infill	20,427,974	1.722	14,153
Sprawl	19,995,599	1.722	13,853

*From motor vehicles

TABLE 6
Estimated TSP Emissions*
in Franklin County, Ohio

Fuel	TSP Emissions (tons/year)	
	1982	1987
Bituminous Coal	12.37	4.64
Fuel Oil	67.26	66.84
Natural Gas	186.71	187.53
LPG	2.92	2.81
Total	269.26	261.82

*From residential space heating by onsite fuel combustion

APPENDIX GG

EFFECTS OF PARA-DICHLOROBENZENE AND ORTHO-DICHLOROBENZENE ON GERMINATION AND EARLY SEEDLING DEVELOPMENT OF CORN AND SOYBEANS

U.S. EPA
PLANT BIOLOGY LABORATORY
BELTSVILLE, MD

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: August 25, 1978

SUBJECT: Sludge Analysis: Region V

FROM: Robert L. Jasper, Acting Section Head
Safety & Biological Section, CBIB (TS-768)

TO:
Dale Luecht, Project Officer
Water Division, Region V

THRU: Coleman H. Hall
Acting Branch Chief
Chemical & Biological Investigations Branch (TS-768)

THRU: for William S. Murray, Ph.D.
Director
Benefits & Field Studies Division (TS-768)

Attached is the report on effects of ortho- and para-dichlorobenzene on corn and soybean germination and radicle growth. You have received the earlier reports.

Uptake studies will get under way shortly. Details or questions should be discussed with Dr. Bernard Schneider, Radioisotope Laboratory.

Please call Bill Audia on 344-2833 if you have questions regarding the attached report.

Attachment

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
PLANT BIOLOGY LABORATORY - Beltsville, Md.

SUBJECT: Sludge project for Region V

DATE: August 22, 1978

FROM: William V. Audia
Supervisory Plant Physiologist

TO: Dale Luecht, Project Officer
Water Division, Region V

Enclosed is a detailed report by Spencer Duffy and Bernard Schneider on the sludge project concerning effects of PDB and ODB on germination and seedling development of corn and soybeans. Please be free to call FTS 344-2833 if you nave any questions concerning the project.

EFFECTS OF PARA-DICHLOROBENZENE AND ORTHO-DICHLOROBENZENE ON GERMINATION AND EARLY SEEDLING DEVELOPMENT OF CORN AND SOYBEANS

Introduction

Para-Dichlorobenzene (PDB) and Ortho-Dichlorobenzene (ODB) are manufactured in large quantities in the United States and abroad. They are widely dispersed in the environment. PDB is used extensively as a household moth control agent and as a deodorant (McKinney 1970). It has been used in animal repellents, as a fungicide for control of blue mold in tobacco seed beds (Berg 1977), and as a miticide in mycological cultures (Elliot 1948; Crowell 1941).

ODB is used in cleaning solvents, heat transfer media, degreasing agents, and for odor control in sewage treatment plants. Generally, the benzene compounds are toxic and are known to be mitotic poisons (EPA-5-OH-1978).

Samples of Ohio sludge were sent to the Plant Biology Laboratory after chemical analysis had shown varying amounts of PDB and ODB (Appendix A). Processed sludge is being considered for use as fertilizer or as a fertilizer base for agronomic crops. A review of the literature showed limited data on the response of higher plants to PDB and ODB. Data are also lacking on uptake and metabolish of these chemicals by higher plants. If processed sludge is to be used as fertilizer or a fertilizer base and PDB and ODB are components therein, it is imperative that their effects upon plant life be known. The purpose of this research is to determine the effects of PDB and ODB on germination and early seedling development of corn (Zea mays L. 'SS727') and soybeans (Glycine max (L.) 'Beeson FW-7').

MATERIALS AND METHODS

Experiment 1

Germination Study. (Environmental chamber). Ten seeds each of corn and soybeans were placed in 15 x 90 mm glass petri dishes lined with two sheets of 9-cm Whatman No. 2 filter paper. Twenty-five ml of PDB or ODB at 1, 5, 10, 15, and 20 ppm were added separately to each petri dish. These solutions constituted the PDB and ODB standards to which the sludge treatments are compared. PDB and ODB were dissolved in acetone. An acetone check was prepared by mixing 0.37 ml of acetone in 100 ml of distilled water. Twenty-five ml of this solution was applied to 10 corn or soybean seeds. Twenty-five-ml aliquots of sludge diluted with distilled water to give concentrations of 50% or 66% (1 to 1 or 2 to 1) from each liquid sample were added to petri dishes containing 10 corn or soybean seeds. Dry sludge (cake) samples were leached through 400 x 45 mm glass columns using distilled water as the solvent. The leachate was filtered through Whatman No. 2 filter paper at the bottom of each column, collected in a beaker, and diluted as above. Twenty-five ml of diluted sludge leachate were applied to petri dishes containing corn or soybean seeds as above. Dishes to which only distilled water was added served as controls. All dishes were incubated in an environmental chamber in the dark at 23 C and 64% relative humidity for six days. At the end of the incubation period, the number of seeds that had germinated was recorded. Seeds were counted as germinated if radicle (root portion of germinating seed) length was at least 5 mm long. As a measure of seed vigor, radicle length was recorded also.

Combinations of PDB/ODB and sludge dilutions were prepared by mixing each with distilled water 50% (1 to 1) or 66% (2 to 1). Standard concentrations of the PDB and ODB were maintained (1, 5, 10, 15, and 20 ppm). Germination and radicle length of all treatments were recorded six days after incubation. All treatments were replicated five times and arranged in a completely randomized design. Treatment means were separated by the Duncan's Multiple Range Test at the 1% level of significance (Steel and Torrie 1960).

Experiment 2

Paper containers, 150 mm high and 175 mm in diameter, with holes punched in the bottom for drainage, were filled with 3.4 kg of white sand. These containers served as planting beds for the specimen plants, corn and soybeans. Ten seeds each of corn and soybeans were planted in separate pots at a depth of 2.54 cm, and sand was brought to field capacity by sprinkling with a fog nozzle. Standard solutions of PDB and ODB at 1, 5, 10, 15, and 20 ppm were prepared in half-strength Hewitt's medium (Steward 1963). Suspensions of 5% sludge were prepared by diluting the sludge samples with an appropriate quantity of distilled water. The PDB and ODB standards and the 5% sludge suspensions were applied separately to corn and soybeans in 200-ml portions 10 times during the test period. An acetone check was prepared as in Experiment 1, and a 200-ml portion was applied as above. A nutrient check was prepared by diluting Hewitt's medium 50% with distilled water. Pots treated as above with half-strength Hewitt's medium and distilled water served as controls. In order to

maintain an adequate moisture level between treatments, 200-ml portions of distilled water were added to all pots as often as necessary. The liquid rate of application for the PDB/ODB standards and the 5% sludge was 23,545 gallons per acre (174.2 kl per hectare). Treatments were arranged in a randomized complete block with five replications. Plant height measurements were taken weekly during the experimental period. All plants were cut at the sand surface, and fresh weights were recorded. Then plants were dried at 80 C for 72 hours to determine the dry weight. Means were separated as in Experiment 1.

RESULTS

Experiment 1

PDB and ODB did not significantly reduce the germination of corn seeds (Table 1). However, some PDB treatments showed lower soybean germination than controls. Combinations of PDB/ODB did not adversely affect the germination of corn or soybeans. The acetone check had no effect on the germination.

Some sludge treatments (Table 2) adversely affected germination of corn and soybeans. Sludge treatment L had the lowest mean germination for corn, while soybeans appeared more tolerant when diluted 2 to 1 with distilled water.

Generally, PDB or ODB alone or in combination did not adversely affect the radicle length (Table 3). Depression of soybean radicle length by PDB was not evident at the higher concentrations. Sludge treatments D (1:1) and L (1:1) significantly decreased radicle length in germinating corn and soybeans. Also, sludge treatment C was detrimental to radicle growth in soybeans.

Experiment 2

PDB, ODB, or 5% sludge treatments did not adversely affect germination of corn or soybeans (Table 5). PDB and ODB did not adversely affect the height, fresh or dry weight or corn or soybeans. However, some sludge treatments adversely affected fresh and dry weight of corn and soybeans (Tables 6-8). The height of corn was significantly reduced by sludge treatments A, E, G, L, and distilled water 14 days after treatment. Treatments A, E, J, and distilled water significantly reduced height 20 days after treatment. Treatments A, C, D, E, F, G, J, L, and distilled water reduced height of corn 29 days after treatment (Table 6) The height of soybeans was significantly reduced when treated with sludge treatments C, D, G, H, J, and distilled water 14 days after treatment; also by treatments C, D, G, and distilled water 20 days after treatment, and by treatments A, C, D, G, H, and distilled water 29 days after treatment (Table 6).

Distilled water and all sludge treatments, except H and K, significantly reduced the fresh weight of soybeans. The same was true for corn excapt that treatment K did not significantly reduce the fresh weight of corn when compared with the nutrient control (Table 7). All sludge treatments and distilled water significantly reduced the dry weight of corn, and all sludge treatments, except K, significantly reduced the dry weight of soybeans when compared with the nutrient control (Table 8).

CONCLUSIONS

Corn and soybeans planted from seed and treated 10 times over a period of 30 days with PDB and ODB 1, 5, 10, 15, and 20 ppm appeared normal and

as healthy as the nutrient controls. These data suggest that PDB or ODB alone or in combination up to 20 ppm does not adversely affect germination or early seedling development of corn and soybeans. The results of this investigation, however, cannot be conclusive until the uptake and fate of PDB and ODB in corn and soybeans are known. Radioisotope studies are planned to supply information on this phenonomen.

Sludge diluted to 5% solid matter did not adversely affect germination of corn or soybeans in the greenhouse. However, certain sludge treatments did adversely affect germination in the environmental chamber (Experiment 1). The concentration of the sludge in environmental chambers (50% and 33%) along with light and humidity factors perhaps accounts for the difference. Most sludge treatments did adversely affect the fresh and dry weight of both corn and soybeans (Tables 7 and 8). Also, most sludge treatments caused stunting of corn and soybeans 29 days after treatment (Table 6). These data strongly suggest that Metropolitan Columbus, Ohio sludge contains growth-inhibiting agents, that do not appear to be PDB or ODB, which may be detrimental to the normal growth and development of corn and soybeans.

Table 1. Effect of PDB/ODB alone and in combination on germination of corn and soybean seeds (environmental chamber).

Treatment	ppm	Ratio PDB/ODB	Corn Germination %*	Soybean Germination %*
PDB	1	---	96 a	68 a-d
PDB	5	---	92 a	56 ab
PDB	10	---	88 a	68 a-d
PDB	15	---	88 a	52 a
PDB	20	---	78 a	52 a
ODB	1	---	90 a	84 bcd
ODB	5	---	96 a	84 bcd
ODB	10	---	90 a	78 a-d
ODB	15	---	90 a	74 a-d
ODB	20	---	70 a	66 abc
PDB/ODB	1	1:1	72 a	94 cd
PDB/ODB	5	1:1	84 a	86 cd
PDB/ODB	10	1:1	88 a	84 cd
PDB/ODB	15	1:1	94 a	76 a-d
PDB/ODB	20	1:1	78 a	74 a-d
PDB/ODB	1	2:1	88 a	88 cd
PDB/ODB	5	2:1	92 a	92 cd
PDB/ODB	10	2:1	90 a	86 cd
PDB/ODB	15	2:1	88 a	80 a-d
PDB/ODB	20	2:1	78 a	88 cd
PDB/ODB	1	1:2	76 a	88 cd
PDB/ODB	5	1:2	88 a	86 cd
PDB/ODB	10	1:2	86 a	88 cd
PDB/ODB	15	1:2	76 a	96 d
PDB/ODB	20	1:2	76 a	74 a-d
Control (Distilled H_2O)		---	92 a	92 cd
Acetone Check		---	90 a	94 cd

*Means within columns followed by the same letter are not significantly different at the 1% level according to Duncan's Multiple Range Test.

Table 2. Effect of sludge treatments on corn and soybean seed germination (environmental chamber).

Sludge Treatment	Ratio H_2O/Sludge	Corn Germination %*	Soybean Germination %*
A	1:1	28 a-d	16 a
A	2:1	50 def	48 c-g
B	1:1	40 c-f	52 d-h
B	2:1	40 c-f	56 e-j
C	1:1	14 ab	26 a-d
C	2:1	30 a-e	34 a-f
D	1:1	14 ab	22 a-f
D	2:1	20 abc	46 b-g
E	1:1	68 fg	92 k
E	2:1	58 f	80 i-k
F	1:1	52 def	78 h-k
F	2:1	48 def	62 f-i
G	1:1	38 c-f	44 b-h
G	2:1	52 def	54 d-i
H	1:1	32 b-e	18 ab
H	2:1	54 def	64 hij
I	1:1	42 c-f	38 a-g
I	2:1	56 cf	82 jk
J	1:1	48 def	54 d-i
J	2:1	56 ef	32 a-d
K	1:1	48 def	92 k
K	2:1	40 c-f	82 jk
L	1:1	6 a	40 a-g
L	2:1	12 ab	80 ijk
Control (Distilled H_2O)		92 g	92 k
Acetone Check		90 g	94 k

*Means within columns followed by the same letter are not significantly different at the 1% level according to Duncan's Multiple Range Test.

Table 3. Effect of PDB and ODB alone or in combination on the radicle length of germinating corn and soybean seeds (Environmental chamber).

Treatment	ppm	Ratio PDB/ODB	Corn - Radicle Length (mm)*	Soybean - Radicle Length (mm)*
PDB	1	---	109 f	27 abc
PDB	5	---	109 f	20 a
PDB	10	---	111 f	16 a
PDB	15	---	98 ef	13 a
PDB	20	---	98 ef	13 a
ODB	1	---	88 c-f	41 abc
ODB	5	---	96 def	40 abc
ODB	10	---	80 b-f	24 ab
ODB	15	---	62 a-e	24 ab
ODB	20	---	36 a	18 a
PDB/ODB	1	1:1	54 abc	52 c
PDB/ODB	5	1:1	52 abc	25 abc
PDB/ODB	10	1:1	56 abc	25 abc
PDB/ODB	15	1:1	59 a-d	30 abc
PDB/ODB	20	1:1	52 abc	30 abc
PDB/ODB	1	2:1	52 abc	48 bc
PDB/ODB	5	2:1	61 a-d	51 c
PDB/ODB	10	2:1	44 ab	34 abc
PDB/ODB	15	2:1	52 abc	33 abc
PDB/ODB	20	2:1	50 abc	36 abc
PDB/ODB	1	1:2	110 f	36 abc
PDB/ODB	5	1:2	59 a-d	38 abc
PDB/ODB	10	1:2	55 abc	42 abc
PDB/ODB	15	1:2	56 abc	42 abc
PDB/ODB	20	1:2	60 a-d	28 abc
Control (Distilled H_2O)		---	77 b-f	37 abc
Acetone Check		---	84 b-f	39 abc

*Means within columns followed by the same letter are not significantly different at the 1% level according to Duncan's Multiple Range Test.

Effect of sludge treatments on corn and soybean radicle length (mm) (environmental chamber).

Sludge Treatment	Ratio H_2O/Sludge	Corn - Radicle Length (mm)*	Soybean - Radicle Length (mm)*
A	1:1	20 ab	8 abc
A	2:1	63 c-h	30 a-e
B	1:1	58 e-h	34 c-f
B	2:1	48 b-g	32 b-e
C	1:1	8 a	5 ab
C	2:1	23 abc	5 ab
D	1:1	3 a	3 a
D	2:1	8 ab	8 abc
E	1:1	90 h	89 h
E	2:1	80 fgh	59 fg
F	1:1	41 a-f	29 a-e
F	2:1	43 b-f	12 a-d
G	1:1	14 ab	7 abc
G	2:1	26 abc	10 abc
H	1:1	37 a-e	6 ab
H	2:1	71 e-h	37 def
I	1:1	44 b-f	12 a-d
I	2:1	80 fgh	60 fg
J	1:1	26 abc	8 abc
J	2:1	30 a-d	5 ab
K	1:1	66 d-h	77 gh
K	2:1	62 c-h	54 efg
L	1:1	2 a	6 ab
L	2:1	8 a	22 a-d
Acetone Check	---	65 d-h	37 def
Control (Distilled H_2O)		84 gh	39 def

*Means within columns followed by the same letter are not significantly different at the 1% level according to Duncan's Multiple Range Test.

Table 5. Effect of PDB, ODB, and 5% sludge on the germination of corn and soybeans, 10 days after treatment (greenhouse).

Treatment	Germination %*	
	Corn	Soybean
PDB 1 ppm	100 a	98 a
PDB 5 ppm	100 a	96 a
PDB 10 ppm	98 a	98 a
PDB 15 ppm	98 a	98 a
PDB 20 ppm	100 a	100 a
ODB 1 ppm	100 a	100 a
ODB 5 ppm	100 a	100 a
ODB 10 ppm	96 a	98 a
ODB 15 ppm	98 a	100 a
ODB 20 ppm	100 a	98 a
Sludge A	92 a	98 a
Sludge B	98 a	92 a
Sludge C	100 a	98 a
Sludge D	98 a	94 a
Sludge E	98 a	94 a
Sludge F	100 a	100 a
Sludge G	98 a	90 a
Sludge H	98 a	98 a
Sludge I	98 a	98 a
Sludge J	100 a	96 a
Sludge K	100 a	98 a
Sludge L	100 a	96 a
Control (Distilled H_2O)	100 a	98 a
Acetone Check	98 a	100 a
Nutrient Control	100 a	100 a

*Means within columns followed by the same letter are not significantly different at the 1% level according to Duncan's Multiple Range Test.

Table 6. Effect of PDB, ODB, and 5% sludge on the height of corn and soybeans (greenhouse).

Treatment	Corn Height (mm)* Days after Treatment			Soybean Height (mm)* Days after Treatment		
	14	20	29	14	20	29
PDB 1 ppm	131 e	184 fg	256 fgh	156 c-g	278 c-g	519 c-h
PDB 5 ppm	130 e	181 efg	265 fgh	151 c-f	301 d-g	530 d-h
PDB 10 ppm	136 e	185 fg	280 h	160 d-g	301 d-g	492 e-g
PDB 15 ppm	129 e	183 efg	247 fgh	182 fg	325 g	606 fgh
PDB 20 ppm	132 e	182 efg	254 fgh	156 c-g	311 efg	608 fgh
ODB 1 ppm	131 e	183 efg	270 gh	169 d-g	322 fg	558 d-h
ODB 5 ppm	135 e	178 efg	241 e-h	187 g	325 g	569 e-h
ODB 10 ppm	133 e	170 d-g	255 fgh	168 d-g	255 b-g	535 d-h
ODB 15 ppm	138 e	183 fg	276 gh	161 d-g	316 efg	644 h
ODB 20 ppm	132 e	174 efg	241 e-h	156 c-g	300 d-g	631 gh
Sludge A	76 ab	113 ab	149 ab	137 a-d	231 a-d	377 abc
Sludge B	115 de	145 a-f	180 bcd	139 a-e	217 abc	425 a-e
Sludge C	118 de	143 a-f	147 ab	124 abc	194 ab	307 a
Sludge D	100 cd	130 a-d	154 abc	113 a	181 a	316 a
Sludge E	82 abc	107 a	150 ab	151 b-f	253 b-f	465 b-f
Sludge F	101 cd	122 abc	137 ab	137 a-d	228 abc	414 a-d
Sludge G	87 abc	149 b-g	139 ab	125 abc	205 ab	335 ab
Sludge H	127 e	144 a-f	174 bcd	119 ab	220 abc	374 abc
Sludge I	128 e	153 b-g	189 b-e	149 b-f	255 b-g	425 a-e
Sludge J	78 abc	115 ab	147 ab	125 abc	235 a-d	410 a-d
Sludge K	122 de	163 c-g	208 c-f	142 a-e	253 b-f	465 b-f
Sludge L	89 bc	115 a	146 ab	142 a-e	235 a-d	413 a-d
Control (Distilled H_2O)	64 a	104 a	112 a	107 a	180 a	337 ab
Acetone Check	117 de	159 c-g	219 d-g	177 fg	310 efg	561 e-h
Nutrient Control	132 e	179 efg	254 fgh	173 efg	280 c-g	534 d-h

*Means within columns followed by the same letter are not significantly different at the 1% level according to Duncan's Multiple Range Test.

Table 7. Effect of PDB, ODB, and 5% sludge on the fresh weight (aerial parts) of corn and soybeans, 31 days after treatment (greenhouse).

Treatment	Fresh weight (g)*	
	Corn	Soybean
PDB 1 ppm	82.2 gh	40.1 fgh
PDB 5 ppm	82.6 gh	39.4 fgh
PDB 10 ppm	76.8 gh	37.3 efg
PDB 15 ppm	69.7 efg	40.8 fgh
PDB 20 ppm	63.1 def	40.7 fgh
ODB 1 ppm	85.4 h	47.6 h
ODB 5 ppm	75.3 fgh	43.6 gh
ODB 10 ppm	73.0 e-h	39.5 fgh
ODB 15 ppm	79.5 gh	41.3 fgh
ODB 20 ppm	70.2 efg	36.7 efg
Sludge A	19.8 ab	18.1 ab
Sludge B	43.2 c	24.8 bc
Sludge C	17.0 ab	12.9 a
Sludge D	18.6 ab	13.5 g
Sludge E	16.6 ab	18.1 ab
Sludge F	16.1 ab	14.4 a
Sludge G	20.9 ab	14.9 a
Sludge H	43.7 c	26.5 cd
Sludge I	47.8 c	24.5 bc
Sludge J	13.1 ab	14.9 a
Sludge K	51.7 cd	30.2 cde
Sludge L	23.4 b	15.8 a
Control (Distilled H_2O	8.8 a	13.0 a
Acetone Check	79.1 gh	38.7 fg
Nutrient Control	61.3 de	33.1 def

*Means within columns followed by the same letter are not significantly different at the 1% level according to Duncan's Multiple Range Test.

Table 8. The effect of PDB, ODB, and 5% sludge on dry weight (aerial parts) of corn and soybeans, 31 days after treatment (greenhouse).

Treatment	Dry weight (g)* Corn	Soybean
PDB 1 ppm	10.6 hi	6.8 jk
PDB 5 ppm	10.6 hi	6.8 jk
PDB 10 ppm	9.7 f-i	6.5 j
PDB 15 ppm	8.9 efg	6.4 ij
PDB 20 ppm	7.9 de	6.4 ij
ODB 1 ppm	10.5 ghi	7.5 k
ODB 5 ppm	9.9 f-j	6.1 ij
ODB 10 ppm	9.1 e-h	6.5 j
ODB 15 ppm	10.1 i	6.4 ij
ODB 20 ppm	9.4 e-i	6.2 ij
Sludge A	2.5 ab	3.5 cde
Sludge B	5.2 c	4.3 ef
Sludge C	2.6 ab	2.4 ab
Sludge D	2.8 b	2.3 a
Sludge E	1.8 ab	3.2 bcd
Sludge F	2.2 ab	2.4 ab
Sludge G	2.5 ab	2.5 ab
Sludge H	5.3 c	4.5 fg
Sludge I	5.4 c	4.0 def
Sludge J	1.9 ab	2.7 abc
Sludge K	6.5 cd	5.2 gh
Sludge L	3.0 b	3.9 def
Control (Distilled H_2O)	1.1 a	2.3 a
Acetone Check	9.6 f-i	6.2 ij
Nutrient Control	8.3 ef	5.6 hi

*Means within columns followed by the same letter are not significantly different at the 1% level according to Duncan's Multiple Range Test.

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APPENDIX A

Beltsville Laboratory Chemical Analysis of Columbus, Ohio Sludge*

Sample Code	Description	Dichlorobenzene content (ppm)	
		Para	Ortho
A	Lagoon HLIN	2.66	4.13
B	Southerly Zimpro process	ND	ND
C	Southerly special condition	0.62	ND
D	Southerly special condition	0.69	ND
E	Southerly Lagoon	0.37	0.28
F	Southerly special sample (cake)	0.25	0.05
G	Southerly special condition	0.91	ND
H	Southerly special sample process	ND	0.13
I	Southerly special sample Zimpro process	0.01	ND
J	Jackson Pile Zimpro (cake)	2.25	2.17
K	Jackson Pike D-U	ND	0.03
L	Jackson Pike 2-sludge	0.13	0.28

Benefits & Field Studies Division

* Analysis by EPA, BFSD, Analytical Chemistry Section, Residues & Special Projects Labaratory, Bldg. 306, ARC-E, Beltsville, Maryland 20705

ND = none detected.

APPENDIX HH

EPA POLICY STATEMENT CONCERNING THE RELATIONSHIP AMONG EPA, ITS CONTRACTORS, SUBCONTRACTORS, GRANTEES, AND THE PUBLIC

1. RELATIONSHIP OF EPA WITH CONTRACTORS AND SUB-CONTRACTORS IN THE EIS PREPARATION PROCESS;

And

2. REQUIREMENT THAT OPINIONS AND CONCLUSIONS OF EIS CONTRACTORS AND SUBCONTRACTORS BE SUBMITTED TO EPA FOR REVIEW BEFORE PUBLIC DISCLOSURE BY EPA.

To Environmental Protection Agency (EPA) Contractors and Subcontractors

Performing Environmental Impact Statement (EIS) Preparation Work:

EPA policy pursuant to 40 C.F.R. Part 6 regulations (esp. Sections 6.104, 6.208, and 6.304) which implement the 1969 National Environmental Policy Act (NEPA) and applicable court decisions require ongoing EPA participation with its assisting contractors and ultimate EPA evaluation in the EIS preparation process. As part of the evaluation, final decision-making on the contents of the draft and final documents with regard to Title II wastewater treatment grant matters (P.L. 92-500, as amended) remains EPA's responsibility, to be exercised by the Regional Administrator (RA) of each EPA region, including Region V.

Therefore, our joint EIS functions (EPA and contractors) commence with the central inventory-gathering of information pertinent to the proposed project, including feasible alternatives, and then proceed to the evaluation of this information and the reaching of preliminary conclusions by the involved contractors and EPA staff. This, in turn, is followed by a reworking and reanalysis of certain elements of the work product until EPA staff, with the assistance of its contractors, has evolved, with and for the RA, the Draft EIS. As a formal document, the Draft EIS should embody conclusions that are tentatively final; thus, it serves (at that refined stage) to remove most of the evolving, "moving target" character of prior preliminary and interim elements of the process. It is at this obvious juncture that EPA would most frequently seek out maximum public participation in the EIS process, since its involvement then would have its most meaningful content and impact.

Further, the overall EIS preparation process concurrently involves a coordinated input from various governmental and private sources. This is accomplished with an eye toward compliance with various Federal, State and local requirements, including and in addition to NEPA. Among other

additional matters, the EIS process must consider whether the project is consistent with the provisions of the Federal Water Pollution Control Act, the Federal Clean Air Act, the National Historic Preservation Act, and applicable State and local laws, e.g., scenic rivers acts and emission control ordinances. Furthermore, it must utilize disciplines pertinently required to be applied in the particular case. The ultimate responsibility for the integration of these activities resides with EPA.

In addition to the foregoing EPA and contractor assisted activities, (as alluded to above) EPA has a responsibility to appropriately accommodate the public's input and participation in the EIS process. Indeed, applicable EPA regulations [(40 C.F.R. § 6.206(a)(2) and (b)] prescribe publication of a notice of intent to prepare an EIS and the solicitation of "[governmental] agency and public input to a draft EIS". Significantly, such involvement must neither mislead these parties nor detract from the consummation of the total process by EPA itself. In certain instances, EPA may determine to formalize the involvement of the public at large in the various stages of the process, from its inception. That approach entails establishing citizen advisory committees to review and discuss preliminary and interim EIS work products. In other situations, a more informal approach is utilized to attain public input. Where EPA decides to utilize an informal approach, caution must be shown against inappropriate or premature disclosure by EPA or its assisting contractors and subcontractors of evolving and, therefore, changing opinions and conclusions circumscribing the EIS process. Such disclosure could not only mislead and confuse the public but consume substantial amounts of EPA staff time (and funds) in clarifying its full significance. As a result, EPA (not its assisting contractors) has the responsibility of determining at what point or points, in addition to the time commencing at and about the publication of the Draft EIS, public disclosure of EIS conclusions may be timely and appropriate.

Therefore, EPA requires that opinions and conclusions reached by its assisting contractors and subcontractors in connection with their EIS contract work be first submitted to EPA for review before any disclosure by EPA to others.

John McGuire
Regional Administrator

Dated: DEC 1 1978

APPENDIX II

COLUMBUS EIS PROJECT PARTICIPANTS

COLUMBUS EIS PROJECT PARTICIPANTS

U.S. EPA REGION V

DALE LUECHT, EIS Project Officer

- B.S. Chemistry, M.S. Natural Sciences
- Preparation of EIS's on Wastewater treatment facilities in the states of Illinois, Indiana, and Ohio since 1974.

DENNIS LONG, Environmental Engineer

- B.S. Civil Engineering
- Project review and construction grants program management for facilities planning in Ohio since August 1978.

THEODORE ROCKWELL, EIS Project Team Member

- B.A. Environmental Conservation
- EIS's on wastewater treatment facilities with EPA since October 1978.

THOMAS WILLIAMS, EIS Project Team Member

- B.S. Civil Engineering
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BOOZ · ALLEN & HAMILTON, INC.

DAVID W. WEISS, Partner-in-Charge

- B.S. Mechanical Engineering
- 25 years experience in systems analysis and environmental assessment.

LAWRENCE B. CAHILL, Project Manager

- B.S. Mechanical Engineering, M.S. Environmental Engineering, M.A. in Public Administration
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STEPHEN W. BAILEY, Wastewater Treatment Analyst

- B.S. Civil Engineering, M.Eng. Environmental Engineering, registered Professional Engineer
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WILLIAM C. LAMB, Natural Environment Analyst

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- 6 years experience in wastewater management facilities planning and river basis studies.

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APPENDIX JJ

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