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CRITICAL EVALUATION OF A
WASTEWATER TREATMENT FACILITY PLANNING PROCESS:
A MICHIGAN CASE STUDY

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CRITICAL EVALUATION OF A WASTEWATER TREATMENT FACILITY PLANNING PROCESS: A MICHIGAN CASE STUDY

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ABSTRACT

CRITICAL EVALUATION OF A
WASTEWATER TREATMENT FACILITY PLANNING PROCESS:
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By

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The increase of federal involvement in the funding of municipal wastewater treatment plants starting in 1972 has led to examples of small communities not being able to support the operation and maintenance of the sophisticated and often oversized facilities built for them. One such example is the $8 million tertiary treatment plant in rural Clinton County, Michigan. The plant is operating at 20% of capacity and operating costs exceed the facility-plan projections by 200%.

This paper investigates the preparation of that facility plan and attempts to document the degree to which the planning process complied with appropriate Environmental Protection Agency guidelines.

The author concludes that the guidelines were not met in at least seven major areas, resulting in the construction of a facility with serious cost and environmental problems.

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I am most grateful for the patience and encouragement of my wife, Joyce, who assumed so capably many of my business and family responsibilities while I attended graduate school. The assurance and loyal support I received from Joyce, as well as from our four children and

eleven grandchildren, was so sincere and enthusiastic that I had no choice but to see this project to successful conclusion.

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KEY TO ABBREVIATIONS AND NOMENCLATURE

the Act	Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500), U.S. Code, vol. 33, secs. 1254-1376 (Supp. III, 1973)
BOD and BOD_5	Biological Oxygen Demand
CEQ	President's Council on Environmental Quality
DNR	Michigan Department of Natural Resources
DPW	Clinton County Department of Public Works
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
"Facility Plan"	Fishbeck, Thompson, Carr & Huber, Inc., Consulting Civil Engineers, "Facility Plan for Southern Clinton County Sanitary Sewer Authority" (Lansing, Mich.: Southern Clinton County Sanitary Sewer Authority, November 1976)
gal	gallon(s)
GAO	General Accounting Office, U.S. Congress
GNP	Gross National Product
gpd	gallons per day
Guidance	U.S., EPA, Guidance for Preparing a Facility Plan (Washington, D.C.: Government Printing Office, May 1975)
I/I	Infiltration and Inflow
mgd	million gallons per day
mg/l	milligrams per liter
ml	milliliter(s)
NEPA	National Environmental Policy Act of 1969, U.S. Code, vol. 42, sec. 4321 et seq. (1970)
NPDES	National Pollution Discharge Elimination System

O&M	Operation and Maintenance
OMB	U.S. Office of Management and Budget
PRM	Program Requirements Memorandum (issued by the U.S. Environmental Protection Agency)
SCCSSA	Southern Clinton County Sanitary Sewer Authority
WRC	Michigan Water Resources Commission
WQM	Water Quality Management

CHAPTER I

INTRODUCTION

Problem Statement

Passage of the Federal Water Pollution Control Act Amendments of 1972 started what has been termed "the largest public works project in the United States."[1] In order to help local governments meet the water-quality goals established by the Act, Congress provided an initial appropriation of $18 billion to subsidize the construction of municipal wastewater treatment systems. By 1972, great strides had been made in the technology of wastewater treatment, and the Act reflected the prevailing philosophy that any degree of water quality could be attained and, in fact, that water pollution could be eliminated in 13 years with the expenditure of enough money.[2]

Consulting engineering and contracting firms responded with alacrity, encouraged by members of Congress anxious to promote public-works projects in their areas, and sewer construction boomed.[3] The construction projects were highly visible local solutions to what was acknowledged as one of the nation's most serious environmental problems.

The enthusiasm of the construction industry was

augmented by that of municipal officials anticipating that federal grants could lead to growing communities and expanding tax roles. Local officials hired engineers, financial consultants, and bonding attorneys to expedite the funneling of Federal funds into their communities.[4]

While the planning, preliminary engineering, and eligible facilities (i.e., treatment plants) were 75 percent subsidized, the Act did not provide funding for the extension of some of the sewer mains fundamental to the construction of large, central treatment plants, and there was no federal funding for the operation and maintenance of those plants. For many communities, therefore, a big public sewer project was easy to start, but hard to support.

Additional provisions of the Act, and rules later promulgated by the U. S. Environmental Protection Agency (EPA), were intended to prevent unqualified applicants from receiving funding for expensive, high technology treatment plants. Municipalities were required to submit a facility plan that demonstrated a need for wastewater-treatment facilities and proved that all alternate solutions to water-quality problems had been investigated. The Act included the caveat that the applicant must have the "financial capability to insure construction, operating and maintenance of treatment works."[5]

As implementation of the Act proceeded, complaints

filtered back to Washington that some of the wastewater-treatment facilities being financed by the federal government were overbuilt, were prohibitively expensive to operate, and sometimes even caused secondary environmental impacts that were as serious as the original water pollution problem.[6] By 1977, the EPA was calling for a "mid-course correction" in funding centralized sewer systems. EPA Administrator Douglas Costle reported that there had been "an over-dependence upon large central sewer systems."[7]

While national leaders discussed potential problems in general terms, the funding of specific projects continued. In March of 1978, municipal officials of three townships and one city in southern Clinton County, Michigan voted to proceed with the construction of a sophisticated, $8 million tertiary treatment plant. The project was strongly endorsed by Michigan's Water Resources Commission which offered a 5 percent subsidy, and it was approved by the federal EPA, which offered to finance 75 percent. The feasibility of the project was explored in a 239-page facility plan prepared by a consulting engineering company with EPA funding.[8] The viability of the project was affirmed by a municipal financial consultant as well as in several reviews by the EPA and the Michigan Department of Natural Resources (DNR).[9]

As this thesis is being written four years later, the plant is essentially complete, and municipal officials are seeking to establish funding for its operation.

Sewer-use fees in one township, originally estimated to be $28.50 per quarter, are now $51.00, and are projected (by the same municipal financial consultant) to rise to $61.00 in the next year. These fees are in addition to the connection fee of $1,650.00 per residential equivalent, which, if paid in installments at 6 percent interest, amounts to an average of $39.88 per quarter for 15 years.[10]

In addition to the use and connection fees, each municipality on the system has levied a special property tax millage against both users and non-users. One of the four municipalities, Watertown Township, still has no sewer system to connect to the plant, and has had to allocate 25 percent of its local tax revenue to pay its contractual obligations for the project.[11] In December, the area's member of Congress, James Dunn, introduced a bill to provide special aid to another of the municipalities (Bath Township).[12]

The treatment plant is now the largest building complex in the 108 square mile area (with the exception of Capital City Airport). The current value of the plant and sewer system, including the extensions of the collector system that have not been completed, is 11 percent of the total appraised value of the community--nearly equal to the value of all commercial and industrial property combined.[13]

The plant apparently achieves the water-quality

goals that were predicted. However, it has incurred operation and maintenance costs for the first year that are higher than the engineering report predicted would be incurred by the year 1990. In fact, the operation expense in 1981 was nearly equal to the combined property tax collections for all other municipal services in the area, including fire and police protection.[14] Part of the cost problem stems from the fact that the plant is operating at only 20 percent of capacity; after all planned collector extensions are completed, only 25 percent of the capacity will be used. Population growth in the area has been less than half of that projected in the facility plan.[15] It is possible that sewer-use fees, which are as much as seven times higher than those in neighboring communities,[16] may play a role in limiting population influx.

In light of these problems, it is of interest to explore whether the facility was built within federal planning and funding guidelines. The results of such an inquiry may prove useful not only to the taxpayers in Clinton County, but also to citizens, municipal officials, legislators, administrators, and environmentalists throughout the country who are interested in pollution-control projects.

One question raised by examination of the Clinton County project is whether the planning and approval of pollution control facilities always entirely reflects the

stated intent of Congress that recipients of federal funding have the financial capability to operate the plant that the government helps them to build.[17] Also of concern are other ramifications besides the obvious financial stress that may be placed on certain communities. The funding and building of expensive projects also may:

1. affect the level of other municipal services, because of the pre-emption of sewer obligations;

2. increase local opposition to future pollution-control projects in many communities, not just the one directly affected;

3. raise a "backlash" reaction, leading to reduction or abandonment of basic water treatment standards because of a public perception that such standards are excessive[18]; and

4. threaten the solvency and credibility of the federal, state, and local governments for solving other environmental and social problems.

Water-quality problems do not confine themselves to financially advantaged communities. Some communities have pollution problems beyond their financial ability to solve with current funding and technical options. Solutions different from the options now available may be needed.

A first step toward solving the problem may be better identification of financially distressed applicants before grants are approved. More appropriate options for

these communities to control pollution without risking financial distress might then be developed.

In terms of the general structure of the Federal Water Pollution Control Act, it appears that some potentially high risk communities are not being identified for one of three reasons:

1. the guidelines established by Congress and the EPA are not being followed;

2. the wrong guidelines have been established; or

3. the "state of the art" of engineering and financial analysis is not sufficiently advanced to identify potential problems.

Each of these possible explanations suggests a separate study. However, it seems most logical to conduct any search for new guidelines, or to embark upon a critical study of engineering and financial analysis methods, only after investigating the first possibility: determining the extent to which the current guidelines are actually being implemented in the planning process.

An exhaustive study of this type might compare the planning of successful projects with the planning of later financially troubled projects and assess the role of current guidelines in each type of project. A less-extensive study might investigate several unsuccessful projects to discover any thread of continuity of problems between them that could have been obviated by more diligent application of the guidelines.

The magnitude of either investigation is beyond the scope of this paper. This investigation is confined to a single case in which the actual use of current guidelines for planning a wastewater treatment facility will be compared to the procedures outlined in the EPA rules and regulations.

Objective of the Study

It is the objective of this investigation to determine the extent to which the facility planning process, and the resultant decision to construct the Southern Clinton County Wastewater Treatment Plant, complied with appropriate provisions of the Federal Water Pollution Control Amendments of 1972.[19]

Hypothesis

It is hypothesized that many of the provisions of the Federal Water Pollution Control Act Amendments of 1972 were ignored or circumvented during the planning for the construction of the Southern Clinton County Wastewater Treatment Plant.

Research Methods

The Law

The first step in determining the extent to which the Southern Clinton County Sanitary Sewer Authority (SCCSSA) planning process complied with the law is to examine the law.

The Federal Water Pollution Control Act Amendments of 1972 (the Act) covers 89 pages, with provisions dealing with topics ranging from national-policy goals to specific local concerns, such as those related to Alaskan villages and to marine sanitation devices. Among those provisions is "Title II--Grants for Construction of Treatment Works," initially providing $18 billion to subsidize the construction of wastewater treatment plants.[20]

Sections 201, 203, and 204 of that title establish the general purpose, limitations, and conditions for funding treatment facilities, and instruct the EPA to establish appropriate rules and regulations to implement the Act. These rules were published in the Federal Register on February 11, 1974,[21] and were summarized in a very concise EPA publication entitled Guidance for Preparing a Facility Plan (Guidance) in May, 1975.[22] The EPA document outlines the recommended procedure for preparation of a facility plan by a municipality or its consultants. It touches upon most of the applicable limitations and conditions of the Act, with reference to the original Federal Register citations. The process it outlines appears to be less redundant and better organized for day-to-day use and application than is the wording of the original Act.

Table 1 presents a summary of the Table of Contents from that publication. Since the Guidance document is the reference recommended to consultants by the EPA, and is

TABLE 1

SUMMARY OF THE TABLE OF CONTENTS OF
GUIDANCE FOR PREPARING A FACILITY PLAN

1. Introduction
2. Facility Planning Area
3. Plan of Study (POS)
4. Facility Plan
    - Step 1: Effluent Limitations
    - Step 2: Assess Current Situation
    - Step 3: Assess Future Situation
    - Step 4: Develop and Evaluate Alternatives
        - 4.1 Baseline: Optimum Operation of Existing Facilities
        - 4.2 Regional Solutions
        - 4.3 Alternative Waste Treatment Systems
        - 4.4 Environmental Impacts
        - 4.5 Additional Guidance on Evaluation
    - Step 5: Select Plan
    - Step 6: Preliminary Design of Treatment Works
    - Step 7: Arrangements for Implementation
5. Public Participation
6. Evaluation of Costs
7. Environmental Evaluation
8. Plan Selection
9. Format for Submission of Plan
10. Review, Certification, and Approval of Plans

used by the EPA for reviewing facility plans, it is used in the present study as the basis for reviewing the application of the Act to the individual case in question. The present study relies supplementally upon the original EPA rules and regulations as promulgated in the Federal Register; official EPA policy statements and correspondence; the provisions of the enabling legislation; and interviews with the people responsible for implementing the law. Articles and comments by qualified observers are also considered as they add insight into the intended thrust or priority of specific provisions of the law. Also considered is whether any provisions being studied have been removed from the discretion of the planner by operation of administrative or judicial law.

The significance of the guidelines was reinforced by a Federal District Court decision in 1976.[23] The City of New Haven, Conn., had applied to the EPA for a federal grant to construct a secondary treatment plant. Of two sites being considered, the city preferred the more expensive, since the other location was reserved by the city for an industrial redevelopment area. The city contended that the use of the redevelopment area for a treatment plant would cost large sums in foregone tax revenue, would seriously interfere with optimum land use planning, and would result in other "adverse social consequences." The basis for the city's position was the provision in the EPA guidelines that:

> The most cost effective alternative shall be the waste treatment management system determined from the analysis to have the lowest present worth and/or equivalent annual value without overriding non-monetary costs.[24]

The guidelines provide that social and environmental costs "shall be accounted for descriptively in the analysis in order to determine their significance and impact."[25]

Evidence presented to the court showed that the use of the city's preferred site would cost $6 million more than would the use of the redevelopment area. The EPA had rejected the plan as not being cost effective. In reaching this decision, the EPA regional administrator acknowledged the responsibility to recognize nonmonetary costs, but said that the EPA generally followed a "rule of thumb" to the effect that nonmonetary costs were not allowed to override monetary costs if the monetary difference between options was more than $500,000.

In finding for the city, the court declared:

> The guidelines call for the exercise of judgment in each instance in determining whether monetary cost differences are outweighed by nonmonetary costs. When administrators conclude that a site must be rejected because its monetary costs are more than $500,000 greater than an alternative and that a difference of this size cannot be overridden by any nonmonetary costs, they have failed to follow their own published guidelines. . . .
>
> Under the present regulations, it [the EPA] must make that judgment upon a careful consideration of the true significance of the nonmonetary costs, unfettered by an arbitrary unpublished rule which, unbeknown

> to the applicant or to the Congress, dictates that at certain levels of monetary cost difference, the non-monetary costs are never to be permitted to prevail.[26]

Thus, in the eyes of the court, the published guidelines enjoy the status of administrative law and are not to be construed as mere suggestions or recommendations.

The Case Study

The process of comparing the law with the individual case involves documenting the planning that was actually done by the SCCSSA. The principal source to be used for this comparison is the 239-page "Facility Plan for Southern Clinton County Sanitary Sewer Authority"[27] (the "Facility Plan"). This is the document required by the Act and on the basis of which the EPA made its decision on federal funding. Much of the investigation here will be original research. The researcher will introduce correspondence, observations, articles, and remarks by people who were involved in the SCCSSA study in an effort to provide an understanding of the "Facility Plan" and its consequences.

Basis of Comparison

Some sections of the "Facility Plan" (e.g., the definition of the study area) follow the format of the EPA guidelines so precisely that compliance is not in question. Other provisions appear to have been ignored completely; their absence from the "Facility Plan," without explanation, leaves open the question of whether the plan followed

the guidelines in those particular respects.

The majority of the items subject to comparison fall between these extremes. The degree of conformity with the law may not be readily measurable by any absolute scale: observers of different perspectives or persuasions might draw differing conclusions. However, the inability to reduce a study of this nature to objectivity does not negate the value of the inquiry. The frequency of non-unanimous decisions by appellate courts attests to the lack of consensus on many legal and social issues. In examining these issues, this researcher will attempt to present the intent of the law as interpreted by the best authority available. EPA rules and regulations, Congressional committee testimony, court cases, and opinions of recognized authorities in the field will be examined from the perspective of that familiar legal paradigm, the "reasonable person," with the recognition that in some cases the best evidence may be inconclusive.

In judging the rightness or wrongness of decisions made five years ago, an objective observer must weigh the evidence as it appeared at the time, recognizing the time and budgetary constraints that were present. In all fairness, the planning activities must be analyzed without the benefit of hindsight. If such an examination shows that the planners made a reasonable effort to comply with the provisions of the law at the time, the hypothesis will not have been proven. Whatever the outcome, the investigation may

reveal potential problem areas to be taken into account in current planning activities, and may provide insight into current pollution control proposals.

Literature Review

The first recognition by the EPA of a possible problem in the facility planning process under the Act apparently is contained in an August, 1976 memorandum from John T. Rhett, deputy assistant administrator, to his regional administrators, indicating that many wastewater treatment facilities then being funded were "too expensive for the local population." Rhett requested that facility plans be checked more closely for consideration of alternative treatment systems, including septic tanks, and that local costs be revealed in the plans.[28]

EPA Administrator Russell E. Train outlined the agency's concern in December, 1976, by observing that alternate systems for wastewater treatment generally appeared "to have been overlooked, in part, because . . . [they are] not in the facility planner's ordinary vocabulary of solutions."[29]

To help expand that vocabulary, Train's successor, Douglas Costle, convened a conference of engineers, planners, and municipal officials at Reston, Virginia in April, 1977. The conference was entitled "Less Costly Wastewater Treatment Systems for Small Communities"; its universal theme--from the opening remarks by Senator Jennings

Randolph (D-West Virginia), Chair of the Senate Public Works Committee, to the "horror stories" presented by officials from bankrupt communities and the technical papers presented in various workshops--was that Congress and the EPA intended to stress the use of low-cost, low energy consuming, alternate treatment facilities for small communities. Decentralized systems, including individual septic tanks, were to be encouraged, and were soon to become eligible for federal grants. In four different presentations, EPA officials iterated the seriousness of excessively costly treatment systems. However, there was no discussion of better methods for identifying this potential problem other than mandating the complete evaluation of existing alternative treatment systems.[30]

The President's Council on Environmental Quality (CEQ) discussed the problem in its 1977 annual report. According to the CEQ, one issue in the management of the Municipal Grants Program[31] was a "continued concern [as to] whether the money is being spent in the most cost effective manner--particularly when used for tertiary treatment facilities and capital intensive facilities in small communities."[32] The CEQ indicated that there was a tendency to build oversized facilities as early as 1974, and it quoted a General Accounting Office study of 26 advanced treatment plants, most of which were built "without a thorough analysis of whether they were needed."[33]

The CEQ's reports for 1978 and 1979 further discussed communities' ability to pay for high energy treatment systems.[34] The reports cited revised EPA rules and the Clean Water Act of 1977[35] as efforts to solve the problem, but the perspective of the reports is broad, and they did not discuss specific application of EPA guidelines.

A review of Selected Water Resources Abstracts, published by the U.S. Department of the Interior, reveals no studies involving the use of the EPA funding guidelines.[36] There are several technical studies on the use of alternate treatment systems, including a three-volume treatise entitled Alternatives for Small Wastewater Treatment Systems published by the EPA in October, 1977 (about the same time the EPA approved building the SCCSSA tertiary treatment plant).

Also of interest are abstracts of several General Accounting Office reports relating to wastewater-treatment plants in small communities. In 1975, the General Accounting Office questioned the rising costs of operation and maintenance of these plants, compared them to pollution-control results, and suggested that more attention be given to cost/benefit analysis.[37] Another GAO report, "Better Data Collection and Planning Is Needed to Justify Advanced Waste Treatment Construction,"[38] is cited by the CEQ in recommending more careful study before the building of tertiary treatment plants. In a 1980 report, "Costly

Wastewater Treatment Plants Fail to Perform as Expected,"[39] a sampling of 242 plants showed that 87 percent were in violation of their discharge permits and 37 percent were in "serious violation"--exceeding discharge limits by more than 50 percent for four consecutive months. In March and June of 1981, the GAO issued a report on an unsuccessful treatment plant in Virginia and another in Wyoming.[40] These reports do not investigate the facility-planning process, but they do imply a need for further study of that process.

The planning phase was addressed more directly by John M. Lishman of the National Wildlife Federation in a paper entitled, "Second Interim Review of EPA 201 Wastewater Treatment Facility Grant Program Documents."[41] Lishman discussed the EPA guidelines for Environmental Impact Statements (EISs), and cited several instances when the EPA decided that oversizing of treatment plants by two or three times was not an impact serious enough to require an EIS. He criticized the EPA regulation regarding preparation of a formal EIS (as opposed to the rather cursory Environmental Impact Assessment required for all projects). The regulation requires an EIS only for projects "which, on balance, have adverse effects."[42] Under a literal interpretation of this regulation, Lishman argued, the EPA would require an EIS only for projects that had already been deemed unfundable, so there would never be

any Environmental Impact Statements.

A review of Dissertation Abstracts International, under the topics of "Environmental Sciences" and "Law and Political Science" from 1974 to date, reveals Master's and Doctoral theses with topics ranging from technical subjects such as the power consumption and air pollution of wastewater treatment plants[43] and biota in a lagoon system[44] to extremely broad perspectives, such as "A Paradigm for Environmental Management."[45] "Environmental Management in Local Government: A Study of Local Government Response to Federal Mandate"[46] is an interesting general discussion of the effect upon local government of federal laws such as Act 92-500. The report concludes that "the vast majority of local jurisdictions have neither the resources nor the expertise to establish successful environmental programs." The dissertation is based upon the results of a survey investigating the political consequences of pollution control more than the financial or environmental consequences.

Notes--Chapter I

[1]U.S., Environmental Protection Agency, Guidance for Preparing a Facility Plan (Washington, D.C.: Government Printing Office, May 1975), Foreword (by James L. Agee).

[2]Federal Water Pollution Control Act, Amendments of 1972, U.S. Code, vol. 33, secs. 1254-1376 (Supp. III, 1973) (Public Law 92-500), sec. 101(a)(1) provides that "it is the national goal that the discharge of pollution into navigable water be eliminated by 1985."

[3]"Facilities construction has created a new industry within our economy, providing many jobs." John R. Quarles, Deputy Administrator, U.S. Environmental Protection Agency, speech to the Water Pollution Control Federation Government Affairs Seminar (Washington, April 6, 1976).

The EPA estimated that pollution-control expenditures added 0.2 percent to the Gross National Product (GNP) in 1976 and lowered the national unemployment rate by 0.5 percent. It estimated (in 1976) that by 1983, pollution control would have added 3.6 percent to the GNP and 4.7 percent to the Consumer Price Index. U.S., Environmental Protection Agency, "The Macroeconomic Impacts of Federal Pollution Control Programs: 1976 Assessment" (Washington, D.C.: Government Printing Office, January 1977).

[4]Highlights, the monthly engineering news magazine of the Water Pollution Control Federation, reported in March, 1976 that the $18 billion was nearly allocated and that "22 states will run out of construction grant funds by March, 1977." Sen. Edmund Muskie sponsored a bill to appropriate an additional $7 billion to the program. Highlights 13(3) (March 1976).

A year later, the Muskie bill had failed; instead, $1 billion had been appropriated in early 1977. "A number of states are expected to exhaust their allotments in the coming months. . . . Program regulations specify that any states who do not obligate all of their allotment will have the balance reapportioned among the other states. . . . A substantial number of states and a large amount of money could be involved in the scramble." Highlights 14(7) (July 1977):4.

[5]Sec. 204(b)(1)(c).

[6]For instance, the village of Whitetown, Indiana attempted to file bankruptcy papers in 1976 because of

sewer construction and operation costs. The cost of the treatment plant reportedly exceeded the assessed valuation of the town. James L. Gamble, president of the town board, Whitestown, Indiana, address to the "National Conference on Less Costly Wastewater Treatment Systems for Small Communities" sponsored by the U.S. Environmental Protection Agency (Reston, Va., April 12, 13, 14, 1977).

[7]Douglas Costle, Administrator, U.S. Environmental Protection Agency, address to the "National Conference on Less Costly Wastewater Treatment Systems for Small Communities" (Reston, Va., April 12, 13, 14, 1977).

[8]Fishbeck, Thompson, Carr & Huber, Inc., Consulting Civil Engineers, "Facility Plan for Southern Clinton County Sanitary Sewer Authority" (Lansing, Mich.: Southern Clinton County Sanitary Sewer Authority, November 1976).

[9]Chapter VII of this paper describes the review procedure in detail.

[10]These are the rates in DeWitt Township, the largest of the municipalities involved. DeWitt Charter Township, "Minutes of the Meeting (Sept. 1, 1977).

[11]Interview with Herman Openlander, Assessor, Watertown Township, March 4, 1982.

[12]An Act to Amend Public Law 97-117, intr. by Rep. James Dunn (R-Michigan), Dec. 29, 1981.

[13]Total plant and collection system values, including estimated collection extensions during the coming year and inflation adjustments for older parts of the plant and collection systems, are estimated to be $38,113,918. Total state equalized value on Jan. 1, 1980 was $170,115,190, according to Leon Thelen, Clinton County Assessor. This figure would indicate a market value for the area of $340,450,380. The market value of all industrial and commercial property in the area was $46,945,074 of that amount. Calculations by the author.

[14]The 1981 budget for the operation and maintenance of the plant and sewer system was $620,725. Southern Clinton County Sanitary Sewer Authority (SCCSSA), "1981 Budget" (n.p., n.d.), presented to the SCCSSA Board. SCCSSA, "Minutes of the Meeting" (Sept. 11, 1980). Total property tax

collection for the four municipalities in 1979 was $637,019.33, including penalties and collection fees. This does not include school millage or revenue from state or federal grants or allocations. For DeWitt Township, 1979 property tax collections were $187,838.43. ("DeWitt Charter Township Budget for 1981," adopted Oct. 27, 1980 [DeWitt Township files, Lansing, Mich.].) Property tax collections in Bath for that year were $127,526.90. (See "Proposed Budget for 1981 for Bath Charter Township," Bath Charter Township, Bath, Michigan.) Watertown Township tax revenues were estimated at $118,800 by Sy Thingstad, Treasurer of the township. (Interview with Sy Thingstad, Watertown Township, Dec. 2, 1980). Tax revenues for 1979 for the City of DeWitt were estimated by City Administrator James Spalding to be $202,854. (Interview with James Spalding, City of DeWitt, Feb. 24, 1981.)

[15]The population was expected to increase by 6,231 between 1970 and 1980. (Fishbeck et al., "Facility Plan.") The 1980 census showed the actual increase to be 2,767. (Source: Tri-County Regional Planning Commission, "Population and Housing Trends in the Tri-County Region by Minor Civil Division" [Lansing, Mich.: Tri-County Regional Planning Commission, Dec. 17, 1980].)

[16]Sewer-use fees in the City of Lansing, the largest municipality in the adjoining area, are based upon water consumption, but average approximately $7.00 per quarter per residential unit. (Lansing Board of Water and Light, "Schedule of Sewerage Rates," and "Urban Water Service Rate" [Lansing, Mich.: Lansing Board of Water and Light, June 1, 1980].)

[17]Federal Water Pollution Control Act, Sec. 204(b)(1): "The Administrator [of the EPA] shall not approve any grant for any treatment works . . . unless he shall first have determined that the applicant . . . has legal, institutional, managerial and financial capability to insure adequate construction, operation and maintenance of treatment works."

[18]In 1976, the citizens of Firchberg, Mass. refused to vote any funds whatsoever for the operation of a new treatment plant. (Kenneth L. Johnson, Deputy Regional Administrator, EPA, address to the "National Conference on Less Costly Wastewater Treatment Systems for Small Communities" sponsored by the EPA [Reston, Va., April 12, 13, 14, 1977].

[19]Federal Water Pollution Control Act.

[20]Ibid., Sec. 207.

[21]U.S., EPA, Regulations, Federal Register 39, no. 29, Feb. 11, 1974 (reprinted in U.S., EPA, Guidance, app. B).

[22]U.S., EPA, Guidance.

[23]City of New Haven v. Train, 424 F. Supp. 648 (D. Conn. 1976).

[24]"Cost Effective Analysis Guidelines," Code of Federal Regulations, Ch. 40, Part 35, App. A. The concepts of Present Worth and Equivalent Annual Value are discussed in Chapter V of this paper.

[25]Ibid.

[26]City of New Haven v. Train, 424 F. Supp. 648 (D. Conn. 1976).

[27]Fishbeck et al., "Facility Plan."

[28]John T. Thett, Deputy Assistant Administrator for Water Program Operations, U.S. EPA, Proposed Program Requirements Memorandum (PRM) re "Eligibility of Septic Tanks and Other Small Treatment Systems" (U.S., EPA, Aug. 18, 1976).

[29]Russell E. Train, Administrator, U.S. EPA, memorandum re "Encouraging Less Costly Wastewater Facilities for Small Communities" (U.S., EPA, Dec. 30, 1976).

[30]Notes of the author (who attended the conference); printed texts of speeches made available at the conference. Notes of the author are from tape recordings of speeches.

[31]Federal Water Pollution Control Act, Sec. 202.

[32]U.S., President's Council on Environmental Quality, Environmental Quality 1977: The Eighth Annual Report of the Council on Environmental Quality (Washington, D.C.: Government Printing Office, December 1977), p. 28.

[33]Ibid., p. 33.

[34]U.S., President's Council on Environmental Quality, Environmental Quality 1978: The Ninth Annual Report of the Council on Environmental Quality (Washington, D.C.: Government Printing Office, December 1978). Also,

U.S., President's Council on Environmental Quality, Environmental Quality 1979: The Tenth Annual Report of the Council on Environmental Quality (Washington, D.C.: Government Printing Office, December 1979).

[35]Clean Water Act of 1977, U.S. Code, vol. 33, Sec. 1251 et seq. (Supp. 1976) (Public Law 95-217), Dec. 27, 1977.

[36]U.S., Department of Interior, Office of Water Research and Technology, Selected Water Resources Abstracts (Washington, D.C.: Government Printing Office, monthly, Jan. 1974 through February 1980).

[37]U.S., Comptroller General, "Potential of Value Analysis for Reducing Waste Treatment Plant Costs" (Washington, D.C.: General Accounting Office, U.S. Congress, May 8, 1975).

[38]U.S., Comptroller General, "Potential of Value Analysis for Reducing Waste Treatment Plant Costs" (Washington, D.C.: General Accounting Office, U.S. Congress, Dec. 21, 1976).

[39]U.S., Comptroller General, "Costly Wastewater Treatment Plants Fail to Perform as Expected" (Washington, D.C.: General Accounting Office, U.S. Congress, Nov. 14, 1980).

[40]U.S., Comptroller General, "EPA Actions Against the Hopewell, Virginia, Wastewater Treatment Facility" (Washington, D.C.: General Accounting Office, U.S. Congress, March 3, 1981), and U.S., Comptroller General, "Wyoming Wastewater Treatment Facility Proves Unsuccessful" (Washington, D.C.: General Accounting Office, U.S. Congress, June 15, 1981).

[41]John M. Lishman, "Second Interim Review of EPA 201 Wastewater Treatment Facility Grant Program Documents" (Washington, D.C.: National Wildlife Federation).

[42]Code of Federal Regulations, Ch. 40, Part 6.200 (a)(1).

[43]Brian J. Buia, "Wastewater Treatment Plants: Power Consumed and Relative Contribution to Air Pollution" (Master's Thesis, Lowell Technological Institute, 1974).

[44]W. Randolph Frykberg, "Biota and Environment of the Muskegon, Michigan, Combined Industrial and Municipal Wastewater Storage Lagoons" (Ph.D. Dissertation, Western Michigan University, 1976).

[45]Robert Van Johnston, "A Paradigm for Environmental Management" (Ph.D. Dissertation, University of Southern California, 1976).

[46]Alan H. Magazine, "Environmental Management in Local Government: A Study of Local Government Response to Federal Mandate" (Ph.D. Dissertation, University of Maryland, 1976).

CHAPTER II

THE SETTING

The area involved in this case study is comprised of three townships and one small city in Clinton County, Michigan. The area is rural, except for several pockets of low-density subdivisions and local shopping facilities, built as a result of mild growth pressure from the City of Lansing, which is immediately to the south. The 1970 census (the latest available when the project was planned) indicated a population of 19,716 for the entire area, sewered and unsewered.[1]

The first municipal sewers in the area were constructed in the City of DeWitt in 1962, along with a primary treatment plant with a capacity rated at 0.2 million gallons per day (mgd).[2] In dry weather, the plant operated at less than capacity, but the degree of treatment was minimal.

The Township of DeWitt completed the first phase of its sewer system in 1971 with the construction of a 0.8 mgd secondary treatment plant about a mile from the city plant.[3] The township system was built in response to threatened legal action by the Michigan Water Resources Commission, which had found evidence of failing septic systems, including septic tanks connected to storm drains without benefit of drain fields.[4] Although the offending

area was contiguous to, and within two miles of, the City of Lansing, the possibility of receiving sewer service from the city was thought to involve a threat of political annexation, so the possibility was never seriously considered.[5]

The subdivisions generating the sewage were located as far as six miles from the treatment plant site, located on the only river in the area.[6] By 1973, 41 miles of sewer lines had been installed in the Township to serve about 1,200 customers.[7]

Financing for the project had been arranged by the Clinton County Department of Public Works (DPW) with the full faith and credit of the county. The DPW operated the plant until the formation of the Southern Clinton County Sanitary Sewer Authority (SCCSSA), and the DPW remains the plant's owner until the county bonds are retired. The total cost of the DeWitt project was $7,422,600, including nearly $3 million in state and federal grants. The local share was financed by revenue bonds requiring payment through 1997.[8]

Bath Township was also required by the Water Resources Commission to build a municipal sewer system in 1974, owing primarily to the degradation of water quality in Park Lake. The first precursor to a concept of a regional plant appeared at this time, as Bath Township contracted for 0.2 mgd of treatment capacity in the DeWitt plant rather than building its own treatment facility.[9]

The total cost of this project, to serve fewer than 600 customers, was $4 million, including a $750,000 grant from the state. Complications in the federal appropriation and allocation procedures at the time prevented Bath from qualifying for a federal grant.

The third township in the area, Watertown Township, had no municipal sewer system prior to the facility-planning process.

Thus, municipal sewer systems were fairly new in the area, and two of the three systems caused financial strain, serving small numbers of customers compared to the cost of the systems.[10]

Into this situation stepped the Water Resources Commission, reporting that pollution-control efforts to date had led to degradation of the water quality of the Looking Glass River. The Commission required operators of both treatment plants to upgrade the quality of treatment to tertiary.[11]

To cope with the new standards, Bath and DeWitt Townships established the SCCSSA in December, 1975. Invitations to join the SCCSSA were extended to the City of DeWitt, which accepted immediately, and Watertown Township, which joined the authority in 1977. The four municipalities established their respective capacity requirements and agreed to pay for the administrative expenses and any capital improvements in the following proportions[12]:

City of DeWitt	11.3131%
Bath Charter Township	12.7273%
Township of DeWitt	55.7576%
Watertown Charter Township	20.2020%

Members of the governing board of the authority were appointed by each municipality. Representation was in roughly the same proportion as the amount of capacity contracted by the municipality.

The SCCSSA assumed operating control of the DeWitt Township plant on Jan. 1, 1976 (Watertown was not yet committed); within two weeks, the SCCSSA hired the consulting engineering firm of Fishbeck, Thompson, Carr & Huber, Inc. to prepare a facility plan and apply for federal and state grants to improve the sewage-treatment system.

The consultants spent nearly a year preparing the "Facility Plan" at a cost of $63,000, 75 percent of which was funded by the EPA. The consultants recommended the abandonment of the city plant and the rebuilding and expansion of the township plant to six times its capacity at the time. They also recommended the construction of several miles of new sewers in order to connect outlying areas to the new plant, to use some of the proposed excess capacity and meet what the engineers construed as a federal requirement for regional treatment.[13]

It is this "Facility Plan" that will be analyzed

in the present study. No effort will be made to determine the technical validity of any element of the plan. The investigation will be limited to the institutional setting and the procedures used to reach decisions, as compared to the EPA guidelines.

Notes--Chapter II

[1]Fishbeck et al., "Facility Plan," p. 57, Table 6.

[2]Interview with James Spalding, City Administrator, City of DeWitt, Feb. 11, 1981.

[3]Fishbeck et al., "Facility Plan," p. 20.

[4]"DeWitt Township Resigned to Sewer System Expense," The State Journal, Dec. 18, 1969, p. 2B.

[5]Ibid.

[6]See map of the three-township area, Figure 1.

[7]Stauder, Barch and Associates, municipal bond financial and marketing consultants, letter to DeWitt Township, Oct. 15, 1971.

[8]Clinton County Department of Public Works (DPW), Annual Report (St. Johns, Mich.: DPW, 1971, 1982, 1973, 1974, and 1975).

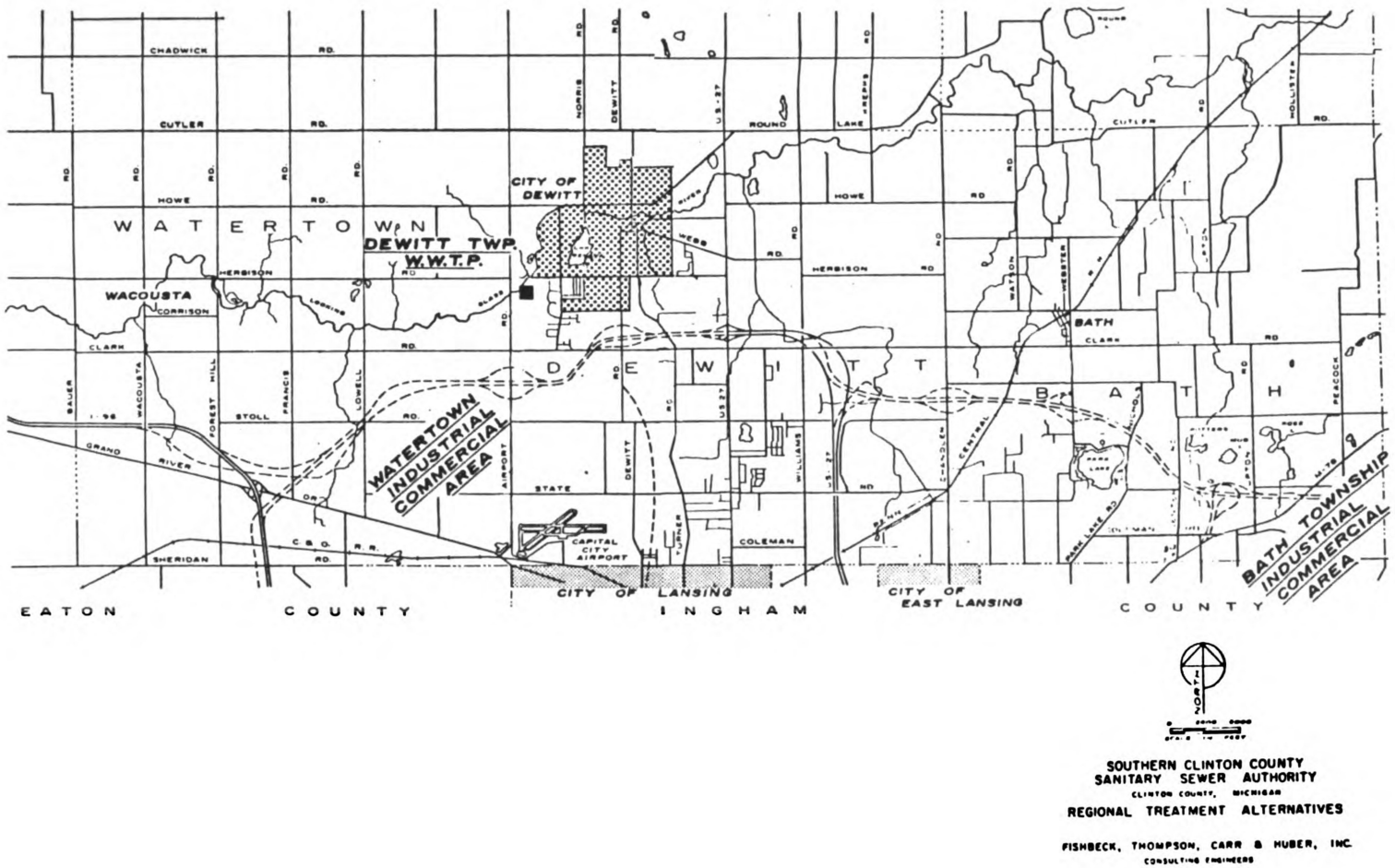
[9]Ibid.

[10]See documentation in Chapter V of this paper.

[11]State of Michigan, Department of Natural Resources, Water Resources Commission (WRC), "Final Order of Determination," June 28, 1977. See Chapter III of this paper for qater quality treatment standards.

[12]SCCSSA, "Clinton County Sanitary Sewage Treatment and Disposal System COntract," Jan. 27, 1977.

[13]Fishbeck et al., "Facility Plan," p. 7.



SOUTHERN CLINTON COUNTY
SANITARY SEWER AUTHORITY
CLINTON COUNTY, MICHIGAN
REGIONAL TREATMENT ALTERNATIVES

FISHBECK, THOMPSON, CARR & HUBER, INC.
CONSULTING ENGINEERS

Figure 1. Map of Three-Township Area.

SOURCE: Fishbeck et al., "Facility Plan."

CHAPTER III

PREPARATION OF THE FACILITY PLAN

Introduction

The first section of the EPA's Guidance for Preparing a Facility Plan document explains the purpose of the document and establishes its authority:

> This guidance suggests procedures for preparing a facility plan for publicly-owned treatment works. The plan is required before a municipality may obtain a Federal grant under the Federal Water Pollution Control Amendments of 1972 to prepare detailed design plans and specifications, and to construct the treatment works itself.
>
> The approach used here is to describe the requirements in the applicable laws and regulations and suggest a planning process by which they can be met.[1]

Areawide Waste Treatment Management Plans

The first requirement for a successful facility plan, according to the booklet, is to coordinate the planning process with the Section 208 Areawide Waste Treatment Management Plan. Section 208 of the Federal Water Pollution Control Act establishes an ambitious planning process to coordinate all waste-treatment management in a state, within regions established by each state governor.[2] In addition to considering such diverse problems as solid waste, non-point water pollution (including

agriculture), and land-use implications, the regional planning agencies are to coordinate the planning and construction of municipal wastewater treatment plants.

Nationally, while the construction industry moved with dispatch to accommodate the $18-billion mandate of Section 201, the EPA began what became a three-year series of hearings on proposed Section 208 regulations, in an attempt to reach consensus among environmental, governmental, and industrial constituencies.[3] Until the Section 208 machinery was in place, the EPA had little choice but to acknowledge in its guidelines that "completion of facility plans should not be dependent on the areawide planning process."[4]

Locally, the 208 planning process was administered for a three-county area (Clinton, Eaton, and Ingham) by the Tri-County Regional Planning Commission. The process began in July 1975 and the final report was presented in August 1977.[5] Thus, "the cart came before the horse": the areawide plan was completed nine months after the SCCSSA facility plan. The engineers seem to have complied with the guidelines' requirements that they submit the plan to the 208 agency for timely review and that they include the Tri-County Regional Planning Commission's comments and their responses (printed in Appendix B of the plan).

State Responsibilities

The guidelines give the state a central role in the facility-planning process. The state is responsible for establishing the boundaries of the planning area and for preparing a priority list for construction grants.[6] In the SCCSSA case, the Michigan Department of Natural Resources (DNR) performed both functions, without controversy--until the entire matter of priority procedures became the subject of a federal lawsuit.

Number one on the priority list was the Detroit wastewater treatment plant, which provided primary treatment for 25 percent of the state's population. When the federal funds for 1977 were released by the Nixon administration, Detroit was scheduled to absorb most of Michigan's share, until the EPA discovered that Detroit was a year behind in its planning and could not use $400 million. Fearful that the money might pass on to other states, several Michigan cities and planning agencies, including the SCCSSA, joined an ongoing lawsuit between the EPA and the City of Detroit and eventually convinced the District Court to allow them to use Michigan's allocation until Detroit was ready.[7]

The SCCSSA plant was near the bottom of the priority list, but it was funded because the planning had been done and the project was ready to go when others were not.

The state's responsibility to review and approve

the completed facility plan before submission to the federal EPA will be discussed in Chapter 8.

The Facility Plan

The guidelines suggest four major steps for the preparation of a facility plan, and the SCCSSA document follows these steps closely. In general terms, the first three steps involve assessing the water-quality problems in the area, including the investigation of population and development trends that might affect that quality. The final step is to propose solutions to current and anticipated pollution problems.

1. Effluent Limitations

In the first step of preparing a facility plan, the guidelines call for a recitation of effluent limitations and for presentation of a copy of the applicable NPDES (National Pollution Discharge Elimination System) discharge permit. The SCCSSA "Facility Plan" expands upon these requirements, presenting, in the process, the first and one of the most controversial issues in the plan.

Although a detailed discussion of water-quality standards is beyond the scope of this paper, a cursory outline of the more common discharge limitations may be helpful. Table 2 presents the effluent limitations established by the Water Resources Commission for the old

SCCSSA plant (Interim Limitations) and gives the higher standards that any new facility it expected to achieve (Final Limitations). The values given in this table are typical treatment standards for these seven common water pollution parameters. Biochemical Oxygen Demand (BOD_5), Suspended Solids, Ammonia Nitrogen, Phosphorus, and Fecal Coliform Bacteria are undesirable characteristics in effluent, so the treatment goal is the lowest feasible number. Dissolved oxygen is beneficial, so a higher value is desirable. The measure of acidity, pH, is generally no problem in wastewater treatment, unless certain industrial wastes are being treated.[8]

The terms secondary and terriary (or advanced) treatment are used to describe either a degree of wastewater treatment or the functional capability of a wastewater-treatment plant. While their definitions are not absolute, the "Interim Limitations" in Table 2 are comparable to secondary treatment, and the "Final Limitations" values can be considered tertiary treatment. Particular treatment plants may be required to meet different standards, depending upon the receiving stream and current treatment philosophy.[9]

Another factor important to water quality is the flow (volume and rate) of the receiving body of water. The discharge of relatively high quality effluent into a small stream or lake might be more detrimental to water

TABLE 2

WATER RESOURCES COMMISSION
EFFLUENT LIMITATIONS

Effluent Parameters	Interim Limitations[a]	Final Limitations	
		May 1-Oct. 31	Nov. 1-Apr. 30
Biochemical Oxygen Demand (BOD_5)	30 mg/l	10 mg/l[b]	15 mg/l[b]
Suspended Solids	30 mg/l	10 mg/l	10 mg/l
Ammonia Nitrogen	-	2.0 mg/l	-
Phosphorus	Provide 80% or greater removal of the total phosphorus contained in the untreated wastewater		
Dissolved Oxygen	-	5.0 mg/l[b]	5.0 mg/l
Fecal Coliform Bacteria	200/100 ml	200/100 ml	200/100 ml
pH	6.0-9.0	6.0-9.0	6.0-9.0
Flow Measurement	Daily	Daily	Daily

[a]Interim Limitations were in effect from date of permit issuance until June 30, 1977, at which time final limitations went into effect.

[b]These are maximum daily discharge limitations; all other values are 30-day average discharge limitations.

SOURCE: Fishbeck, Thompson, Carr & Huber, Inc., "Bath, DeWitt, Watertown Townships and City of DeWitt Facility Plan for Southern Clinton County Sanitary Sewer Authority" (Lansing, Mich., November 1976), Table 1.

quality than a much lower quality discharge into a large river. The literature lacks concise numerical values, comparable to "Effluent Limitations," for dilution ratios, but there appears to be some truth to the cynical adage that "the solution to pollution is dilution."

The WRC permits refer only to concentrations of pollutants in the effluent (e.g., milligrams per liter, parts per million), not to total volume of pollutants (e.g., pounds or tons per day) or ratio of effluent to river flow.[10] Thus, if efficiency of a plant were increased, but the capacity were increased even more than the efficiency, the net effect on the environment could be negative.

Water-quality standards in the SCCSSA case focus on conditions in the Looking Glass River. This river, with its tributaries (mostly human-made county and private drains), is the only significant natural stream in the area. (See Figure 1.) Owing to the relatively flat terrain in the area, the river flows rather slowly, averaging 17.6 cubic feet per second (cfs) near DeWitt and dropping to as little as 8 cfs during drought periods.[11] This is roughly equivalent to the flow of a 27-inch pipe,[12] and compares with a dry-weather flow from the then-existing treatment plants of about 1.2 cfs.[13] Therefore, the Looking Glass River can assimilate very little pollution beyond the natural decomposition of plant and animal wastes and the treatment standards for a wastewater plant

discharging into this river had to be among the highest in the state.

Beginning in 1974, the WRC informed both the City and the SCCSSA in each discharge permit that tertiary-treatment standards eventually would have to be met.[14] In the permit issued Nov. 21, 1975 to the SCCSSA, the WRC ordered that:

> On or before March 31, 1976 the permitee shall obtain resolutions from all users of the wastewater treatment facilities indicating their intent with respect to utilization of grant assistance for provision of facilities capable of complying with the conditions of this permit and shall certify to the Chief Engineer of the Michigan Water Resources Commission that when grant assistance becomes available either directly or through a "lead agency" mutually agreed upon or designated by the WRC that it will be accepted and utilized in a timely manner to complete the planning, design and construction tasks required under grant regulation.[15]

Thus, the discharge-permit procedure apparently influenced the facility-planning process beyond simply establishing numerical goals for the treatment process to attain. The wording of the WRC permits may have foreclosed deliberation on the outcome of the plan for some participants, especially local government officials, in terms of alternative treatment options: The WRC called for the plants to be upgraded as soon as possible.

The SCCSSA "Facility Plan" included a statement that the tertiary standards would be required by June 30, 1977.[16] The report did not note that the requirement was conditioned upon grant assistance becoming available.[17]

After presenting that deadline, the consultants proceeded to reach a conclusion for which there appears to be no basis in the EPA guidelines or state permit requirements:

> Both the City of DeWitt's Wastewater Treatment Plant and the Southern Clinton County Plant are now operating under the interim effluent limitations (secondary treatment) of their NPDES Permits. These limitations are shown in Table 1 above.* However, prior to June 30, 1977, both facilities would have to be modified in order to meet the final effluent limitations shown in Table 1. This is another reason for the investigation of a Regional Wastewater Treatment Facility to treat all of the wastewater generated within the plan of study area and eliminate the need for improving both of the existing facilities.[18]

Thus, before addressing the subjects of regionalization and alternate treatment (Step 4 in the EPA guidelines), the plan focused on a centralized system, including the abandonment of the existing plants.

2. Current Flows and Waste Loads

Existing Collection Systems. The EPA guidelines state:

> An inventory of existing wastewater treatment systems should be provided, including services, treatment plants, effluent disposal or reuse methods, sludge disposal methods, and flow and waste reduction measures currently being used, if any.[19]

The "Facility Plan" gives a detailed description of both the SCCSSA secondary treatment plant, serving approximately 6,800 people in DeWitt and Bath Townships, and the primary

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*Reproduced as the present study's Table 2, p. 38.

treatment plant in the City of DeWitt, serving 2,254 people. Watertown Township had no municipal sewer system. Two private facilities, Culligan Water Conditioning and Country Village Mobile Home Court (approximately 135 people), were recognized. The discussion therefore accounts for only 9,189 people in a population (estimated in 1973) of 20,977.[20]

The "Facility Plan" inventories only the municipal facilities and the two WRC-recognized private facilities. If this is considered sufficient under the EPA regulations, then a facility plan for an area without a municipal treatment plant would require no inventory at all.

This researcher attempted to establish a more complete inventory. It was found that a fairly small area along Sheridan Road in DeWitt Township, adjoining Lansing, was being served by the City's sewer system and, according to Lansing officials, had been connected to the City sewer system for a number of years.[21] Among the few customers, however, were two mobile home parks and a small shopping center, so the number of people served was in excess of 600.

The existence of this situation was well known locally: DeWitt Township had been involved in a lawsuit in 1972 when it attempted to force the mobile home parks to abandon the Lansing service (then at $4.00 per quarter) and accept Township service (then at $12.00 per month).[22] The residents won the case, insuring that at least 3 percent of

the area's total population would not need to join the SCCSSA system.[23]

Another omission was King Arthur's Court, a 392 space mobile home park (approximately 1,000 people) operating a private lagoon system. Although the DNR described the effluent from the system as "very high quality, with negligible effects on the receiving waters of Remey-Chandler Drain,"[24] the facility did not have an NPDES discharge permit. At the time of the "Facility Plan" inventory, the discharge permit was being considered in WRC administrative hearings, awaiting, among other things, the outcome of the "Facility Plan" and any subsequent construction.[25]

The balance of the area, accounting for 50 percent of the population, was served by private septic tanks. In discussing the lack of municipal sewers in Watertown Township, the plan makes several general comments on the tendency of some septic systems to fail and notes that some were connected illegally to storm drains. It does not evaluate the extent of the problem, except to predict that "the continued dependence on septic tank systems will impose physical limitations on future development."[26]

One item which was not explained in this section was the "Facility Plan's" repeated reference to "a building moratorium in both Bath and DeWitt Townships."[27] Several township officials were questioned on this matter

for the present study. As these officials explained,[28] when the WRC ordered Bath Township to construct a sewer system in 1974, Bath arranged a contract with DeWitt Township for the use of one-fourth (200,000 gallons/day) of its treatment-plant capacity. In 1976, as the Bath system was being completed, the engineers warned that existing homes might use the entire contracted treatment capacity and recommended that no construction be allowed in the sewer-service area until all existing customers were connected. Consequently, construction was delayed on two fourplex housing units and a few houses over the course of a year.[29] This was at the same time that the facility-plan engineers were documenting the need for the SCCSSA plant expansion. The completion of all connections resulted in less than a 0.2 mgd flow, and as of January 1982, the flow from Bath still had not reached that figure.[30]

The reference to a moratorium on construction in DeWitt Township was apparently premature: Concern for diminishing sewer capacity was not apparent in DeWitt Township until three months after the "Facility Plan" was published. According to minutes of the township board meetings, the question was discussed in March 1977, prompted by a developer's request to reserve sewer capacity for 16 proposed duplexes.[31] Since the management of King Arthur's Court had alleged that there was not adequate capacity for the mobile home park's connection, the township board

instructed the building inspector to monitor sewer connections carefully, reporting to the board whenever ten new customers were connected.[32] This practice was discontinued in June 1977, and no building permits were ever denied.[33]

Infiltration and Inflow. As the "Facility Plan" describes, infiltration and inflow can dramatically affect the performance and necessary size of a wastewater-treatment plant. Infiltration takes place when groundwater seeps into sewer collection systems through defective pipes, joints, and manhole walls.[34] It occurs when sewer collection pipes are below the water table, either because of permanently wet ground conditions or because of seasonal high water. The groundwater pressure can sometimes be high enough to force water into nearly indiscernable cracks.

For this reason, the present state of the art of sewer construction cannot eliminate all infiltration, and municipal construction specifications allow a certain amount of it. Typically, the permissible infiltration is 500 gallons per inch of diameter per mile of pipe per day.[35] In the case of DeWitt Township, with 41.1 miles of pipe, the collection system can be expected to receive 209,915 gallons of water per day from infiltration alone.[36]

As sewer collection systems age, infiltration increases, sometimes exceeding the amount of sewage. Repairs, once considered impossible except by replacement, are now made by televising and grounting techniques.[37]

Inflow is the water that pours into the system

through manhole covers, combined storm/sanitary sewers, and yard, roof, and footing drains.[38] Compared to infiltration, this problem is often much easier to remedy, sometimes with solutions as simple as repairing a swinging cover (check gate or "flapper") at the end of an overflow pipe to keep the river from flowing back into the treatment plant at flood stage.

The EPA guidelines specify that the facility plan must include a determination as to whether or not there is excessive infiltration and/or inflow (I/I) and, if so, to analyze the problem in detail and determine needed corrective action and its cost.[39] Both the City of DeWitt and the SCCSSA hired separate consultants (other than Fishbeck, Thompson, Carr & Huber) to conduct this study.

The "Facility Plan" summarizes the results of these other studies.[40] The City plant, designed for 200,000 gallons per day (gpd), was treating only 100,000 gpd in dry weather. In wet weather, the flow increased by 600 percent. In addition to infiltration, estimated at 280,000 gpd from the system's 16.8 miles of sewer, there was inflow from two lift station overflow pipes which allowed the Looking Glass River to flow back into the collection system. With inflow restricted only by the size of the pipe, these sources could take in 500,000 gallons a day during flood stage.[41]

In the Township, the 610,000 gpd flow during dry

weather increased to 1,880,000 during wet weather. In addition to excessive infiltration into the six-year-old collection system[42] estimated at 373,000 gpd, the engineers found seven manholes submerged during wet weather and 40 more leaking badly.[43]

The consultants presented cost estimates for treating the excess flow and concluded that the most cost-effective option was to correct the most obvious malfunctions and to plan for treating the water from the rest. For instance, they estimated that at least 35 percent of the 1,600 single family home customers had illegally connected footing drains to the system. While these could contribute substantial inflow during wet weather, they felt that identification and enforcement of individual cases was not worth the expense.

Their conclusions can be summarized as follows[44]:

Source of Flow	City of DeWitt	Township (SCCSSA)
Dry-weather flow (sewage)	100,000	610,000
Projected I/I after corrections	103,500	268,000
Total flow to be treated	203,500	878,000

If the plants were not treating rainwater, neither would be over capacity: The City plant would be operating at 40 percent of capacity, and the Township plant would be at 76 percent. While the consultants indicate that treating

371,500 gpd of rainwater is "more cost-effective" than identifying and correcting the sources of the I/I, they do not explicitly indicate whether this assessment is based on a recognition that the I/I problem is one of the reasons for scrapping the old plants and starting an $8 million project.[45]

Existing Treatment System. The EPA's Guidance publication calls for information of a somewhat-technical nature under this category, including study of existing plant performance compared to optimum performance; adequacy of sampling and laboratory facilities; and quality of operation, maintenance, and personnel.

The SCCSSA plan provides this information for both plants, including schematic diagrams of each treatment process and a concise efficiency analysis (summarized in Table 3). By comparing these values with those in Table 1, it can be seen that the SCCSSA plant was very close to achieving the tertiary standards of the WRC, at least for the three parameters displayed.[46] Whether or not a relatively minor modification of the treatment plant could have achieved those standards was not discussed in the "Facility Plan." There is authority, however, to suggest that the theory of diminishing returns applies to wastewater treatment, and the improvement of a few percentage points in waste removal at this stage could cost as much as the first 50 or 60 percent of removal.[47]

TABLE 3

LOADING AND REMOVAL EFFICIENCIES

Parameter	Influent Conc. mg/l (#/Day)[a]	Effluent Conc. mg/l (#/Day)[a]	Removal Efficiency
SOUTHERN CLINTON COUNTY WASTEWATER TREATMENT PLANT			
Flow, mgd	0.64	0.64	-
Biochemical Oxygen Demand	100 (535)	13 (65)	88%
Suspended Solids	126 (675)	15 (80)	88%
Total Phosphorus	4.6 (25)	1.1 (6)	76%
CITY OF DeWITT WASTEWATER TREATMENT PLANT			
Flow, mgd	0.09	0.09	-
Biochemical Oxygen Demand	285 (214)	110 (165)	23%
Suspended Solids	252 (189)	124 (93)	51%
Phosphorus	10 (7.5)	9 (6.8)	10%

[a]Concentration, milligrams per liter; in parentheses, pounds per day.

SOURCE: Fishbeck et al., "Facility Plan," p. 24 (Table 3) and p. 29 (Table 4).

While the SCCSSA plant was near achievement of WRC standards, the quality of treatment at the City plant was quite low. Other than the settling of some of the suspended solids, treatment was practically nonexistent. The efficacy of the installation was not enhanced by the fact that the plant had been constructed in the Looking Glass River flood plain: An Army Corps of Engineers study includes an illustration of a 100-year flood superimposed on a picture of the city treatment plant, showing only the top two feet of the building above water.[48] The "Facility Plan" authors unequivocally conclude that the rehabilitation of this plant, at that location, would be economically and environmentally unsound.

3. Future Flows and Waste Loads

Before this section, the "Facility Plan" addresses the need for improved quality of treatment. This portion of the report establishes the need for increased quantity.

The EPA guidelines call for a planning period of 20 years beyond the date when the planned facility is scheduled to begin operation[49]; the planners' use of the year 2000 meets this criterion. The guidelines stress that this planning period does not mean that all necessary facilities must be built immediately; the EPA suggests that phased construction is often most cost-effective.

Design flows are to be "fully justified" by projected population growth and land-use patterns,

"carefully coordinated with applicable state, local and regional land-use management regulations, policies and plans."[50] The forecasting of future flows, then, involves projecting population growth, as well as commercial and residential development, and relating those projections to present and future wastewater-treatment capacity.

As previously discussed, the design capacity of the two existing plants was slightly over one million gallons per day. In dry weather, the plants were operating at about 70 percent of capacity. During wet weather, the flow was predicted to be 8 percent above existing design capacity, after the implementation of the I/I corrections recommended in the plan.[51] The engineers forecast future needs at 5.1 mgd, based upon projections of population growth and industrial growth.

Population Growth. The population projections in the "Facility Plan" are presented in Table 4. The 1970 figures were from the U.S. Bureau of the Census, and the figures for later dates were estimates. The "Facility Plan" notes that Tri-County Regional Planning Commission projections had been modified, but it does not indicate how. The table shows a projected population growth of 31.5 percent from 1970 to 1980, with the population nearly doubling by the year 2000.

Four months before the "Facility Plan" was complete, the Tri-County Regional Planning Commission issued updated projections which reduced anticipated growth during

TABLE 4

POPULATION PROJECTIONS FOR THE STUDY AREA

Area	1950	1960	1970	1973	1980	1990	2000
Bath Township	2,804	3,732	4,832	4,993	5,321	6,012	6,582
DeWitt Township	4,072	6,411	9,909	10,322	14,215	18,108	22,000
Watertown Township	1,585	2,008	3,146	3,401	3,812	4,725	5,565
City of DeWitt	824	1,238	1,829	2,261	2,581	3,307	3,998
TOTALS	9,285	13,389	19,716	20,977	25,929	32,152	38,145

NOTE: The "Facility Plan" indicates that "those variations in the above figures from Tri-County Regional Planning Commission projections have been authorized by the Planning Commission."

SOURCE: Fishbeck et al., "Facility Plan," p. 57 (Table 6).

the planning period to about 42 percent.[52] Later, during the review process, both the tri-county commission and the EPA expressed concern about the optimistic nature of the "Facility Plan" growth projections.[53]

As it developed, actual growth between 1970 and 1980 was 14 percent (a compounded rate of just over 1 percent per year), instead of the anticipated 31.5 percent. Adverse economic conditions during the decade affected the entire state, including the tri-county area, which showed a total growth for the ten-year period of 10 percent.[54]

A key element in the flow projections was the planners' assumption that nearly everyone in the entire 108 square mile area, present and future, would be connected to the sewer system. The projected percentage of users by the year 2000 was 85 percent of the Watertown population, 95 percent in DeWitt Township, 96 percent in Bath, and 100 percent in the City of DeWitt.[55] The figures are reproduced in the present study in Table 5.

Although the issue was raised in the public hearings, projected costs for extending the sewer system into as many as 70 square miles of rural area to attain this concentration of users were never discussed.[56]

Industrial Growth. Projected industrial and commercial sewer use is summarized in Table 5. The "Facility Plan" established design standards (flow forecasts) of 2,000 gpd per acre for industrial users and 500 gpd per

TABLE 5

FORECASTED WASTEWATER FLOWS FOR
PLAN OF STUDY AREA FOR YEAR 2000

Area	Design Pop/Acre	Percent Served	Flow Rates	
			Avg. mgd	Max. mgd
1. Bath Township				
A. Residential	6,582	96	0.63	1.575
B. Industrial	-			
C. Commercial	-			
2. DeWitt Township				
A. Residential	22,000	95	2.09	5.23
B. Industrial	300	100	0.60	1.50
C. Commercial	130	100	0.07	0.18
3. Watertown Twp.				
A. Residential	5,565	85	0.47	1.18
B. Commercial	320	100	0.64	1.60
C. Industrial	28	100	0.02	0.05
4. City of DeWitt				
A. Residential	3,998	100	0.40	1.00
B. Industrial	90	100	0.16	0.40
C. Commercial	-			
5. TOTALS				
A. Residential	30,402[a]		3.59	8.99
B. Commercial	700		1.40	3.50
C. Industrial	158		0.09	0.23
6. DESIGN BASIS	30,400		5.10	12.70

[a]This appears to be a typographical error in the "Facility Plan." It apparently should read 35,947, the total of the design population adjusted by "Percent Served." Using the engineers' figure of 100 gallons per capita, this also would reconcile with the total residential average flow rate of 3.59 mgd.

SOURCE: Fishbeck et al., "Facility Plan," p. 59 (Table 8).

acre for commercial users.[57] While there are immense differences in water usage among various industries, these values are accepted by engineers as reasonable general averages when no more specific information is available.[58]

The problem arises in determining the number of acres against which to apply these values. The "Facility Plan" proposed treatment capacity for all of the land zoned for industrial or commercial use, on the assumption that it would all be used by the end of the 20-year planning period.[59] The acreage figures used to calculate future flows are:

Area	Industrial	Commercial
DeWitt Township	300	130
City of DeWitt	80	-0-
Watertown Township	320	28
Bath Township	-0-	-0-

NOTE: Figures are in acres.

Officials from the four municipalities were interviewed for the present study, in an attempt to verify these land-use projections.

DeWitt Township zoning maps indicate that there were 254 acres of commercially zoned land at the time, not the 130 indicated in the plan. Most of the land was located in the sewer-service area along U.S. 27 and, although only about 100 acres were occupied, there were over

100 commercial sewer customers at the time. Most of the vacant land had access to the Sewer. There is no explanation as to why the "Facility Plan" used the 130-acre figure.[60]

The indicated 300 acres of industrially zoned land in DeWitt Township proved to be more elusive. There were in fact only three industrial concerns in the township, and none was scheduled to be hooked up to the sewer system. The largest water user, Culligan Water Conditioning, used 20,000 gallons per day for back-flushing water softeners and had an NPDES permit for its private treatment system.[61] The Spartan Asphalt Company plant, in the southeast corner of the township, was nearly two miles from a sewer collector, and Michigan Beef Company, which employed more than 100 people and processed 150,000 pounds of meat per day, was a mile from the nearest sewer and had expressed no interest in sewer service.[62]

Examination of a "Facility Plan" map, reproduced here as Figure 2, reveals that 300 acres of "industrial" land is located at the intersection of DeWitt and State Roads. According to township records, this area has never been zoned industrial; the Building and Zoning Administrator said he did not know how this area came to be so designated on the map.[63]

The township currently has 330 acres of industrially zoned land and, since no one in authority who was

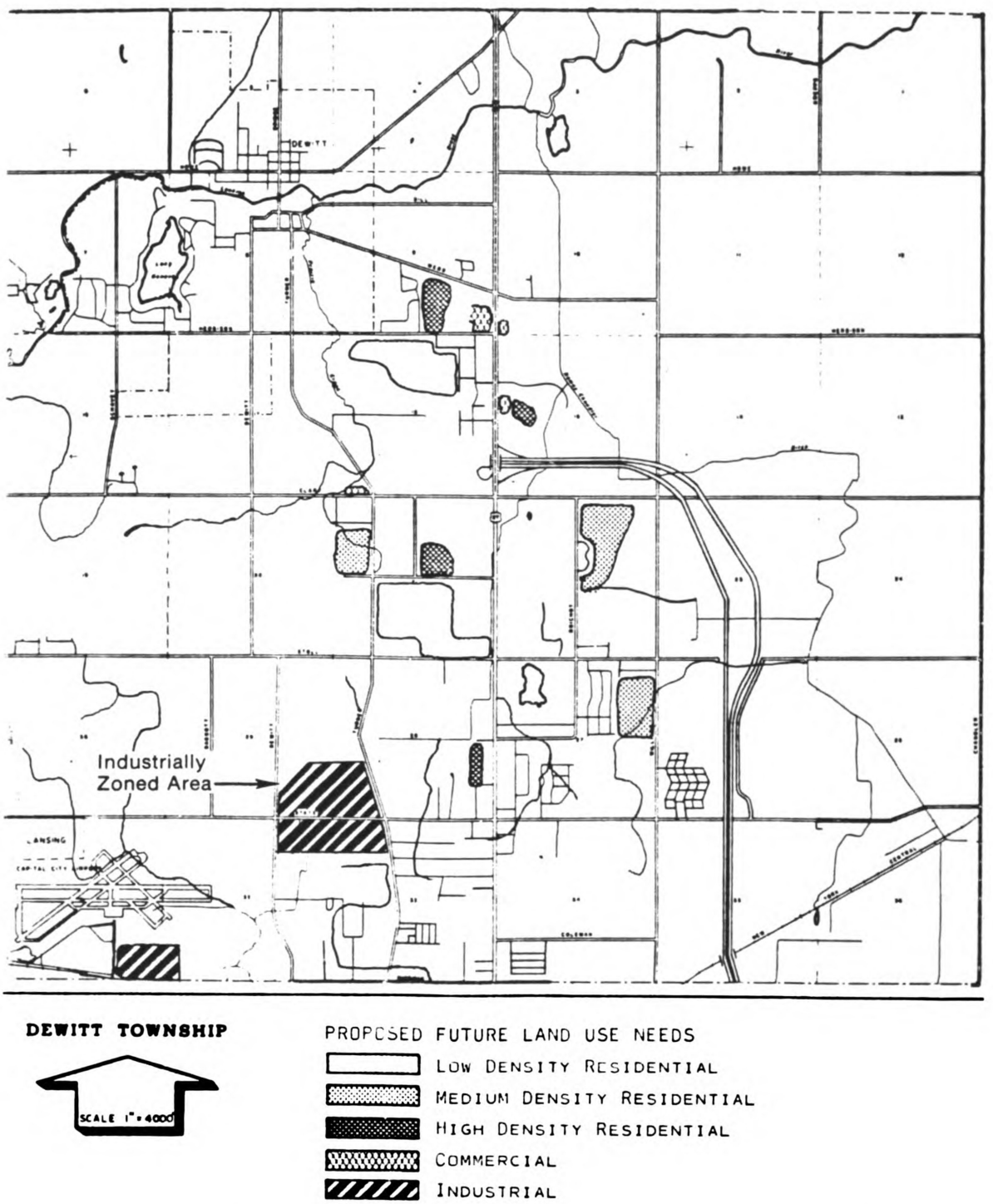

Figure 2. Facility Plan Map of DeWitt Township Industrial Zone.

SOURCE: Fishbeck et al., "Facility Plan."

interviewed for the present study[64] can recall any significant changes in the past few years, it might be that the map was in error and that the plan's reference to 300 industrial acres meant the acreage actually zoned industrial at the time, 80 percent of which is a mile or more from existing or currently planned sewer service and 10 percent of which (near Capital City Airport) is connected to the City of Lansing. Only two parcels, both vacant, totaling 32 acres, have access to the SCCSSA system.[65]

The City of DeWitt was listed as having 80 acres of industrial land. This figure was confirmed by the City Administrator, and it remained accurate at the time of the present study.[66] The land is located along Main Street at the eastern city limits, but was not shown on the "Facility Plan" Projected Service Area map as being likely to receive service before the year 2000. The six acres of commercially zoned land in downtown DeWitt were not shown in the plan. (This does not affect the projections a great deal.)[67]

The plan shows 348 acres of commercial and industrial land in Watertown when, according to the Township Assessor, there were actually over 1,300.[68] The southeastern three sections of the township are served by a major highway (Grand River Avenue, Business Interstate 96) and an operating railroad. There was a small concentration of industry along the highway, consisting of a printing company employing approximately 200 people and

about 15 small warehouse operations. Township zoning maps show about 90 acres currently in use.[69] The facility planners included one-fourth of the zoned land in their projections, but township officials interviewed for the present study did not recall the circumstances surrounding this estimation.

The "Facility Plan" initially indicated no projected industrial use for Bath Township. The abandonment of the Penn Central Railroad in the area and the lack of other transportation facilities near the sewer system are factors supporting this projection. However, at some time between the preparation of the plan's Table 5 (showing no industrially zoned land) and the final construction proposals, it was determined that Bath does have a commercial and industrial area along Highway Michigan 78 in the southeast corner of the township, including the land then being rezoned for Dutch Hills Mobile Home Park. According to county zoning records, there were nearly 100 acres commercially zoned, but only about 20 were occupied (as gas stations, a motel, and other highway businesses). While not recognizing the area in the flow projections, the plan later proposed a three-mile sewer extension to this area.[70]

The summary in the "Facility Plan" also failed to include nearly 1,100 acres of industrially zoned land in Sections 19, 30, and 31 along Chandler Road in Bath Township.[71] The plan did not propose the extension of sewers to this area. Approximately ten acres of commercial land

in the village of Bath were also omitted from the summary.

Overall, then, the total industrial and commercial acreage in the four municipalities was estimated by the engineers at 858, but could have been as high as 3,290 if all of the zoned land were included,[72] or as low as 226 if only the occupied land within actual and proposed sewer service areas were considered.[73] Documents from the Tri-County Regional Planning Commission give figures ranging from 227 to 1,118 acres, depending upon the document. (The development of some of these statistics will be discussed in a later section of this paper.)[74]

4. Development and Evaluation of Treatment Options

Having established the need for expanded treatment facilities, the "Facility Plan" next discusses various methods of satisfying that need. The EPA Guidance document suggests that "the alternative [of] optimizing performance of existing facilities should be considered first."[75] Since over half of the area's existing sewage treatment facilities had been ignored in the plan's inventory section, the analysis of existing facilities is reduced to an evaluation of the two municipal plants.

The plan's authors conclude that the SCCSSA facility could be upgraded to meet water-quality standards, but improving the City plant in the flood plain would not be practical.

Regionalization. The EPA's concept of regionalization, at the time, seemed to favor centralized treatment plants, as indicated in the Guidance booklet:

> Regional solutions may include interconnection of facilities, construction of one or more large facilities to eliminate the need for many small facilities and joint management of facilities to improve operation and maintenance costs.[76]

Although the SCCSSA engineers expressed a similar preference as early as page 6 of the Facility Plan,[77] they did analyze ten regional treatment options, including some rather ambitious projects (Table 6).

Each option was accompanied by a map. (One is reproduced here as Figure 3 so that the reader may understand the geography involved.)

The first four options listed in Table 6 involve aggregating all of the sewage into one system and moving it to a single point for treatment. The map shows the plan eventually recommended, which involved pumping sewage as far as 12 miles to the DeWitt Township (SCCSSA) location. (In option number 4, the pumping distance could have been as great as 25 miles.)

The fifth and sixth options listed involved having the City of DeWitt construct a separate plant. Both options would require pumping from the Lake Geneva area (the southern half of the city) across the Looking Glass River to a proposed site north of town. The Lake Geneva area could have been (and now is) connected by gravity to

TABLE 6

REGIONAL TREATMENT OPTIONS
DISCUSSED IN THE "FACILITY PLAN"

1. All areas treated in DeWitt Township
2. All areas treated in Watertown Township
3. All areas treated at Lansing Wastewater Treatment plant
4. All areas treated at Delta Township Wastewater Treatment Plant
5. Bath, DeWitt, and Watertown Townships treated in DeWitt Township; City of DeWitt treated alone
6. Bath and DeWitt Townships treated in DeWitt Township; City of DeWitt and Watertown Township each treated alone
7. Bath and DeWitt Townships, and City of DeWitt, treated in DeWitt Township; Watertown split between DeWitt and alone at Wacousta
8. Same as above, except Wacousta joined with the Village of Eagle
9. Watertown split between Lansing, DeWitt, and Wacousta; others to DeWitt Township (the map shows some flow to Delta Township as well)
10. Bath split between DeWitt Township and East Lansing; all others to DeWitt Township

SOURCE: Fishbeck et al., "Facility Plan," p. 76 (Table 13).

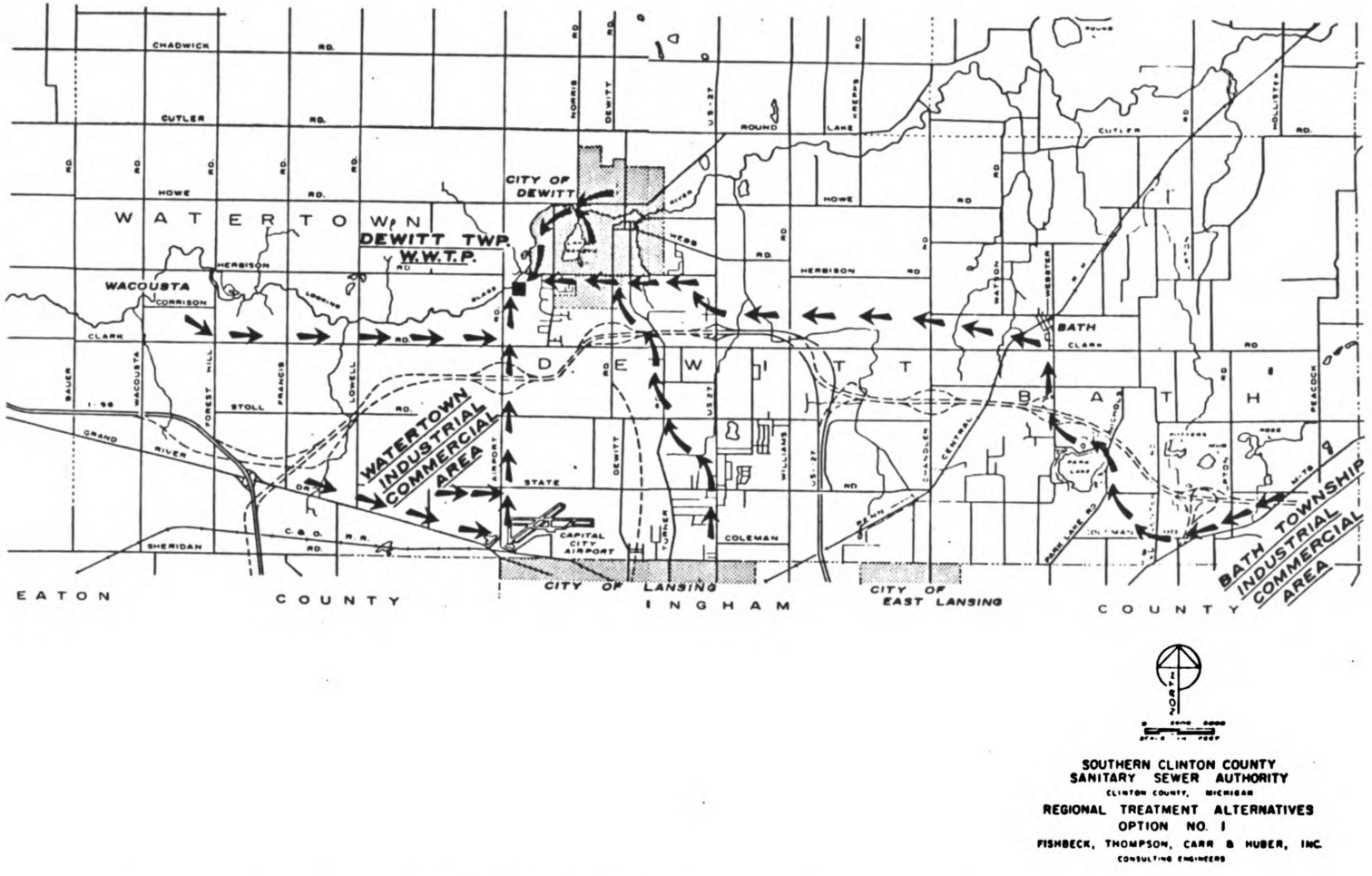

Figure 3. Map of Facility Plan Regional Option #1.

SOURCE: Fishbeck et al., "Facility Plan."

the SCCSSA site just across Herbison Road, but the option of recognizing the river as the logical dividing line and considering a small facility for the north half of town apparently was not considered.

The remaining four options would involve splitting flow between the SCCSSA plant and existing treatment facilities in Lansing, East Lansing, and/or Delta Township, possibly with a separate facility at Wacousta in western Watertown Township.

To understand these options, a reader not familiar with the area should consult the map (Figure 3) and visualize that the majority of the sewered population is in or immediately south of the City of DeWitt and in a mile-wide corridor on each side of U.S. 27, from Lansing to Webb Road. Most of that corridor had been connected to the DeWitt Township plant several years before, making a treatment plant of some sort at the SCCSSA location quite logical. The degree of treatment at that plant might not necessarily be tertiary; for instance, partially treated effluent could be pumped to a lagoon or some other facility for final treatment. However, failure to build at the SCCSSA site would have meant abandoning or reversing the flow of 41 miles of pipe.[78]

The 12 mile sewer main common to all of the plans from southeastern Bath Township to the SCCSSA plant was also a fait accompli. Owing primarily to pollution in Park Lake, Bath Township had been pressured by the WRC

several years before to build a sewer system and, in the absence of EPA regulations, the "regional" (centralized) theory prevailed at the time.[79]

The "Facility Plan" proposed sewering the Dutch Hills Mobile Home Park in the newly designated industrial and commercial area at M-78 and Upton Road. The engineers planned to have the sewer extension completed by the time the park was finished. Township officials later decided that prospective revenue did not warrant the extension, and Dutch Hills was connected to the Meridian Township system, less than a mile to the south, while the SCCSSA plant was being expanded.[80] At the time when the "Facility Plan" was approved, the option including connecting the southeastern commercial area and the mobile-home park to the East Lansing plant was said to cost $158,700 per year more than the $1.14 million extension of the SCCSSA interceptor.[81]

The remaining regional options involved the two large areas in Watertown Township that were being considered for sewer service. The first was the Village of Wacousta, with a population of about 900. Option 7 in Table 6 postulated a small alternative treatment system (capacity 0.125 mgd), but the installation of five miles of interceptor with two lift stations (the flow being upstream all the way) was determined to be more cost effective.[82] (The Wacousta portion of the plan was later modified, as will be discussed later.)

Serving the Watertown industrial area by installing several miles of force main to the SCCSSA site was also determined to be less expensive than other options, such as connecting to the Lansing system. In discussing the possibility of directing that flow to the south (Option 9), the plan refers to the township having to purchase capacity in both the Delta Township plant and the City of Lansing plant. Although no estimate is given for the cost of this investment, the plan's authors conclude that the total cost would be higher than the cost of treatment in DeWitt Township.[83]

In view of the fact that the City of Lansing at the time was providing sewer service to the Capital City Airport, less than a mile from the proposed Watertown service area,[84] the reason for the high cost of service from Lansing was investigated for the present study. Although the engineers had no available records,[85] the City of Lansing had a reasonably complete history of proposals to serve Watertown.

According to city records, Fishbeck et al. performed a sewer study for Watertown Township in 1970.[86] The study proposed the sewering of six sections (3,840 acres) in the southeastern corner of the township, including installing approximately seventeen miles of collectors, four lift stations, and a force main to the SCCSSA plant (then the DeWitt Township plant), three miles to the north. This undertaking was to serve a then-current population of 688 persons

and 13 commercial or industrial customers, with projected growth to nearly 1,000 people and 336 industrial workers by 1990. The study suggested that the whole township share the cost,[87] because the project would benefit the entire community.

At about the same time, the City of Lansing was preparing an "Official Pollution Control Plan" for the WRC, including long-range forecasts of sewer requirements in the immediate area. The City's consulting engineer reviewed the Fishbeck study in 1971 and commented that up to 1,200 people in Watertown could be served by Lansing by extending 2,000 feet of 8-inch sewer at a cost of $50,000.[88] The engineer also recommended, however, that if the City wanted to accommodate very substantial growth in Watertown (i.e., on the order of 25,000 people), a new 27-inch interceptor should be constructed to the City plant, less than two miles away, at an estimated cost of $500,000.[89]

In December 1972, the Watertown Supervisor informed the City of Lansing that his township was pursuing a state grant for the DeWitt township plan, and the WRC had told him that the township should investigate connecting to the City of Lansing.[90] There is no record in the city's file of a written response, but the file indicates that the city was tentatively reserving sewer capacity for 3,840 acres in Watertown Township, with a population projection that had grown by then to 70,000.[91] The City Engineer surmises that

this information was passed along verbally to Watertown, along with the news that the extension of city sewers required the political annexation of the service area.[92]

Shortly thereafter, the city changed its annexation policy, and Watertown requested a clarification of the new policy.[93] By Jan. 2, 1974, the annexation issue was settled, and the city sent a specimen contract to Watertown, outlining a sewer-extension policy without political annexation. The city also explained that new service areas would be assessed a one-time "Equity Investment Fee" which would represent the area's pro-rata share of the city's investment in the existing treatment plant. In 1974, the charge would have been $1,117.66 per acre, in addition to the cost of any new interceptors, lift stations, or other equipment.[94]

Township officials referred the city's letter to Fishbeck et al., which responded on Jan. 22 with a recommendation to the township. The firm pointed out that the city proposed to serve the same area being considered by the Clinton County plan, and reported that the WRC "leaned toward" service from the City of Lansing, contingent upon final cost analysis. Use fees, they said, would be less than proposed township use fees, but there would be additional costs:

> Generally all sewer costs will be paid for by the Township besides a charge of about $1,100 per acre (Utility Equity Investment Fee). If this fee is projected

> for the six sections, the total cost would be about $4,200,000. Admittedly, the Township would have to share in the costs of expanding the County's DeWitt plant, but it doesn't seem that the costs would be that high even at ultimate development. Also, the $1,100 fee is subject to change each year.[95]

The engineer went on to suggest that the township decline the offer and proceed with plans to connect to the DeWitt plant. A week later, the township did exactly that. In a letter dated Jan. 28, the Supervisor informed the city that the township would not be needing Lansing's sewer service.[96]

Watertown officials do not recall any efforts to compare the proposed $4.2 million city fee with the cost of a township plant of comparable capacity. The city's charges reflected a contemplated service-area population of 70,000; the estimated cost of the SCCSSA plant, developed a few months later in the facility plan, was $8 million to serve a total population of exactly half that number.[97]

During 1974, the engineers met with the City of Lansing one more time.[98] Neither the township records nor the recollection of township officials reveal any serious study of the Lansing proposal. Township officials expressed a lingering suspicion of Lansing's political motives.[99] Although they knew that the city had dropped its annexation prerequisite, they felt that reliance upon city utilities would eventually lead to political compromise, if

not annexation.[100]

Alternative Waste Treatment Systems. The guidelines require that alternative methods be considered for both collection and treatment. Regarding collection, the EPA's Guidance states:

> Alternative waste treatment for each service area should be considered in addition to the regional questions.[101]

For treatment systems, the guidelines require a brief investigation of (a) some alternative treatment and discharge system, (b) treatment and reuse, and (c) land application. Conceding that the current state of the art in alternative treatment systems precludes their universal application, the EPA states:

> Options for treatment and discharge should, as appropriate, take into account and allow to the extent practicable for the application of technology at a later date to provide for the reclaiming or recycling of water or otherwise eliminate the discharge of pollutants.[102]

Alternative treatment systems involving waste recycling were receiving a lot of interest from the news media and the EPA at the time when the "Facility Plan" was being developed.[103] The giant land treatment system in Muskegon, Michigan had recently been completed,[104] and plans were being made to make septic tanks and other small, non-conventional systems eligible for federal grants.[105] Not all internal EPA procedures had kept pace with public pronouncements, however: One suggested facility plan

format in the Guidance publication lacked any reference to alternative treatment,[106] as did the "Facilities Plan Review Sheet" used by Region 5 EPA personnel to assess facility plans.[107]

The SCCSSA plan contained no mention of alternative collection systems. Continuing the policy established in the inventory section, the plan ignored existing septic-tank and lagoon systems, as well as the potential flexibility, reduced infiltration, and reduced pumping costs that might be associated with individual or sub-regional collection systems.

The plan did include study of a land-disposal system that would treat all of the sewage collected by the centralized collection system. The system reviewed by the planners consisted of two eight-acre aerated lagoons, four storage lagoons of 185 acres each, and 706 acres for spray-irrigation fields. With a buffer zone of 800 feet around the entire operation, total land area would be 2,050 acres.[108] The plan included the proposition that after the raw sewage was collected and pumped to a central point (such as the SCCSSA plant), it would be pumped another 10 miles to the lagoon system, the location of which was not specified.[109]

Under these conditions, the alternative system proved more expensive than the conventional system.[110] The aggregation of this much land in the area would have

involved the displacement of 10 to 21 families, the plan concluded, making this option politically and environmentally unattractive.

Sludge Disposal. While the Guidance document devotes only six lines to sludge disposal, the "Facility Plan" contains 28 pages of detailed analysis of 19 different solids-handling alternatives.

As the "Facility Plan" explains, the higher the degree of wastewater treatment provided, the larger the amount of solid residual that must be handled. This is due not only to the pollutants originally discharged into the water but also to the chemicals used at the plant to precipitate those pollutants back out of the water. The 5.1 mgd proposed plant was expected to produce 18,000 pounds (dry weight) of sludge per day. However, sludge coming from the treatment process can be as much as 97 percent water, so the sludge-handling process initially involves many times the dry-weight tonnage before the percentage of water is reduced to manageable proportions.[111]

Thus, the proposed SCCSSA plant would have to handle approximately 70,000 gallons of dark, odoriferous slurry each day--a process that, as the "Facility Plan" explains, "can be the single most complex and costly operation in a municipal wastewater treatment system."[112] The various options involve one or more of the following basic processes[113]:

1. Sludge thickening: Settling by gravity is the most common form.

2. Sludge stabilization by digestion: This allows the biological process, started in the secondary-treatment phase, to continue until the natural decomposition is fairly complete.

3. Sludge conditioning: adding chemicals such as lime to coagulate and separate some of the solids.

4. Mechanical dewatering: extracting water by vacuum or pressure processes.

5. Reduction: incineration after other methods have reduced the water content to the point where the solids will support combustion after the incinerator has been heated to a very high temperature.

Most treatment techniques involve more than one of these principles. Even the simplest systems, such as drying the sludge in the sun on sand beds (as at the old SCCSSA plant) or applying it to field as a soil conditioner, require some pre-treatment.

Unlike the fairly narrow range of cost estimates developed for the ten regional treatment plant options, the estimated annual cost of solids-handling alternatives in the "Facility Plan" range from $253,500 to $609,400.[114] Incineration, with the prerequisite dewatering process, was the most expensive. Application to farmland was estimated at $442,000 per year, and deemed economically infeasible,

mainly because of the cost of building a storage facility for six winter months' production of 267 tons of liquid material per day.

The process judged most cost-effective, and recommended by the authors of the "Facility Plan," was modification of the existing SCCSSA plant with a combination of sludge thickeners, chemical conditioning, vacuum filtration, and final disposal in a landfill. After the pre-disposal process described, the sludge would still be 75 percent to 80 percent water and would amount to 63 tons per day.[115]

The "Facility Plan" authors discussed the environmental impact of the sludge-disposal methods, comparing the potential air pollution problems of incineration with the more extensive land use required for land disposal. There was some criticism of this section during the public review phase for not identifying the location of the proposed 45 acre landfill and for not considering the impact of that facility. However, in terms of the EPA Guidance requirements, no topic received more attention in the document than the matter of sludge disposal.

Phase Construction. The guidelines suggest that phased construction be considered when there are "uncertainties of projected long-term wastewater flows."[116] Reviewing previous sections of the plan we find that:

1. the proposed treatment plant was being designed

for five times the combined capacity of the two old plants[117];

2. 80 percent of that capacity was for projected growth[118]; and

3. 35 percent of that growth was to be industrial development that had not been identified and was projected to take place in zoned areas that are not in the sewer district.[119]

In spite of the uncertainty inherent in these conditions, no consideration was given in the "Facility Plan" to phased construction of the treatment plant. After reviewing the plan, the EPA requested an analysis of phased construction; the engineers developed a six-page study which showed that option to be more expensive.[120] (The results of that study hinged a great deal on the planners' choice of interest and discount rates over 20 years; these will be discussed later under "Costs.")

Notes--Chapter III

[1]U.S., EPA, Guidance, p. 1. The preparation of the facility plan is referred to in EPA regulations and publications as Step I. The preparation of detailed design plans is Step II, and the actual construction of a facility is Step III.

[2]Federal Water Pollution Control Act (PL 92-500), Sec. 208, "Areawide Waste Treatment Management."

[3]The enabling legislation provided that the federal subsidy for 208 planning would be reduced from 100 percent to 75 percent after two years. Some planning areas had not been designated by the EPA in time to receive the full subsidy and the planning agencies responsible for such areas filed suit to force payment of the full amount. The Federal District Court (D.C.) held for the planning agencies, ruling that "time limits . . . should not be invoked . . . where local planning agencies could not apply for 100-percent funding before the end of fiscal year 1975 solely because of failure of the EPA to meet statutorily mandated deadlines." National Association of Regional Councils v. Costle, 564 F. 2d 583 (1977).

In 1976, Richard A. Hellman, minority counsel (Republican) for the Senate Committee on Public Works, reported to a Washington conference, "After some early confusion, EPA is now committed to a full scale [208] regional planning effort." Highlights 13(5) (May 1976).

The General Accounting Office (GAO) was not as positive, after two more years: "Comprehensive planning has been conspicuous by its absence throughout the history of Federal involvement in wastewater management." (U.S., Comptroller General, "Sixteen Air and Water Pollution Issues Facing the Nation" (Washington, D.C.: General Accounting Office, U.S. Congress, Oct. 11, 1978).)

[4]U.S., EPA, Guidance, p. 2.

[5]Tri-County Regional Planning Commission, "Tri-County Regional 208 Water Quality Management Plan" (Lansing, Mich., August 1977).

[6]The state project priority system was established by Section 205.9(a) of the Federal Water Pollution Control Act and implemented by detailed rules promulgated in the Federal Register 39(29) (Feb. 11, 1974), Sec. 35.915. The state is to consider "the severity of pollution problems,

the population affected, the need for preservation of high quality waters, and national priorities as well as total funds available, project and treatment works sequence and additional factors identified by the state in its priority system."

[7]U.S. v. City of Detroit, et al., U.S. Dist. Ct., Eastern Div. of Mich., Civil Action #7-71100. (Order issued Sept. 14, 1977; case continuing under administrative injunction; no final opinion as of April 1, 1982.) The initial court opinion of Sept. 14, 1977 enjoined the EPA from "reallocating or otherwise disposing of disimpounded F.Y. [Fiscal Year] 1976 Federal Grant Funds in the amount of $399,055,250 to any other state." That order left open the possibility of the money being used by other municipalities with the suggestion that "the state may apply to the Court for access to the above reserved Federal Water Pollution Control Act Funds for distribution in accordance with existing applicable Federal and State laws and regulations." This was later done (interview with Fred Cowles, Michigan Department of Natural Resources, April 2, 1982).

[8]Southeast Michigan Council of Governments, "Water Quality Standards," Water Quality Memo No. 4 (Detroit: n.d.).

[9]Since the issuance of the Water Resources Commission (WRC) order for South Clinton County (1977), Michigan water quality standards have been reduced to 4 mg/l for dissolved oxygen and the acceptable fecal-coliform count has been increased to 1000 organisms per 100 ml. The latter change apparently recognizes that rivers often exceed the 200/100 ml standard due to the presence of waterfowl and animals. The higher standards for wastewater may be continued, however. See Michigan Department of Natural Resources (DNR), Environmental Services Division, "Looking Glass River Study Below DeWitt" (Lansing, Mich., March 1979).

[10]Michigan WRC, "Authorization to Discharge Under the National Pollutant Discharge Elimination System" (Lansing, Mich., Nov. 21, 1975).

[11]DNR, "Looking Glass River Study Below DeWitt," p. 6. See also Fishbeck et al., "Facility Plan," p. 14.

[12]Comparison is based on "Kutter's Formulae." (Ernest W. Steel, Water Supply and Sewerage (New York: McGraw-Hill Book Co., 1960), p. 368.) Applicability of

formulae confirmed by Greg Huntington, Snell Environmental Group (interview with Greg Huntington, Lansing, Mich., March 20, 1982).

[13]The plant ultimately built has a capacity of 5.1 mgd, which translates to 7.9 cubic feet per second (cfs), nearly equal to the total drought flow of the river.

[14]Michigan WRC to City of DeWitt, March 19, 1974.

[15]Michigan WRC, "Authorization to Discharge."

[16]Fishbeck et al., "Facility Plan," p. 5.

[17]Michigan WRC, "Authorization to Discharge," p. 8, states that if "grant assistance will not be available in a timely manner, this permit may be revised to establish reasonable specific dates by which various planning, design and construction tasks shall be completed."

[18]Fishbeck et al., "Facility Plan," pp. 6-7. While the quotation refers to "another reason" for the investigation of a regional facility, there is no apparent reference earlier in the report to any first reason(s).

[19]U.S., EPA, Guidance, p. 6.

[20]Fishbeck et al., "Facility Plan," Table 6.

[21]Interview with George Swanson, City Engineer, City of Lansing, March 12, 1981. Customers' records are not filed or cross-referenced by political subdivision, so an exact count and dates of beginning service were not available.

[22]Dr. Milton Goodman and Leonard Goodman (d.b.a. Kristana Mobile Village) v. Township of DeWitt and City of Lansing, Clinton Cty. Cir. Ct., Docket No. 1136, 1972.

[23]Another area in DeWitt Township on the south side of Capital City Airport is also connected to the City of Lansing, but this is excluded from the "Facility Plan." Fishbeck et al., "Facility Plan," Fig. 1.

[24]John Bohunski, Water Quality Division, Michigan DNR, Memorandum to Michigan Department of Public Health, Jan. 16, 1978.

[25]The WRC formally denied the discharge permit in May 1979, withthe observation that the SCCSSA tertiary plant was under construction and that township officials had "strongly urged them" to deny the permit. See WRC, "Notice of Intent to Deny Permit," Re King Arthur's Court, Inc., May 14, 1979.

[26]Fishbeck et al., "Facility Plan," p. 41.

[27]Ibid., pp. 107, 111, 115, 193, and 206.

[28]Interview with Thomas Woodruff, former Supervisor, Bath Township, April 10, 1982; interview with Catherine Reed, Treasurer, DeWitt Charter Township, March 22, 1982.

[29]Interview with Woodruff.

[30]SCCSSA, "Plant Influent Sheet" (monthly operating report) for October 1980 through January 1982, files of SCCSSA, DeWitt, Mich.

[31]DeWitt Charter Township, "Minutes of the Meeting," March 14, 1977; interview with Raynold St. Pierre, DeWitt Charter Township Zoning and Building Administrator, March 22, 1982.

[32]DeWitt Charter Township, "Minutes of the Meeting," April 11, 1977.

[33]DeWitt Charter Township, "Minutes of the Meeting," June 20, 1977.

[34]U.S., EPA, "Final Construction Grant Regulations," Federal Register 39(29) (Feb. 11, 1974), sec. 35.905.9.

[35]Interview with Roger Slykhouse, P.E., Slykhouse & Associated Consulting Engineers, Grand Rapids, Mich., Jan. 21, 1980.

[36]Fishbeck et al., "Facility Plan," p. 69.

[37]A television camera, six inches in diameter, is pulled through the pipe to find leaks. The camera is followed by a deflated "balloon" with rubber hoses attached. When sophisticated measuring equipment determines that the balloon is at the leak, the hoses eject epoxy

cement toward the crack or hole while the balloon inflates to force the cement into any voids. This is an expensive process. (See Sewer Specialists, Inc., "The Problem Solvers" (brochure) (Owosso, Mich., n.d.).)

[38]U.S., EPA, Federal Register 39(29), Sec. 35.905.11.

[39]U.S., EPA, Guidance, p. 7.

[40]They are Capital Consultants, Inc., "Infiltration/-Inflow Analysis for the City of DeWitt, Clinton County, Michigan" (Lansing, Mich., August 1976), and Kyes Engineering Associates, "Infiltration/Inflow Analysis for DeWitt Township" (Lansing, Mich., 1976).

[41]Fishbeck et al., "Facility Plan," p. 64.

[42]Construction of the first phase of the DeWitt Township sewer system started in the spring of 1970. (See Mick and Rowland, Consulting Engineers, "DeWitt Township Report of Sewers, Phase II" (Angola, Ind., May 1971).

[43]Fishbeck et al., "Facility Plan," p. 68.

[44]Ibid., pp. 67 and 73.

[45]As of this writing, four years after the verification of the I/I problem, the $8 million tertiary treatment plant has been completed, but the I/I corrections, estimated by Fishbeck et al. at $148,064, have not been done. On May 11, 1981, the new plant's operators recorded a flow of 2.96 million gallons, nearly four times the average daily flow in July. (See SCCSSA, "Plant Influent Sheet," May and July, 1981, files of SCCSSA, DeWitt, Mich.) Since the City was still not connected to the plant at that time, and very few new customers had been added to the system since the 1.88 mgd flow reported in the I/I study, the extra one million gallons indicate either a continued deterioration of the now 12-year-old collection system or that the I/I problem was more serious than the I/I study recognized.

[46]Note also that the water coming into the SCCSSA plant has less than half the concentration of pollutants present in the influent to the city plant. The reason is that the city system takes on water when the river rises, while the township system had a certain amount of

infiltration all of the time. Interview with Roger Slykhouse, P.E., Slykhouse & Associates Consulting Engineers, Grand Rapids, Mich., Jan. 21, 1981.

[47]Ibid. As an example, a Union Carbide Corp. study indicated that a 50-percent increase in investment would be required to raise the pollution-removal efficiency of its operations from 93 percent to 98 percent. A parallel and even more pronounced trend was anticipated in the area of operating expense. (Warren M. Anderson, Vice President, Union Carbide Corp., Highlights 12(5) (May 1975).

[48]U.S., Army Corps of Engineers, "Floodplain Information, Looking Glass River, Clinton County, Michigan" (Washington, D.C.: Government Printing Office, 1969).

[49]U.S., EPA, Guidance, p. 7.

[50]Ibid., p. 8.

[51]The old plants and the new one were designed for short-term impacts of 150 percent above optimum capacity. (See Fishbeck et al., "Facility Plan," p. 23.)

[52]Tri-County Regional Planning Commission, "Tri-County Regional 208 Water Quality Management Plan, Interim Outputs" (Lansing, Mich., August 1976).

[53]Thomas P. Looby, Engineer/Planner, Tri-County Regional Planning Commission, to Fishbeck et al., Nov. 5, 1976; and Mike Mikula, Engineer, U.S. EPA, "Facility Plan Review Sheet" re SCCSSA (Chicago, March 2, 1977).

[54]Tri-County Regional Planning Commission, "Population and Housing Trends" (Lansing, Mich., December 1980).

[55]Fishbeck et al., "Facility Plan," p. 59 (Table 8).

[56]At the time the plan was being discussed, a study of the building permits issued in DeWitt Township from 1975 to Sept. 1, 1977 by the author showed that 44 percent of the permitted buildings were in the unsewered area. All three townships contain expensive homes built in scenic wooded areas, far removed from the proposed sewer district. Compare Fishbeck et al., "Facility Plan," p. 50: "The provision of water, sewer, and solid waste facilities will stimulate the form and magnitude of development within the Townships."

[57]Fishbeck et al., "Facility Plan," p. 58.

[58]Interview with Roger Slykhouse, P.E., Slykhouse and Associates Consulting Engineers, Grand Rapids, Mich., Jan. 21, 1981.

[59]Fishbeck et al., "Facility Plan," pp. 31, 32. The acreage figures are presented in Table 5 in the "Facility Plan" and are described as the "specific areas zoned for industrial and commercial development. These proposed land-use areas will be used to calculate future wastewater loads and flows."

[60]Interview with Reynold St. Pierre, DeWitt Charter Township Building and Zoning Administrator, Feb. 1, 1981.

[61]Fishbeck et al., "Facility Plan," p. 30.

[62]Interview with Richard Kiebler, President, Michigan Beef Co., Sept. 8, 1980.

[63]Interview with Raynold St. Pierre, DeWitt Charter Township Building and Zoning Administrator, Feb. 1, 1980.

[64]Ibid.; interview with Catherine Reed, Treasurer, DeWitt Charter Township, March 22, 1982; interview with Thomas Woodruff, Service Coordinator, DeWitt Charter Township, April 12, 1982.

[65]Interview with Raynold St. Pierre, DeWitt Charter Township Building and Zoning Administrator, Feb. 1, 1980.

[66]Interview with James Spalding, City Administrator, City of DeWitt, Feb. 1, 1981.

[67]Ibid.

[68]Interview with Herman Openlander, Watertown Charter Township Assessor, March 31, 1982. Watertown officials confer industrial zoning upon land by the section. Most of the southeast three sections not occupied by the cemetery, airport right-of-way, or highway is industrial or commercial. Clinton County officials used somewhat the same approach in Bath, but DeWitt did its zoning on a parcel-by-parcel basis.

[69]Ibid.

[70]Fishbeck et al., "Facility Plan, p. 224 (Table 25).

[71]Interview with Tom Walsh, Clinton County Building and Zoning Administrator, St. Johns, Mich., April 12, 1982.

[72]DeWitt Township: 254 commercial, 330 industrial; City of DeWitt: 86 total; Watertown: 1,300 total; Bath: 1,320.

[73]DeWitt Township: 100 commercial; City of DeWitt: six commercial; Watertown: 90 total; Bath: 30 total.

[74]Tri-County Regional Planning Commission, Regional Data Book (Lansing, Mich.: Tri-County Regional Planning Commission, 1969) reported a total of 1,117.78 acres zoned commercial and industrial in the four municipalities. The 227-acre estimate was reported in "Tri-County Regional 208 Water Quality Management Plan--Interim Outputs" (Lansing, Mich., August 1976).

[75]U.S., EPA, Guidance, p. 9.

[76]U.S., EPA, Guidance, p. 9.

[77]Fishbeck et al., "Facility Plan," pp. 6, 23, 28, 33. Among the references on page 28: "Federal and State grant funds would be easier to obtain for a regional plant than [for] two separate facilities."

[78]When the first DeWitt Township system was planned in 1969, there was a suggestion that the southern two miles of the Township be annexed to, or contract with, the City of Lansing for sewer service. There was service available at the City limits, so the longest piping distance would have been two miles with gravity flow, instead of six miles north through a series of pumping stations. The proposal was politically unpopular and was not explored. ("DeWitt Township Resigned to Sewer System Expense," The State Journal, Dec. 18, 1969.)

[79]June Bartlett, Bath Township clerk at the time, argued for considering a local lagoon system. (Interview with June Bartlett, Aug. 14, 1976.) EPA funding was not available at the time; the Township has been trying ever

since to get a retroactive grant from the federal government. Its efforts seem to have succeeded: U.S. Code, PL 97-117 (offered by Rep. James Dunn, R-Michigan), Dec. 29, 1981.

[80]Interview with Thomas Woodruff, former Supervisor, Bath Township, April 12, 1982.

[81]Fishbeck et al., "Facility Plan," p. 105 (Table 14).

[82]Ibid.

[83]Ibid.

[84]Ibid.

[85]Interview with Thomas E. Doan, P.E., Fishbeck et al., Grand Rapids, Mich., February 1980.

[86]Fishbeck, Thompson & Carr, Civil Engineering Consultants, Inc., "Engineering Report on Sanitary Sewer Collection System and Sewage Treatment Facilities, Watertown Charter Township, for Clinton County Department of Public Works" (August 1970).

[87]Detailed cost figures could not be found in the Lansing files, but the study mentions local costs, after state and federal grants, of $1.5 million.

[88]McNamee, Porter and Seeley, Consulting Engineers, Ann Arbor, Mich., to City of Lansing, Nov. 10, 1971, City of Lansing, Public Service Dept., files.

[89]Ibid.

[90]Herman Openlander, Supervisor, Watertown Charter Township, to City of Lansing, Dec. 13, 1972, City of Lansing, Public Service Dept., files.

[91]City of Lansing, "Utility Equity Investment Report" (Lansing, Mich., n.d.).

[92]Interview with George Swanson, City Engineer, City of Lansing, April 8, 1982.

[93]Herman Openlander, Supervisor, Watertown Charter Township, to City of Lansing, June 10, 1973, City of Lansing, Public Service Dept., files.

[94]City of Lansing, "Utility Equity Investment Report" (Lansing, Mich., 1976).

[95]Fishbeck, Thompson & Carr, Civil Engineering Consultants, Inc., to Watertown Charter Township, Jan. 22, 1974, City of Lansing, Public Service Dept., files.

[96]Herman Openlander, Supervisor, Watertown Charter Township, to City of Lansing, Jan. 28, 1974, City of Lansing, Public Service Dept., files.

[97]Fishbeck et al., "Facility Plan," p. 59 (Table 8).

[98]The meeting was reported to the township in a letter from Fishbeck, Thompson & Carr, Civil Engineering Consultants, Inc., Nov. 25, 1974; City of Lansing, Public Service Dept., files.

[99]The City of Lansing had been forced by the state to drop its annexation policy, and the WRC had pressured the city to consider outlying areas as part of the WRC concept of regionalization. Contrary to the suspicions of some township officials, the city's interest was so benign that the city engineer was not aware that Watertown had become part of the SCCSSA until informed by this researcher three years after the fact. Interview with George Swanson, City of Lansing Engineer, March 12, 1981.

[100]Interview with Vaughn Montgomery, Supervisor, Watertown Charter Township, April 1, 1982. Montgomery commented that the uncertain role of the State Municipal Boundaries Commission, involved for several years in litigation over jurisdiction of the Capital City Airport, added to the difficulty of guaranteeing municipality sovereignty.

[101]U.S., EPA, Guidance, p. 10. EPA regulations define alternative as anything that is not conventional. A conventional system is "a collection and treatment system consisting of minimum size (6 or 8 inches) or larger gravity collector sewers, normally with manholes, force mains, pumping and life stations and interceptors leading

to a central treatment plant employing conventional concepts of treatment. Code of Federal Regulations, Part 40, Sec. 35, Ch. 5, Appendix E.)

[102]U.S., EPA, Guidance, p. 11. This appears to be the only reference in the document to the zero-pollution goal expressed by Congress in the first section of the Federal Water Pollution Control Act. Section 101(1): "It is the national goal that the discharge of pollutants into the navigable waters be eliminated by 1985."

[103]See Russell E. Train, Administrator, EPA, apeech to the "EPA Technology Transfer Design Seminar," Atlanta, Georgia, April 23, 1975; Train, remarks to the "Fifth Annual Composting and Waste Recycling Conference," April 25, 1975; Train, remarks at the dedication of the Muskegon County Waste Management System, July 24, 1976.

[104]U.S., EPA, Wastewater: Is Muskegon County's Solution Your Solution? (Chicago: U.S. EPA, September 1976). The system treated 27 mgd on 10,850 acres.

[105]John T. Rhett, Deputy Assistant Administrator, U.S. EPA, "Eligibility of Septic Tanks and Other Small Treatment Systems," draft copy of proposed Program Requirement Memorandum, released Aug. 16, 1976.

[106]U.S., EPA, Guidance, Chapter 9.

[107]U.S., EPA, "Facilities Plan Review Sheet," Form L-0 (Rev. Nov. 30, 1976).

[108]Fishbeck et al., "Facility Plan," p. 177.

[109]Ibid., p. 179 (Table 18).

[110]Ibid., p. 209 (Table 24).

[111]Ibid., p. 120.

[112]Ibid. The problem was described as "The Achilles Heel of the Treatment Cycle" by Prof. Richard S. Engelbrecht in Highlights 12(5) (May 1975):3.

[113]Fishbeck et al., "Facility Plan," p. 121.

[114]Ibid., p. 133 (Table 15).

[115]Ibid., p. 135. The magnitude of the sludge-disposal problem can be further illustrated by the fact that, if it were incinerated in a special furnace at 1500°F, there would be 5.5 tons of ash per day. (Ibid., p. 140.)

[116]U.S., EPA, Guidance, p. 15.

[117]Fishbeck et al., "Facility Plan," p. 59 (Table 8).

[118]Ibid.

[119]Ibid., pp. 60ff.

[120]Fishbeck et al., "Phased Construction Evaluations" (n.d.).

CHAPTER IV

PUBLIC PARTICIPATION

EPA Requirements and Hearing

Chapter 5 of the EPA's Guidance publication presents the agency's policy regarding public participation in the facility-planning process. This chapter will summarize those policies and will compare them with the planning activity actually undertaken in the SCCSSA case. The public response and the planners' reaction to that response will be documented, particularly in regard to the disclosure of user costs.

The Guidance document advises:

> The public should participate from the beginning in facility planning so that interests and potential conflicts may be identified early and considered as planning proceeds.
>
> The planner should define issues and analyze information so that the public will clearly understand the costs and benefits of alternatives considered during the planning process.[1]

The philosophy that public participation is to be encouraged early in the planning process is expressed more specifically in the formal regulations: "One or more public hearings or meetings should be held within the area to obtain public advice at the beginning of the planning process."[2] While the regulations urge early participation,

the only mandatory public involvement is in the form of a public hearing that "shall be held prior to the adoption of the facilities plan by the implementing governmental units."[3] The rules specify a 30-day notice of the required hearing and stipulate that the final facility plan document the hearing with a report and a brief description of the public views expressed.

During the eight months that the "Facility Plan" was being prepared for the SCCSSA, no attempts to involve the public were reflected in the minutes of the meetings of either the SCCSSA or the DeWitt Township Board.[4] The first documented step involving the general public was the publication in the two area newspapers of the notice of the mandatory public hearing scheduled for Nov. 29, 1976.[5] Notices of the hearing were also mailed to a wide spectrum of state and local government agencies, including the Tri-County Regional Planning Commission, the Clinton County Road Commission, the Michigan Department of Natural Resources, and the Michigan Public Health Department. The only recorded invitation to a non-governmental party was to the Michigan United Conservation Clubs, Lansing.[6] The hearing was held in the DeWitt High School on the evening of Nov. 29 and was attended by 75 people besides the engineers and municipal officials involved in the project.[7]

According to the minutes of the meeting, the engineers gave a detailed description of the project, including the I/I analysis, the regional options,

wastewater-treatment techniques, and the recommended option. After federal and state grants, the cost to the municipalities for the construction was estimated at $5.8 million. This cost was to be met by bond issues, to be repaid with revenues from connection charges and/or monthly debt service charges. Although the exact amount and combination of charges would be decided by each municipality, the engineers estimated connection fees of $800 (DeWitt Township) to $3,500 (Watertown Township), with monthly charges of $9.80 to $12.10.[8]

According to the minutes, citizens' questions and comments concerned the following six subjects:

1. If one unit did not participate, whether this would jeopardize the grants

2. The added debt-service charge on top of the current monthly charges

3. Whether Watertown Township was contributing to pollution in the Looking Glass River, and to what extent

4. Who determines who participates in the project

5. Why a land disposal system like that in Muskegon, Michigan is not being used

6. Why the expansion and sewers are necessary

The minutes do not record responses to these questions. There was no discussion of operating and maintenance costs and there were no projections of total monthly expense to the user.[9]

The minutes record that "the only written comment

was submitted by Theodore L. Powell and is attached" to the minutes, Appendix E of the facility plan.[10]

The hearing closed with the engineers' recommendation that each municipality adopt the enabling resolutions within two weeks in order "to meet the timetable."[11]

Wacousta's Response

The proposed plan was likely to affect the people of Watertown Township more than those of other municipalities. Since they had no central sewer system, and Watertown was the least densely populated area,[12] proposed costs for Watertown were the highest among the areas to be served, with connection fees estimated at $3,000 to $3,500.

These fees were based, for Wacousta residents, upon the cost of constructing a local sewage collection system and 28,000 feet of forced-main interceptor to reach the SCCSSA plant five miles up the Looking Glass River (see Figure 1). A local lagoon system, considered under options 7 and 9 of the regional treatment options, had been rejected as more expensive than the forced main/pumping option.[13]

After the public hearing, there were warnings from residents that township officials "had better let them vote" on Watertown's participation before any firm commitment was made,[14] as well as threats of lawsuits.[15] Township officials held emergency board meetings and scheduled another public hearing for the township at the Wacousta School.

Meanwhile, the Fishbeck firm addressed the

feasibility of a five mile forced main:

> The Facility Plan indicates that it is more cost effective for Watertown Township to build the proposed force main and lift stations to convey the wastewater to DeWitt Township than to either construct separate treatment facilities for each area or purchase capacity in the City of Lansing's facility.[16]

While publicly rejecting the possibility of a lagoon for Wacousta, the consultants must have discussed it shortly thereafter with the Michigan DNR to prompt the DNR's letter to the engineers of Jan. 14, 1977:

> Due to the public input in the facilities planning process we have discussed alternatives to the degree of treatment that would be required for a separate sewage treatment facility serving the Wacousta Area of Watertown Township. It has been previously assumed that if the Wacousta Area were served by a sewage treatment facility that that facility would be required to produce an effluent of equivalent quality to a sewage treatment facility treating the wastewater from the entire region and discharging elsewhere to the Looking Glass River. This was a reasonable assumption to make. Due to the public involvement it was decided to further investigate the validity of that conclusion. After a detailed investigation of the assimilative capacity of the Looking Glass River, the Department of Natural Resources has determined that a lagoon type treatment facility with semi-annual discharge serving the Wacousta area would adequately protect the water quality of the Looking Glass River.[17]

By the time the Wacousta hearing was held on Jan. 20, 1977, the engineers reported that a lagoon system would reduce overall costs about $100,000, as it would eliminate five miles of forced main. The reason for not considering

a local lagoon system earlier, according to a newspaper account that quotes an engineer for the Fishbeck firm, was that the planners "didn't think the State Department of Natural Resources would approve it."[18]

This decision not only promised to save some money for Wacousta residents but also removed the urgency for their commitment to the SCCSSA. Construction of the lagoon system could be entirely separate; the SCCSSA could reduce its proposed plant capacity by 0.1 mgd (2 percent) and proceed without Wacousta.

Westwinds' Response

Wacousta was only one of the three areas in Watertown Township that was scheduled for sewers in the "Facility Plan." The Watertown board's Westwinds constituents also opposed the plan. Westwinds is a subdivision of about 70 new homes[19] on the west side of Airport Road, just north of the Looking Glass River, about half a mile from the SCCSSA treatment plant.

Among the Westwinds residents were at least two employees of the DNR who criticized the plan in depth. In a four-page letter to the Watertown Township Supervisor, Thomas L. Kamppinen voiced the following concerns[20]:

1. The proposed sewer conflicts with the Township's long range planning goal by encouraging high-density development in agricultural areas.

2. High-density development results in:
    a. inflated property taxes for farmland
    b. increased agricultural drainage problems
    c. higher frequency and severity of flooding
    d. increased runoff, allowing less groundwater recharge
    e. lower-quality runoff: the runoff from a 40-acre subdivision during a one-year, 24-hour storm equals the total suspended solids loading of the proposed treatment facility, according to Kamppinen

3. Specific septic tank problems have not been documented.

4. Excessive and unnecessary amounts of energy would be consumed for treatment.

5. Costs may approach 30 or 40 percent of the assessed value of some homes.

Kamppinen suggested that officials consider inspecting and maintaining existing septic systems in the rural areas and connecting the industrial area to Lansing's sewer system, where treatment costs, he claimed, were about half of the costs for the proposed SCCSSA facility.[21]

In an interview four years later, Kamppinen said there was never an effort by anyone to answer or discuss his accusations. Nor was there ever another attempt to connect Westwinds to the SCCSSA plant, according to a Watertown official.[22]

Willow Creek Farms' Response

On the opposite side of Airport Road, less than half a mile north of Westwinds, is the subdivision described as "Willow Bend" in the "Facility Plan." The name is actually "Willow Creek Farms," and the subdivision includes about 50 suburban homes[23] similar to those in Westwinds. This was the only area in DeWitt Township scheduled to be added to the SCCSSA system.

Because of its proximity to the plant, the area could be connected to the system for $241,700 in collector and interceptor costs.[24] In the opinion of the engineer, the project was grant eligible, so the net cost to the residents would be less than $1,000 per house.[25] Although this estimate later was increased, the Willow Creek project seemed to be one of the more financially favorable portions of the "Facility Plan."[26]

Residents of the subdivision asked the DeWitt Township board to excuse them from the program. On April 20, 1977, a lengthy hearing was held at the DeWitt Township hall, where 30 Willow Creek residents asked questions of the township attorney, the Fishbeck engineers, the chair of the SCCSSA, and the township Board of Trustees. At the conclusion of the hearing, the residents voted 27 to 10 (including seven letters from absent residents) not to join the sewer system.[27] Five days later, the Township board officially passed a resolution terminating the

Willow Creek portion of the project.[28]

User Cost Discussions

As is shown in the foregoing discussion, much of the public's interest in the plan focused on costs. Although costs will be discussed in detail in the next chapter, the question of the public's right to information on costs might appropriately be discussed here.

The minutes of the initial public hearing do not reflect any discussion of operation and maintenance costs, and the newspaper accounts refer to "insufficient" cost information.[29] The newspaper report of the Jan. 20 Watertown meeting says that township officials indicated that they "held the meeting because residents complained that not enough information was made available at the earlier hearing in December."[30] Residents complained that they had been getting "guesstimates," not firm figures; the reporter surmised that they did not fare any better at the January hearing. Even the township supervisor, Herman Oppenlander, said that he was confused, that "so many figures had been bounced around he couldn't copy them all down."[31]

In response to the EPA's request for comments,[32] a letter was submitted alleging, among other things, that the planners still had not made public the fact that the monthly charges proposed in the "Facility Plan" were "in addition to present sewer charges for most of the people

in the area."[33] A month later, an EPA official said that the allegation was being investigated, and that if the total residential unit cost indeed had not been revealed in the plan, then it was likely another public hearing would have to be held before the grant process could continue.[34]

A letter from Sara J. Segal of the EPA's Region V office clarified the use-rate situation:

> My staff have contacted the Engineer for the Southern Clinton County Sanitary Sewer Authority on the project, and he indicated that the $9.80 cost for DeWitt Township includes the cost of operation and maintenance for the new plant. Not included in this figure is $8.00 for the debt retirement of previously existing sanitary collector sewers. This charge would exist whether or not any consolidation (or expansion) occurred, so was not included in the finance plan for the present project. This would bring the total charge for DeWitt Township customers to between $16.30-$17.80 per month (operation and maintenance costs will vary from $5.00-$6.50 per month over the years). An additional $260,000 (reimbursement for treatment plant land and existing plant use) can be used to reduce debt service charges or to retire existing bonds earlier.[35]

There was no public statement to the citizens of DeWitt Township clarifying that the charges indicated in the "Facility Plan" did not include debt retirement for previously existing sanitary collector sewers.

Citizens Sewer Committee

Another facet of public involvement, while not an official part of the facility-plan record, was DeWitt

Township's Citizens Sewer Committee. While the decision on the SCCSA plant expansion was being deliberated, the DeWitt Township Board, which was responsible for 75 percent of the cost of the old plant, officially recognized that current use and connection fees were not covering its existing obligations.[36] When the sewer-collection system was expanded in 1972, the actual cost was below engineering estimates, and the township was subsidizing current expenses and debt retirement from that steadily depleting fund.[37]

The April rate increase did not stem the adverse financial tide; in September 1977 the board met with SCCSSA officials, the "Facility Plan" engineer, and the board's municipal financial/bonding consultant. The financial/bonding consultant recommended an increase in service rates of $8.00 a month for debt retirement; the SCCSSA chair reported that monthly operating-and-maintenance (O&M) charges would increase by $4.50, and the debt retirement by another $3.17, when the new plant was built.[38] The financial consultant explained the possibility of adopting a general tax to cover the deficit, and warned that if the board didn't "face up to the problems," it could jeopardize the selling of bonds for the proposed expansion. The board decided to take the matters to the public at an open meeting the following month.

On Oct. 10, 1977, in a crowded DeWitt Township hall, the various possibilities were presented. The largest developer in the area wanted a general tax levied

so that use fees would not be prohibitively high; farmers wanted the use fees increased to cover all of the deficit, since they received no benefit from the sewer; and many people wanted the three mobile home parks, not yet connected to the system, to help solve the problem by connecting immediately.[39] To address the problem, the board appointed a committee of volunteers, none of whom were members of the board.

In less than six weeks, the Citizens Sewer Committee submitted a nine-page report to the board, including a study of corresponding sewer use rates in neighboring communities. The report recommended (a) a small increase in user fees, (b) a 1.5-mil property tax on users and nonusers, and (c) a $50,000 transfer from the general fund, affordable because there would soon be "an upswing in the economy."[40]

While the citizens' committee was deliberating, the township board was still discussing the SCCSSA expansion. The suggestion was made that the Citizens Sewer Committee consider fiscal implications of the expansion at this time. Although the chair of the committee expressed interest, the suggestion was dismissed by the board.[41]

Summary

While not encouraging any more public participation than was required, the SCCSSA conformed to the EPA guidelines by printing the meeting notice, a list of the people

signing the attendance sheet, and the minutes of the public hearing. It also included the written comments received at the hearing and the engineers' three-page response to those comments.[42]

Notes--Chapter IV

[1]U.S., EPA, Guidance, p. 17.

[2]U.S., EPA, Federal Register 39(29) (Feb. 11, 1972), Sec. 35.917-5(b).

[3]Ibid.

[4]The "Facility Plan" reports: "Several meetings have been held since the initiation of the facility plan with each of the Townships involved and the City of DeWitt to request their input into the facility plan. Such items as population projections, land use planning and projected sewer service areas have all been reviewed with each township and the City of DeWitt." (See Fishbeck et al., "Facility Plan," p. 210.) The investigation undertaken for the present study disclosed no record of, and no municipal official who recalls, meetings to which the general public was invited prior to the November 1976 hearing.

[5]"Notice of Public Hearing," The State Journal (Lansing, Mich.), Oct. 29, 1976, and The Clinton County News (St. Johns, Mich.), Nov. 3 and Nov. 10, 1976.

[6]SCCSSA (Donna B. Syverson, Secretary-Treasurer), "Minutes of the Public Hearing," DeWitt, Mich., Nov. 29, 1976.

[7]Ibid., "Attendance Record of Public Hearing" (in Appendix).

[8]These charges and the pertinent Michigan legislation on municipal bonding are discussed in more detail in Chapter VI of this study.

[9]"Clinton Sewer Expansion Interest Lags," The State Journal (Lansing, Mich.), Dec. 1, 1976, p. B-3: "Spectators indicated some opposition is building, with most questioning tap-in costs and use fees which still are not definite." Also, Theodore L. Powell, personal notes from attending the hearing, Nov. 29, 1976.

[10]Theodore L. Powell, Memorandum: "Bath, DeWitt, DeWitt City and Watertown Facility Plan," Nov. 29, 1976.

[11]SCCSSA, Minutes, Dec. 16, 1976.

[12]Tri-County Regional Planning Commission, "208 Water Quality Management Plan--Interim Outputs" (Lansing, Mich., August 1976). The 1976 population estimates were 288 people per square mile for DeWitt Township, 144 for Bath, and 126 for Watertown.

[13]Fishbeck et al., "Facility Plan," p. 105 (Table 14). The fact that a mechanical treatment plant was never considered for Wacousta was explained on page 102 of the "Facility Plan." The engineers concluded that lagoon systems are more cost effective for treatment capacities up to 1.2 mgd. "A great deal of care was taken . . . to make sure that arbitrary decisions on treatment systems are not made," the plan states.

[14]The State Journal (Lansing, Mich.), Dec. 1, 1976.

[15]The State Journal (Lansing, Mich.), Jan. 25, 1977.

[16]Fishbeck et al., "Comments Made Concerning the Facility Plan at the Public Hearing, Nov. 29, 1976" (Lansing, Mich., Dec. 23, 1976). This memorandum was in response to the oral and written questions raised by citizens at the public hearing.

[17]Fred E. Cowles, Engineer, Water Quality Division, Michigan Department of Natural Resources (DNR), to Fishbeck, Thompson, Carr & Huber, Inc., Jan. 14, 1977.

[18]The State Journal (Lansing, Mich.), Jan. 25, 1977, p. B-12. The $100,000 figure was presented in the newspaper account. By Feb. 16, the savings estimate had increased by another $400,000: In a letter on that date, Fishbeck et al. reported that "the overall capital expenditure has been reduced by approximately $500,000 due to the new DNR ruling accepting a semi-annual discharge in the Wacousta area." (Fishbeck et al. to Theodore L. Powell, Feb. 16, 1982.)

[19]This is according to this author's count; no user or residential equivalency figures are presented in the "Facility Plan."

[20]Thomas L. Kamppinen to Herman Oppenlander, Watertown Township Supervisor, Jan. 20, 1977.

[21]Ibid.

[22]Interview with Vaughn Montgomery, Supervisor, Watertown Charter Township, April 10, 1982.

[23]The author's count.

[24]Fishbeck et al., "Facility Plan," p. 224 (Table 25). See also Table 7 of the present study.

[25]Ibid., p. 224 (Table 25) and p. 238 (Table 27).

[26]For instance, the $1,903,800 extension to southeastern Watertown would serve 200 residential equivalents at an average of $9,500 each, less federal and state grants estimated at about 45 percent. The Bath extension to Dutch Hills Mobile Home Park would cost an average of $5,800 per service, with no prospect of a grant. (See Fishbeck et al., "Facility Plan," p. 224 (Table 25) and p. 238 (Table 27); see also Table 7 of the present study.)

[27]DeWitt Township, Minutes of Meetings of the Board of Trustees, meeting of April 20, 1977.

[28]DeWitt Township, Minutes of Meetings of the Board of Trustees, meeting of April 25, 1977.

[29]SCCSSA, Minutes of the Public Hearing, Nov. 29, 1976; The State Journal (Lansing, Mich.), Dec. 1, 1976, p. 3-B.

[30]The State Journal (Lansing, Mich.), Jan. 25, 1977, p. 2-B.

[31]Ibid.

[32]Kent Fuller, Chief, Planning Branch, Region V, U.S. EPA, Memorandum, "To All Interested Government Agencies and Public Groups and Citizens," regarding SCCSSA, Project No. C262692, March 29, 1977.

[33]Theodore L. Powell to Kent Fuller, Chief, Planning Branch, Region V, U.S. EPA, April 6, 1977.

[34]Telephone interview with Mike Mikula, Region V, U.S. EPA, May 10, 1977.

[35]Sara J. Segal, Chief, Michigan Planning Section, Region V, U.S. EPA, to Theodore C. Powell, May 4, 1977. The fact that the Township would have a credit of $260,000 for the land and six-year-old plant facilities may not have been reassuring. The Township's bonded indebtedness at the time was in excess of $5 million, including collection-system costs, with principal and interest obligations of more than $450,000 a year until 1997. (Stauder, Barch & Associates, "Analysis of Debt Service and Operating Rates Necessary to Cover Existing and Proposed Requirements," presented to the DeWitt Township Board, Sept. 1, 1977; also, Township of DeWitt, "Comparative Balance Sheet, March 22, 1977 and March 23, 1976.")

[36]DeWitt Township Board of Trustees, Minutes of Meetings, Meeting of Jan. 10, 1977. Three members of the Board were appointed to study the sewer rates. At a meeting on Feb. 28, the board voted to increase operating-and-maintenance (O&M) charges from $2.50 to $5.00 per month, with the acknowledgment that debt-service funds were being used for current operation; the board said that the debt-service problem would "be addressed later." (DeWitt Township Board, Minutes of Meetings, Meeting of Feb. 28, 1977.)

[37]A newspaper article later reported that the system had been losing money for five years and that the last of the excess construction funds were used in November 1977. The State Journal (Lansing, Mich.), Dec. 2, 1977, and ibid.

[38]DeWitt Township Board of Trustees, "Minutes of Special Meeting," Sept. 1, 1977. The monthly rate, which had been increased to $14.50 in April, was apparently headed for $30.17.

[39]The developer was Gordon Long, president of Long Development Co., which had just built nearly 200 residential units in its Country Meadows project at Shavey and Herbison Roads. Long served on the Citizens Committee. The three mobile home parks were Kristana Village and Havana Trailer Park, whose management considered their parks permanently connected to Lansing's sewer system, and King Arthur's Court, Inc., whose management contended that its lagoon system was superior to the public system and who were at the time alleging in Clinton County Circuit Court that the

200-feet provision of Act 288 of 1972 applied to mobile-home parks as well as other properties. (The provision provided that connection to a public sewer was not mandatory if the building from which the sewage emanated was more than 200 feet from the public sewer line.)

[40]"Citizens Sewer Committee Report and Summary," Nov. 21, 1977. The tax on non-users was described as necessary to promote orderly growth in the community; "as orderly growth takes place, non-users will become users and benefit by having the current facilities." Non-users were a minority of the committee; most of them resigned, and submitted a minority report. (See also DeWitt Township Board of Trustees, Minutes of Meetings," meeting of Jan. 28, 1978; "DeWitt Given Plan to Save Sewer System," The State Journal (Lansing, Mich.), Dec. 2, 1977, p. B-7.)

[41]Interviews with Glynn Bowen, chair, Citizens Sewer Committee, 1977 and 1978. The author was present when Bowen attended a meeting of engineers, EPA personnel, and township officials on Nov. 14, 1977, at the DeWitt Township offices. Bowen was told by township officials that his committee's inquiry was to be confined to the existing system.

[42]Fishbeck et al., "Facility Plan," Appendix E.

CHAPTER V

EVALUATION OF COSTS

Sunk Costs

Section 6 of the EPA's Guidance publication introduces the subject of costs with a discussion of "sunk costs." Sunk costs are past expenditures that have no bearing on current alternatives. The guidelines require that any investments or commitments made prior to facility planning be regarded as "sunk costs" and not included as monetary costs in the plan. Such investments include[1]:

1. Investments in existing wastewater treatment facilities and associated land, even though incorporated in the plan
2. Outstanding bond indebtedness
3. Cost of preparing a facility plan

The EPA's treatment of "sunk costs" may be the justification for the engineers' failure to mention existing bonded indebtedness in the "Facility Plan," and for the treatment of existing indebtedness in the letter from Sara Segal of the EPA, described in the previous chapter.[2]

One potential effect of this rule is that ignoring previous expenditures may cause the community with the heaviest financial burden to appear to have the lightest. For instance, Watertown had no existing sewer, so the

proposed project constituted that community's entire sewer investment, with monthly debt retirement rates projected at $5.10 and connection fees of $3,500; DeWitt Township had previously invested several million dollars in its system, so the current project was to be less extensive, resulting in proposed monthly debt retirement payments of $3.30 and connection fees of $800.[3] To the reviewer unaware of the "sunk costs" for DeWitt Township, it would appear that DeWitt might easily afford the sewer project when, in fact, its new debt service would be twice as high as Watertown's (DeWitt's being $11.30 total) with connection fees of $2,300 ($800 plus the already-existing fee of $1,500). The EPA's treatment of "sunk costs" would allow for another study, five years hence, to classify all previous indebtedness as "sunk costs" again and propose a new treatment system that, on its face, would seem even more "cost effective."

Present Worth Theory

The second major consideration in the guidelines is a pair of concepts called Present Worth and Equivalent Annual Costs. In order to compare the cost of various treatment options, the guidelines stipulate that annual operating costs, current capital investments, phased (future) capital investments, and future salvage values must be reduced to either Present Worth or Equivalent Annual Costs. Through the use of standard discount tables,

20 years of operation and maintenance (O&M) costs can be expressed in terms of Present Worth--the amount of money which, if invested now at a given rate, would provide exactly the required O&M funds annual for 20 years (similar to a single-payment annuity).[4]

Conversely, the value of a capital investment can be expressed as the amount of annual income that would be earned by the investment of that sum at a given rate. A $1 million capital investment can be said to have an Equivalent Annual Cost of $50,000 per year for 20 years at no interest, $94,390 at 7 percent interest, or $186,800 at 18 percent.[5]

Thus, the cost of a system that requires a relatively high initial investment, but offers lower annual O&M costs, can be compared objectively to one that has lower initial costs but higher O&M expenses. The analysis can become fairly complicated when trying to establish such conditions as the present worth of an investment that will not be made until 10 years in the future, but most of these problems can be solved by consulting the appropriate compound-interest table. As the example in the previous paragraph indicates, the choice of interest rate is crucial in any long-term analysis. EPA regulations, at the time of the SCCSSA "Facility Plan," required that the planners use a discount rate of 7 percent for calculating Present Worth and Equivalent Annual Cost. This figure had been established by the federal Water Resources Council as a

reasonable reflection of municipal bond rates at the time.[6]

Capital Costs

Considering capital investment first, the "Facility Plan" summarized the cost as follows[7]:

Collectors	$ 4,488,900
Interceptors	2,791,600
Treatment Plant Lift Stations	709,400
I/I Correction	179,000
Treatment Plant	8,600,000
TOTAL	$16,728,900

Collectors are small (8- or 10-inch) sewer lines, most of them gravity flow, installed in the neighborhood to be served.[8] If a neighborhood, such as the Westwinds subdivision, is excused from participation, the total cost of collectors for that neighborhood is eliminated.

Interceptors are larger lines, often forced mains with lift stations, that carry sewage from a neighborhood to the treatment plant (or to a major interceptor that goes to the plant).[9] Two or more neighborhoods may be served by an interceptor, so the elimination of a proposed service area may or may not eliminate the need for an interceptor.

The proposed treatment plant lift stations were to be located on the final mile of the major interceptor, pumping the sewage from the entire area into the plant.[10]

The location and importance of these lift stations were such that two of them would have been necessary if any service was to be provided to the City of DeWitt or to Watertown Township, regardless of volume. The third and most expensive lift station (a $500,000 rehabilitation) was necessary only for projected growth and the excessive I/I that caused overflow in the spring.[11]

As the cost summary indicates, nearly half of the proposed $16 million project involved the construction of collectors and interceptors. The eight collector-interceptor systems are listed in Table 7.

New construction was grant eligible at the time as long as the project was to be in a community that was "in existence" on Oct. 18, 1972 (the date when the Federal Water Pollution Control Act was enacted). "In existence" was defined by the regulations to mean that the bulk (generally two-thirds) of the flow design capacity was for flow that existed on that date.[12] In the course of the present study, no indication was found that seven of the eight areas would have any problem complying with this requirement. The Coleman Road/M-78 extension in Bath Township would not qualify, however: The Dutch Hills Mobile Home Park had been built since the cutoff date. The "Facility Plan" recognized this, but did not provide a rationale for building an unsubsidized extension with an Annual Equivalent Cost of $108,031 to an area that could promise an

TABLE 7

COLLECTOR AND INTERCEPTOR COSTS

A.	Bath Township			
	1. Coleman Road/-M-78	Collector:	$ 1,035,600	
		Interceptor:	108,800	
		TOTAL:	1,144,400	
	2. Clark Road	Collector:	116,300	
	3. Chandler Estates	Collector:	401,400	
		Interceptor:	61,900	
		TOTAL:	463,300	
	BATH TOWNSHIP TOTAL			$ 1,724,000
B.	DeWitt Township			
	1. Willow Bend (Willow Creek Farm)	Collector:	158,900	
		Interceptor:	82,800	
		TOTAL:	241,700	
	DeWITT TOWNSHIP TOTAL			241,700
C.	City of DeWitt			
	1. West Shore, Lake Geneva	Collector:	437,800	
		Interceptor:	498,000	
		TOTAL:	935,900	
	CITY OF DeWITT TOTAL			935,900
D.	Watertown Township			
	1. Wacousta	Collector:	1,373,800	
		Interceptor:	811,300	
		TOTAL:	2,185,100	
	2. Grand River Avenue	Collector:	700,000	
		Interceptor:	803,800	
			400,000	
		TOTAL:	1,903,800	
	3. Westwinds Subdivision	Collector:	225,000	
		Interceptor:	25,000	
		TOTAL:	250,000	
	WATERTOWN TOWNSHIP TOTAL			4,338,900

SOURCE: Fishbeck et al., "Facility Plan," p. 224 (Table 25).

annual revenue of only $23,751 from its 195 customers.[13]

The balance of the proposed capital expenditure was for the $8.6 million remodeling of the SCCSSA treatment plant and expansion to a capacity of 5 mgd. The rationale for proposing a plant of this size was discussed in Chapter IV. The next section examines the proposed cost.

Phased Construction

When the EPA reviewed the "Facility Plan" in March 1977, its first criticism concerned the cost of the proposed capacity. The EPA noted that "the design flow is over two times the present flow," and suggested that a smaller plant be considered.[14] Recognizing that a 5-mgd plant might eventually be needed, the EPA requested a phased-construction study, suggesting that a plant size of 2.7 mgd be considered for the first ten years of the planning period. Since the proposed size was a crucial part of the "Facility Plan,"[15] and the plan was not accepted by the EPA until a phased study was completed, the present report will examine that phased study in some detail.

The consulting engineers' eight-paged "Phased Construction Evaluations" study[16] compared Present Worth and Equivalent Annual Costs of the proposed 5 mgd plant with an initial 2.7 mgd plant enlarged 10 years later to 5 mgd. The figures were based upon the premise that building costs would inflate by an annual compounded rate of 10

percent over the ensuing 10 years, so that the plant addition would cost two and one-half times as much in 1986 as it would if built in 1976. The study concluded, using the 7 percent discount rate required by EPA at the time for Present Value analyses, that building the reserve capacity immediately was more cost effective by $31,091 per year.[17]

If it is assumed that the second phase will be necessary, that building costs will inflate, and that construction money can be borrowed at less than the rate of inflation, it is a mathematical certainty that immediate construction will cost less. In fact, since the 7 percent discount rate set by the EPA is less than the 10 percent inflation rate selected by the engineers, the more prematurely reserve capacity is built, the more cost effective the project will be.[18]

The EPA rules entitled "Cost Effectiveness Analysis Procedures" provide the following:

> Inflation of wages and prices shall not be considered in the analysis. The implied assumption is that all prices involved will tend to change over time by approximately the same percentage.
>
> Exceptions to the foregoing can be made if there is justification for expecting significant changes in the relative prices of certain items during the planning period. If such cases are identified, the expected change in these prices should be made to reflect their relative deviation from the general price level.[19]

The inflation rate at the time the "Facility Plan" was written was not 10 percent.[20] The fact that it represented an exception to EPA policy was not noted in the plan, nor was there mention of the basis for using the 10-percent figure.

Further, the phased-construction analysis did not consider the possibility that the reserve capacity might not be needed within the 20-year study period.

Table 8 presents a summary of the engineers' "Phased Construction Evaluation" for the two options they discussed, as well as for two other options that were not discussed. The first two columns are taken from the engineers' report, which indicates that while the smaller plant would cost $1,662,000 less initially, expanding it later to 5 mgd would cost $1,880,000 (without inflation), or $218,000 more. According to one engineer,[21] in the second phase of construction, walls would have to be removed or modified and other changes would have to be made that could have been more efficiently included in a single phase. The cost of the smaller plant is 76 percent of the larger plant's cost with only 54 percent of the capacity, because of lost economy of scale and because some systems would initially be oversized to allow for efficient expansion later.[22]

The $1,880,000 cost of the second phase was projected forward for ten years at a 10 percent annual

TABLE 8

PHASED-CONSTRUCTION EVALUATION--PRESENT-WORTH SUMMARY

Item[a]	5 mgd Initially	2-Phase Construction	First Phase Only	First Phase Only
1. Plant Construction	$ 6,928,000			
First Phase 2.7 mgd		$ 5,266,000	$5,266,000	$5,266,000
Second Phase 2.3 mgd		2,479,000		
	$ 6,928,000	$ 7,745,000		
2. Constant O&M				
20 yrs. @ $218,000 (10.594)	2,309,500			
10 yrs. @ $218,000 (7.024)		1,531,200		
10 yrs. @ $218,000 (7.024 x .5083)		778,300		
	$ 2,309,500	$ 2,309,500	$2,309,500	$2,309,500
3. Variable O & M Increasing[1]				
$32,200/yr. for 20 yrs. (77.5091)	2,495,800			1,247,900
$26,600/year for 10 yrs. (27.7156)		737,300	737,300	
$266,000/yr. for 2nd 10 yrs. (7.024 x .5083)		949,800	949,800	
$37,800/yr. during 2nd 10 yrs. (27.7156 x .5083)		532,500		
	$ 2,495,800	$ 2,219,600	$1,687,100	$1,247,900
Present Worth	11,495,800	12,274,100	9,262,600	8,823,400
Less Salvage Value	- 323,800	- 535,200	- 242,483	- 242,483
Present Net Worth	$11,409,500	$11,738,900	$9,020,117	$8,580,917
Equivalent Annual Costs	1,076,943	1,108,035	851,409	809,953
Annual Cost Difference with Phasing	-	+ 31,092	- 225,534	- 266,990

[a]Numbers in parentheses are factors from the compound interest tables used to discount future costs to present values. In each case they agree with the Fishbeck study.

SOURCE: Fishbeck et al., "Phased Construction Study" (n.d.).

inflation rate to arrive at a 1986 estimated cost of $4,877,000. This figure was then discounted back to 1976 at the 7 percent bonding rate to arrive at the Present Net Worth of $2,479,000, imposing a $599,000 handicap on this option.

In the first two alternatives, constant O&M costs were established by the engineers as the cost of treating 1 mgd. This was the capacity of the two existing plants and, based upon then-current flow figures, was the minimum flow of a new plant regardless of eventual size. This figure for all options is $2,309,500.

The variable O&M is the amount by which O&M costs increase as the number of gallons treated increases. It is calculated on a straight-line basis from 1 mgd in 1976 to 5 mgd in 1996. The figure is less for the phased construction option because the smaller plant apparently could operate for less money during the first 10 years, with operating costs increasing at $26,000 per year, while operating the larger plant would cost $32,200. After the smaller plant's expansion, variable costs would rise at a $37,800 increment per year, reaching the same total cost at the end of 20 years. This is illustrated graphically in Figure 4.

The third difference between the options is in the salvage value at the end of the 20-year planning period. Since part of the phased plant would be only 10 years old, it would have a value estimated to be $822,200 more than

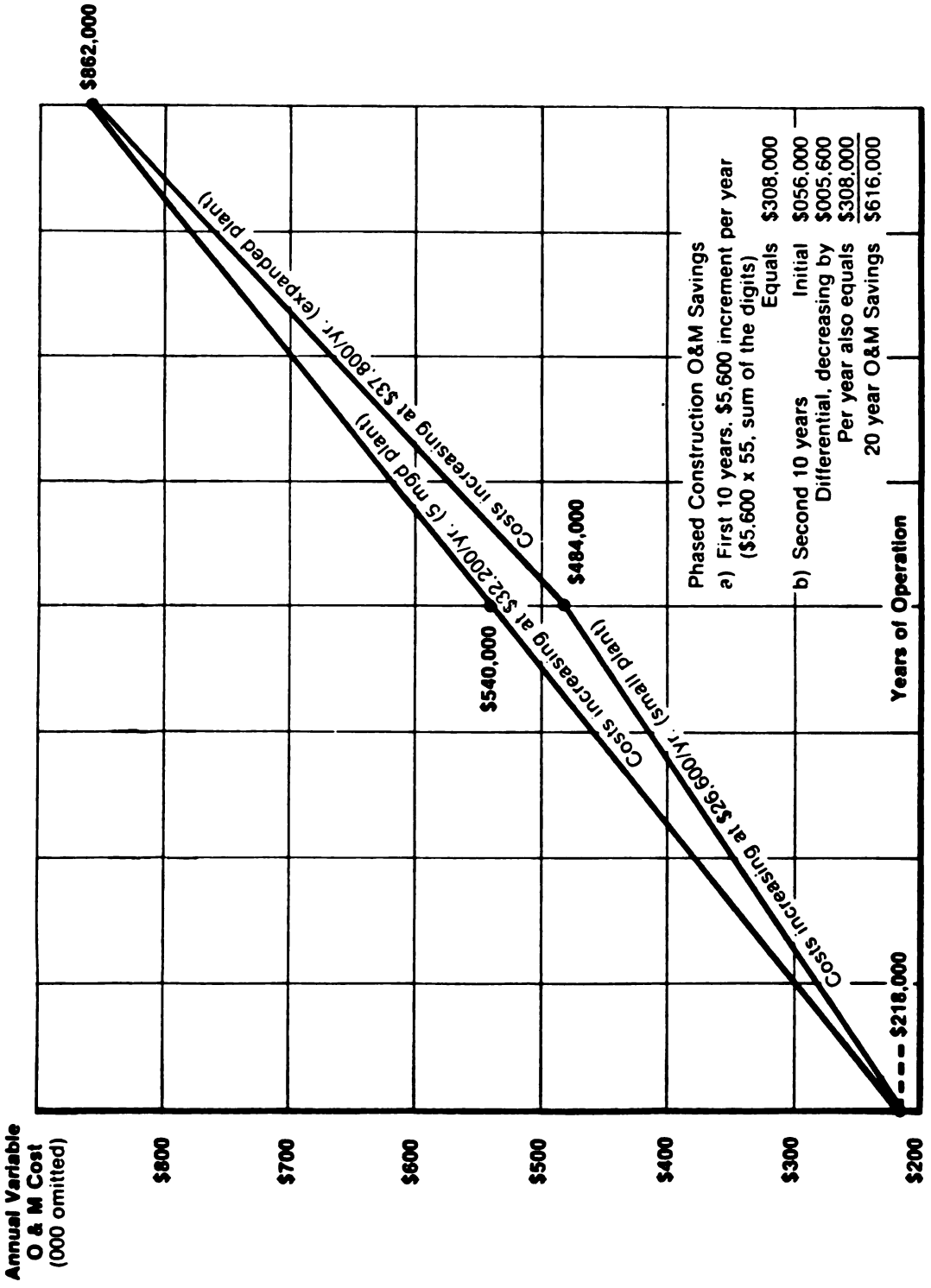

Figure 4. Annual Increase in Variable O & M Costs. Initial 5 mgd plant compared to phased construction option.

SOURCES: Fishbeck et al., "Facility Plan," Table 23; Fishbeck et al., "Phased Construction Study," Table 3.

the value of the non-phased plant.

Thus, although the phased construction would result in lower O&M costs and a higher salvage value, the assumption of a 10 percent inflation rate resulted in the conclusion that that option would be more costly by $31,092 per year. (If a 7 percent inflation rate had been assumed, the phased plant would have cost $25,448 less per year than the non-phased, large plant.[23])

Accepting the 10 percent inflation factor, Table 8 also includes the possibility that a larger plant would not be needed. The second two columns summarize the cost of a 2.7 mgd plant during the first ten years, the same as the engineers' forecast, but with no increase in sewage treated during the second ten years. This possibility is included because the rate of growth in the area had declined by more than half of its value during the preceding ten years. A similar decline during the following ten years would reduce expansion to nearly zero.[24] Constant O&M is the same, and variable O&M increases by the same amount for the first 10 years. The cost of expansion is eliminated, and the increasing variable costs (to reach 5 mgd for the second ten years) are eliminated.

The fourth column illustrates an initial growth rate of only half the engineers' projections, with growth to 2.7 mgd spread over 20 years. All figures are the same as in column three, except that with lower variable O&M costs initially, Present Worth of these costs is reduced by

about $440,000.

In sum, then, in the "Phased Construction Evaluation" the engineers considered only the possibility that the smaller plant would have to be expanded. If they had also considered the possibility that no expansion would be necessary, the same phased plan might have saved either $225,534 or $266,990 per year, depending upon the timing of the slower growth rate. Before approving the larger plant, decision makers could have weighed the potential annual loss of $31,000 (Table 8, col. 2) against a potential annual gain of almost $267,000 (Table 8, col. 4).

Operation and Maintenance Costs

The other part of the cost-evaluation process was the estimation of O&M costs. The magnitude of O&M costs is sometimes not appreciated because of the practice of expressing them in terms of Present Worth. While this is helpful in comparing one proposed facility with another, it does tend to de-emphasize the O&M component. Construction costs are presented at face value, being the same as Present Worth, while O&M costs are discounted by increasingly larger factors over the planning period, with the 20th year being discounted by 74.16 percent.[25] Thus, Table 8 of the present study indicates that construction costs are $2,309,500, and variable O&M costs are $2,495,800. It might not be readily apparent to the average reader that this translates into a 20-year O&M expenditure of

11,122,000.[26] Further, there is a possibility that the "Facility Plan's" projections were modest. As indicated in the introduction to this paper, the actual O&M cost for the first year of operation, 1981, was $620,725,[27] $70,000 more than the engineers' projection for 1990--and this is with the plant operating at only 20 percent of capacity. Table 9 presents a comparison of the "Facility Plan" projection and the first year's actual budget.

TABLE 9

OPERATION AND MAINTENANCE COSTS

Item	"Facility Plan" Projection for First Yr. Operation	Actual 1981 Budget	Percent Increase
Labor	$ 112,000	$ 206,750	85
Power & Utilities	33,000	184,750	460
Maintenance and Solids Handling	25,000	53,450	113
Chem. & Supplies	48,000	60,775	26
Replacement Res.	-0-	115,000	-
TOTALS	$ 218,000	$ 620,775	185

NOTE: The SCCSSA budget does not categorize costs in exactly the same way as does the "Facility Plan." Labor and Utilities are readily identifiable, but some budget items were arbitrarily assigned by the author to either (1) Maintenance and Solids Handling (e.g., vehicles, gasoline) or (2) Chemicals and Supplies. How these items are categorized does not affect the totals.

SOURCES: Fishbeck et al., "Phased Construction Evaluation"; SCCSSA, "1981 Budget" (Lansing, Mich., December 1980).

The final budget item is a reserve fund required by EPA regulations and originally not recognized in the "Facility Plan."[28] The remainder of the increase can be accounted for only as a result of inflation or inaccurate estimates, since there were no changes in the design or operating standards of the plant since the "Facility Plan" was written.

As the percentage figures illustrate (Table 9, last column), energy costs are a major source of the cost increase. These costs were questioned when the plan was presented in 1976.[29] The engineer stated at that time that "costs used in the Facility Plan were developed based on anticipated costs in the year 1990." Some projected costs were based upon "expected cost increases over the next twenty years."[30]

The record does not provide more-specific information on how the projections were made, but a graphic display of the four cost categories (Figure 5) reveals some possibilities. The consumption of power and chemicals is generally proportionate to the amount of wastewater treated, and should increase in linear fashion as the flow increases from 1 mgd to 5 mgd. The cost of these items will increase, then, proportionate to total quantities consumed, and any cost increase beyond that amount would be an indication of an inflation factor. Labor costs tend to be fairly fixed for this type of plant and would rise mainly through inflation.[31]

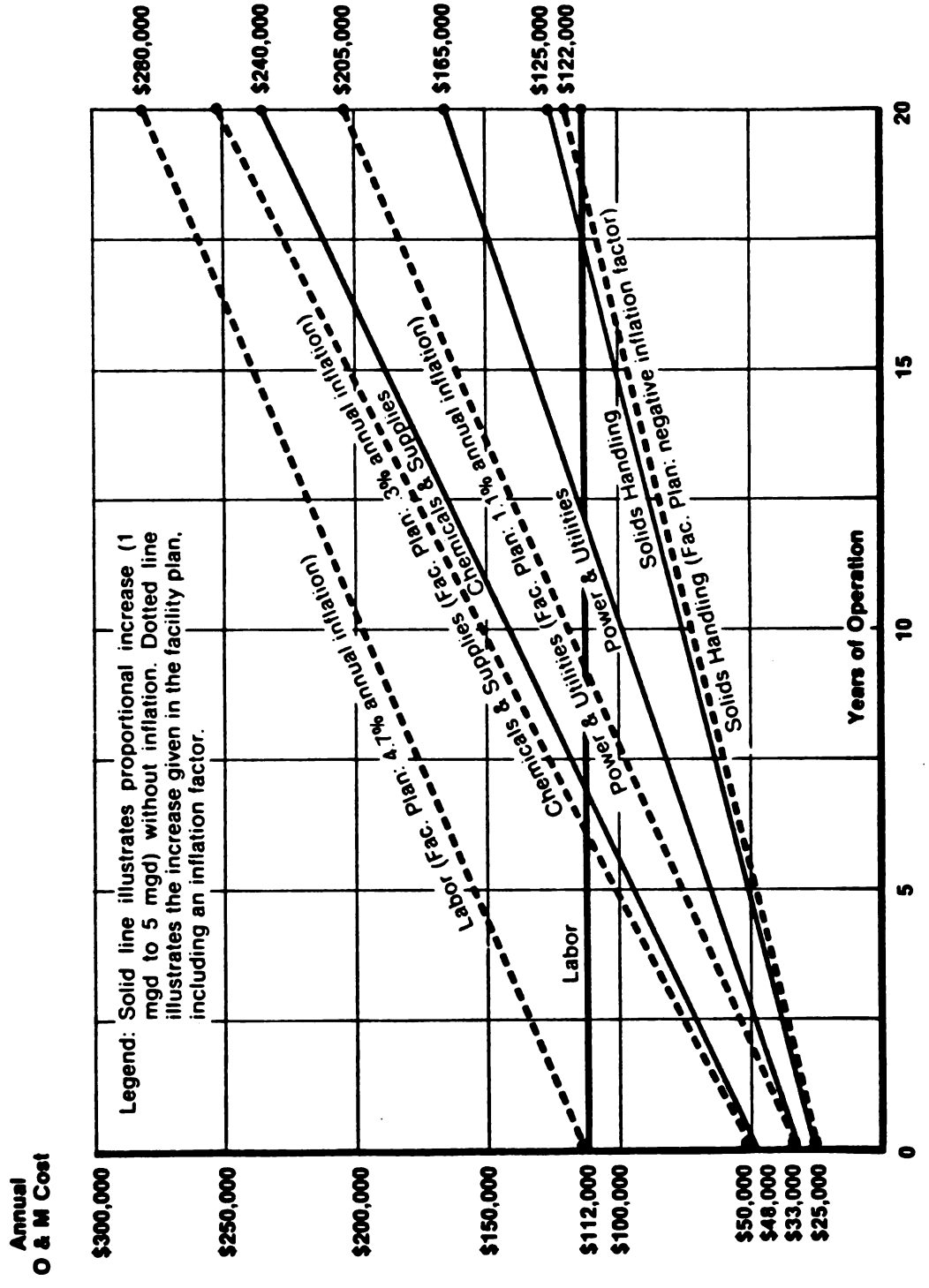

Figure 5. Inflation Cost Factors for O & M Cost Estimates.

SOURCES: Fishbeck et al., "Facility Plan," Table 23; Fishbeck et al., "Phased Construction Study," Table 3.

As suggested in a previous section of this study, predicting the rate of inflation is a delicate undertaking. In fact, in an engineering study, a strong case can be made for avoiding it altogether, on the assumption that inflation will affect all areas of the economy somewhat evenly.[32] However, the O&M cost estimates in the "Facility Plan" indicate that the engineers had considered inflation. This effort shall now be examined.

Cost projections for the four principal cost items are charted on the graph in Figure 5, comparing the Fishbeck et al. estimate to the proportionate increase attributable to higher quantities of sewage treated. The extent to which the engineers' projections exceed the proportionate growth is presumed to be an allowance for inflation. For instance, power consumption was estimated at $33,000 for 1 mgd, so a proportionate increase for 5 mgd would be $165,000 (dotted line in Figure 5). The fact that the engineers predicted that power costs would rise to $205,000 indicates an inflation adjustment of $40,000 over 20 years (at a compounded annual rate of 1.1 percent).

As Figure 5 illustrates, after variable expenses were increased by a factor of five, the "Facility Plan" assumed an inflation rate of 1.1 percent per year for power and utilities, just over one-fourth of 1 percent for chemicals and supplies, and a reduction of $3,000 (less than one-fourth of 1 percent per year) in maintenance

and solids-handling expenses. If labor is assumed to be a fixed expense, the plan allows for an annual inflation rate of 4.7 percent for that item.[33]

While the "Facility Plan" was being developed, the EPA released a study by Culp/Wesner/Culp, consulting engineers, concerning projected inflation rates to the year 2000.[34] This study predicted annual price increases of about 4 percent for power and chemicals and about 3 percent for labor. Figure 6 shows the effect of inflation on one particular variable cost, such as power. The "Facility Plan" authors estimated this cost at $33,000 for treating 1 mgd for the first year. If power consumption were to increase in exact proportion to treatment volume, the cost would be $165,000 at 5 mgd (the 0-percent inflation line). The "Facility Plan" contemplated a 1.1 percent inflation factor, resulting in annual costs of $205,000 in 20 years, as illustrated on the second line. The other lines illustrate the results of a five-fold increase in consumption with the 4 percent inflation rate predicted by the Culp study and the 10-percent rate predicted by Fishbeck et al. for construction costs.

To further illustrate the impact of a small percentage increase over a long period of time: If labor units were fixed, and all other expenses increased five-fold, annual operating expenses for the SCCSSA plant in 20 years, adjusted for the 10 percent inflation rate used

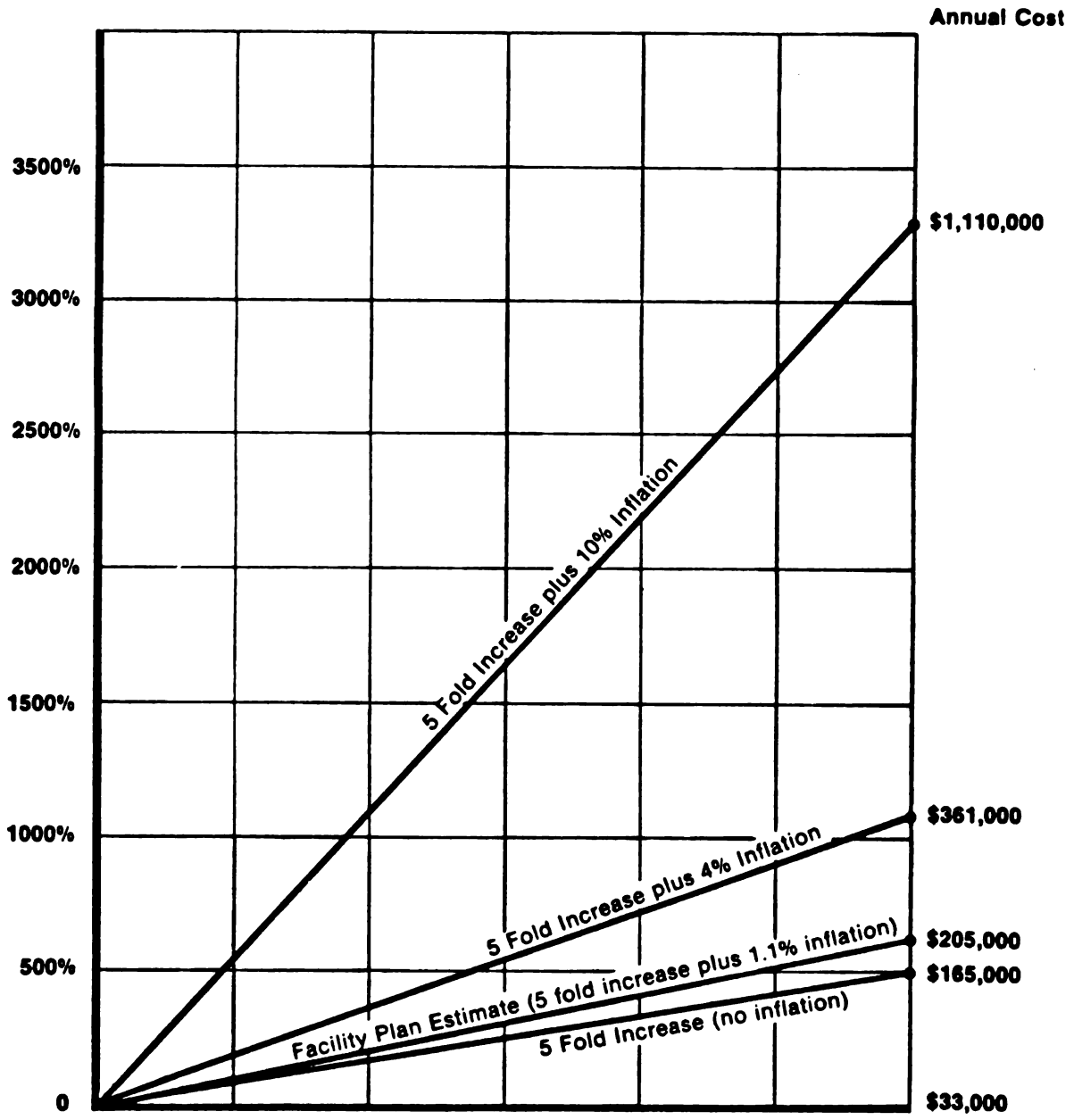

Figure 6. SCCSSA Variable O & M Costs with Selected Rates of Inflation.

SOURCES: Fishbeck et al., "Facility Plan," Table 23; Fishbeck et al., "Phased Construction Study," Table 3; Donald G. Newnan, Engineering Economic Analysis, "Compound Interest Factors" (San Jose, Calif.: Engineering Press, 1980).

in the phased-construction study, would be $4,318,734, in contrast to the $862,000 shown in the plan.[35]

Local Costs

In the final phase of the cost study, the planners turned their attention to the matter of how the local share (i.e., 36 percent of the capital investment and 100 percent of the O&M costs) would be paid. This phase is covered in one page of the plan, and is presented here as Table 10.[36]

Each municipality is responsible to the SCCSSA for its share of the expansion, but is free to decide how these obligations will be met. Municipalities could raise the funds through assessment of charges as sewer-connection fees, monthly debt retirement fees, front-footage assessments, or ad-valorem taxes on all property.[37]

Front-footage assessment had been considered in DeWitt Township because it would spread the cost over many property owners, including those whose property might appreciate because of sewer service, and thereby reduce the cost per capita. However, the sewer system traversed a considerable amount of vacant land in order to connect the populated areas to the treatment plant, and the township board decided it would be inappropriate to charge large frontage fees to farmers who never intended to use the system.[38]

Knowing that front-footage assessments had not been used in the past, the engineers appeared to have

TABLE 10

MONTHLY CHARGES PER RESIDENTIAL EQUIVALENT

Area	Debt Service					O&M Costs				Conn. Charges for Collector Sewers
	WWTP	Inter Sewer	I/I Red.	Admin. Costs	Total Debt	WWTP	Inter	Total O & M	Total Monthly Payment	
City of DeWitt	2.00	0.75	0.10	1.00	3.85	5.40	1.10	6.50	10.35	$2,000-2,500
DeWitt Township	2.00	0.20	0.10	1.00	3.30	5.40	1.10	6.50	9.80	$ 600- 800
Bath Township	2.00	0.50	--	1.00	3.50	5.40	1.25	6.65	10.15	$3,000-2,500
Watertown Township	2.00	2.10	--	1.00	5.10	5.40	1.60	7.00	12.10	$3,000-3,500 ($1,000)

SOURCE: Fishbeck et al., "Facility Plan," p. 240 (Table 29).

suggested in their Table 29 (Table 10 in the present study) that the cost of interceptors and of treatment-plant expansion be paid through monthly debt service fees and that the cost of collectors be paid through connection fees. As has been noted, though, each municipality had its prerogative, and the planners could not predict the exact combination of fees to be assessed until each board made its decision.

Although the "Facility Plan" contains considerable data on present and future population, it gives no information about the number of actual customers (residential equivalents) connected to the two old plants at the time, or expected to be connected to the new plant at any particular time. Because the figures used in preparing this section are unavailable, any attempt to analyze the user costs is confronted with the problem that half the equation is missing. (However, a review of EPA regulations at the time indicates that the planners were under no legal obligation to reveal even as much about user charges as they did.)

In a memorandum dated Aug. 16, 1976, John T. Rhett, Deputy Assistant Administrator of the EPA, pointed out that until that time the only regulation concerning the presentation of local costs to the public was Sec. 35.925-5 of the grant regulations, requiring the regional administrator to determine, before awarding grant assistance, that the applicant (a) has agreed to pay the non-federal

project costs, and (b) has the legal, institutional, managerial, and financial capability to insure adequate construction, operation, and maintenance of the treatment works throughout the applicant's jurisdiction. Mr. Rhett observed:

> The financial assurances would have little basis unless those served by the treatment works are informed of their costs. The quality review of facility plans during the past years has shown that many lack financial information on non-Federal debt service or operation and maintenance costs and that, even where such data are presented, these costs are not usually translated into charges for a typical residential customer. Some EPA regions have indicated that most residents to be served by grant funded treatment works will be unaware of their financial obligations until construction of the works is 80% complete and user charges have been determined.[39]

The EPA adopted a new policy to require that the facility plan contain (a) a breakdown of estimated grant-eligible and ineligible costs; (b) a report on the expected method of local financing and estimated annual debt-service costs; (c) estimated annual O&M costs; and (d) estimated monthly charges for O&M and debt service for a typical residential customer. This information was not required for facility plans for which public hearings had been held before Jan. 2, 1977.[40] The SCCSSA hearing was held in November 1976, so the planners apparently did not violate the letter of the law.

Notes--Chapter V

[1]U.S., EPA, Guidance, p. 18.

[2]Sara J. Segal, Chief, Michigan Planning Section, Region V, U.S. EPA, to Theodore C. Powell, May 4, 1977.

[3]Fishbeck et al., "Facility Plan," p. 240 (Table 29).

[4]U.S., EPA, Guidance, p. 18.

[5]Donald G. Newnan, Engineering Economic Analysis (San Jose, Calif.: Engineering Press, Inc., 1980), pp. 445, 451: "Capital Recovery Factor Table, Uniform Payment Series."

[6]U.S., Federal Register 39(29) (Feb. 11, 1974), Appendix f.(5).

[7]Fishbeck et al., "Facility Plan," p. 225 (Table 25).

[8]U.S., Federal Register 39(29) (Feb. 11, 1974), Sec. 35.905-19.

[9]Ibid., Sec. 35.905-12.

[10]Fishbeck et al., "Facility Plan," p. 216.

[11]Michigan Department of Natural Resources (DNR), "Report of Pollution Discharge or Environmental Injury" (Lansing, Mich., March 2, 1976). This report, signed by the SCCSSA Plant Superintendent, describes the repeated overflow of a "combination of sanitary sewerage and surface water" from a manhole on the gravity interceptor leading to the last lift station before the plant. The DNR file indicates that this occurred often in the spring, for a period as long as three months in some years. The final lift station did not have the capacity to pump the "infiltration/inflow entering the sanitary sewage system." As of this writing, the lift station has been rebuilt, but the I/I problem has not been corrected. (SCCSSA, "Plant Influent Sheet," monthly report, October 1980 through January 1982, Files of SCCSSA, DeWitt, Mich.)

[12]U.S., Federal Register 39(29) (Feb. 11, 1974), Sec. 35.925-13. The matter of extending sewer-collection systems into sparsely populated areas at federal expense received further attention in the 1977 amendments to the Federal Water Pollution Control Act. EPA Program Requirement Memorandum #78-9 (issued March 3, 1978) announces that, in addition to the provision that "generally two-thirds" of the design-capacity flow must have been in existence in 1972, the population density must average more than 1.7 persons per acre. In addition, the facility plan would have to document that there was a public-health problem or contaminated groundwater, and that repairs or improvements to existing facilities (i.e., septic tanks) were not feasible. Preliminary estimates by the author indicate that all eight proposed areas would meet the density requirement, but DNR records show that only three of them (DeWitt City, Wacousta, and the Watertown industrial area) had any record of pollution problems.

[13]Total connector and interceptor costs are $1,144,400 (Fishbeck et al., "Facility Plan," p. 224 (Table 25)). The Annual Equivalent Cost factor of 0.0944 produces a result of $108,031. Total revenue would be 195 times a monthly rate of $10.15 (Fishbeck et al., "Facility Plan," p. 238 (Table 27)) per month times 12 months. According to Bath Supervisor Richard Brooks (interview, March 24, 1982), an interceptor was constructed to Dutch Hills for less than $100,000 by ignoring the potential for future customers and extending the forced main the shortest distance "cross country." This produces a substantial profit for the Township, although it triples the sewer rates for the residents of Dutch Hills who must abandon their Meridian Township connection. (Interview with Jan Davis, Manager, Dutch Hills Mobile Home Park, March 4, 1981.)

[14]John Kelly, Chief, Michigan Project Evaluation Section, Region V, U.S. EPA, to SCCSSA, March 8, 1977.

[15]Ibid. See also DeWitt Charter Township Board of Trustees, Minutes of Meetings, Meeting of Sept. 1, 1977: "The Sewer Authority looked at not going ahead with the expansion, but just upgrade [sic] the treatment plant as required."

[16]Fishbeck et al., "Phased Construction Evaluation" (Lansing, Mich., n.d.).

[17]Ibid., p. 3.

[18]Consider the following examples:

	Inflation Rates			
	0%	7%	10%	20%
1976 est. cost ($1000s)	$ 1,880	$ 1,880	$ 1,880	$ 1,880
1986 est. cost ($1000s)	1,880	3,698	4,877	11,641
Present Worth @ 7% discount rate ($1000s)	956	1,880	2,479	5,917

With any inflation rate less than 7 percent, one would not borrow the money to build. At a 20 percent inflation rate, the plant is already worth $5,917,000, so it should be built immediately.

[19]U.S., Federal Register 39(29) (Feb. 11, 1974), Appendix A, Sec. f.(4), "Prices."

[20]The inflation rate, as reflected in the Consumer Price Index, was 9.1 percent for 1975, 5.8 percent for 1976, and 6.5 percent for 1977. (U.S., Department of Commerce, Bureau of Labor Statistics, Statistical Abstract of the United States (1981) and Monthly Labor Review.)

[21]Interview with Roger Slykhouse, P.E. Slykhouse and Associates, Grand Rapids, Mich., Jan. 21, 1981.

[22]Ibid.

[23]The $599,000 difference ($2,479,000 less $1,880,000) multiplied by 0.09439 (the annual cost equivalent factor for 10 years at 7 percent) equals $56,540 per year. Subtracting $31,092 results in a $25,448 savings.

[24]Table 4 indicates a compound population growth rate in the area from 1950 to 1970 of 3.8 percent (from 9,285 to 19,716). The Tri-County 208 study, released while the "Facility Plan" was being developed, showed an increase of 2,034 by 1976, a compound increase of 1.6 percent per year. (Tri-County Regional Planning Commission, "208 Water Quality Management Plan--Interim Outputs" (Lansing, Mich., August 1976).) Projecting that trend, the growth rate would be 0.8 percent by 1982, 0.4 percent by 1986, and 0.2 percent by 1992, resulting in population increases on the order of 23 people a year by then. (See Donald G. Newnan, "Compound Interest Factors," in Newnan, Engineering Economic Analysis (San Jose, Calif.: Engineering Press, Inc., 1980).) Figures published since the plan was completed show that the growth rate had dropped to less than 1 percent by 1980 and population had actually declined in

DeWitt Township. (Tri-County Regional Planning Commission, "Population and Housing Trends" (Lansing, Mich., Dec. 17, 1980).)

[25]Newnan, Engineering Economic Analysis.

[26]Constant O&M of $218,000 times 20 years equals $4.36 million. Variable O&M increases by $32,000 per year for 20 years. The sum of the digits is 210 times $32,200 equals $6,762,000.

[27]SCCSSA, "1981 Budget" (Lansing, Mich., December 1980).

[28]EPA guidelines at the time stated that a provision for replacement of equipment must be included in O&M costs, but the author was not able to discover any suggested amounts or percentages. (See U.S., Federal Register 40(72) (April 14, 1975), Sec. 35,905-17.) The reserve was intended to be a bookkeeping entry similar to depreciation, not supported by money in the bank, according to the SCCSSA chair. (Interview with William Purves, Chair, SCCSSA, Dec. 9, 1980.) However, the Operations Section of the EPA Region V office was insisting upon cash reserves for this item. (Interview with Chris Averkiou, Operations Section, U.S. EPA, Chicago, Dec. 15, 1980). In any case, this item represents 20 percent of the budget in the "Facility Plan."

[29]Theodore L. Powell, Memorandum, "Bath, DeWitt, DeWitt City and Watertown Facility Plan" (Lansing, Mich., Nov. 29, 1976).

[30]Fishbeck et al., "Comments Made Concerning the Facility Plan at the Public Hearing, November 29, 1976" (Lansing, Mich., Dec. 23, 1976).

[31]Interview with Roger Slykhouse, P.E., Slykhouse and Associates, Jan. 21, 1981.

[32]See EPA guidelines.

[33]These assumptions are general; it is unlikely that the engineers presumed absolutely no increase in labor cost as the operation grew from 1 mgd to 5 mgd; nor is it likely that all of the variable expenses were expected to increase exactly fivefold. To the extent that the estimates

include more labor units, the allowance for inflation would be reduced; to the extent that variable-expense items were not projected to increase in linear fashion with production, the inflation factor would be higher. In the absence of more-specific information, however, the range of inflation values (-0.25 percent to +4.7 percent) appears to be valid, according to a review by Slykhouse and Associates (interview with Thomas Slykhouse, P.E., April 2, 1982) and James Burns, P.E. (interview, April 22, 1982).

[34]Culp/Wesner/Culp, Consulting Engineers, "Energy Conservation in Municipal Wastewater Treatment" (Washington, D.C.: U.S. EPA, COntract No. 68-03-2186, Nov. 5, 1976).

[35]Fishbeck et al., "Phased Construction Evaluation" (n.d.), Table 3, "Estimated Annual Operation and Maintenance Costs" (submitted to the EPA under cover letter dated March 16, 1977). Labor, $112,000 x 6.727 (20-year, 10 percent interest factor) equals $753,424. All other expenses, $106,000 x 6.727 x 5 (for increase in gallons treated) equals $3,565,310.

[36]Fishbeck et al., "Facility Plan," p. 240 (Table 29). No explanatory text was included.

[37]Interview with Tony Presecan, Municipal Finance Commission, State of Michigan, March 29, 1982. Under the provisions of the state act, townships may finance local projects by contracting with the County Department of Public Works, which sells the bonds with the county's full faith and credit. Presumably, this results in lower interest rates than if a municipality were to sell its own obligations, as allowed under Public Act 188 of 1954.

[38]Stauder, Barch & Associates to DeWitt Township, Oct. 7, 1969 and Sept. 2, 1971, files of DeWitt Charter Township.

[39]John T. Rhett, Deputy Assistant Administrator, U.S. EPA, "Construction Grants Program Requirements Memorandum (PRM) #76-3" (Washington, D.C., Aug. 16, 1976).

[40]Ibid.

CHAPTER VI

ENVIRONMENTAL IMPACT

Statutory Requirements

The necessity of including an environmental evaluation in a facility plan arises from the provisions of the National Environmental Policy Act of 1969 (NEPA). This legislation, which created the Environmental Protection Agency, requires all agencies of the federal government to:

> Include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on--
>
> i. the environmental impact of the proposed action,
>
> ii. any adverse environmental effects which cannot be avoided should the proposal be implemented,
>
> iii. alternatives to the proposed action,
>
> iv. the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and
>
> v. any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.[1]

To comply with these requirements, the EPA guidelines require that planners evaluate specific environmental impacts during several stages of the facility-planning process. Among the primary impacts to be considered are

(a) destruction of historical, archaeological, cultural, or recreational areas; (b) destruction of sensitive ecosystems; (c) water pollution during construction; (d) displacement of households; (e) noise and air pollution; and (f) violation of other state or federal environmental laws or standards. Secondary impact refers to changes in the rate, density, or type of development, and to the effect upon the environment of such changes in land uses.[2]

"Facility Plan" Response

The "Facility Plan" devotes some 38 pages to the discussion of environmental impacts.[3] Each major treatment option, including the "no-action" option, is covered in a three-page discussion of environmental effects. The discussions in each case are practically the same, with references to temporary dislocation of wildlife in the area during construction, compliance with the Michigan Soil Erosion Act, and a statement that the proposed action would "relieve the present moratorium on new building in both Bath and DeWitt Townships."[4]

None of the proposed courses of action would affect any unique resources such as historic sites, ecologically sensitive wetlands, or endangered-species habitat.[5] The planners point out at some length that any construction activities would temporarily disrupt the environment, use energy resources, and commit land and other resources to the project. However, they concluded

that the resultant improvement in treatment facilities would immediately enhance the water quality of the Looking Glass River for current and future recreational use.[6]

The "Facility Plan" indicates that the most serious potential environmental effect would be the commitment of 2,050 acres for the land-treatment alternative. This would represent 3 percent of the land in the study area, or nearly 9 percent of the area of whichever township was selected for the site.[7] If it is concluded that the only viable alternative treatment system is a centralized spray irrigation system with six months' storage capacity, the use of that much land would undoubtedly have a serious environmental impact on the community.[8]

The "Facility Plan" recognized that the most generally discussed secondary environmental impact of the expansion of sanitary-sewer service is the promotion of population growth.[9] Increased development brings more traffic, more air and noise pollution, greater demand for public services, and more storm-water runoff.

The water-quality literature leaves little doubt that increased storm-water runoff generated by increased development can negatively affect the water quality of a receiving stream, more than offsetting the positive effect of better treatment.[10] As a Watertown Township resident (and DNR employee) pointed out at the time, "it seems somewhat foolhardy to spend $17 million to provide such

treatment that the discharge from the plant contains only 15 mg/l of suspended solids, and encourage and allow storm sewers to discharge in concentrations up to 600 mg/l."[11]

The "Facility Plan" recognized population growth as "the major secondary environmental effect of the proposed project," but did not initially mention the storm water degradation problem or other secondary impacts. Discussion of such secondary impacts was prompted by the Tri-County Regional Planning Commission during the review process.[12]

While the impact of faster growth was viewed as "major," it was not considered by the engineers as being particularly adverse.[13] However, the environmental study does not consider the impact of extending sewer lines to most areas in the three townships in order to achieve the 95-percent participation envisioned for 1996. (One reviewer concluded that the cost of extending those lines might exceed the investment in the entire sewer system to date.[14]) Nor was any mention made of the effects of the project cost. Sewer-treatment charges, including debt retirement for previous sewer projects, might represent a substantial percentage of local government expenditures. How does this affect the quality of police and fire protection, schools, parks, and roads?

EPA Assessment

The EPA's Guidance publication requires that, after identifying the specific environmental effects of a proposed project, the planners summarize their conclusions in an environmental impact assessment as part of the facility plan.[15] The EPA reviews the planners' assessment and determines whether or not the project would have a "significant" impact on the environment. If so, then a detailed Environmental Impact Statement (EIS) is required; if not, the EPA issues a "negative declaration," explaining why an EIS is not warranted. The public and other interested agencies then have 15 working days to comment on the decision. If the decision stands, the EPA then prepares an Environmental Impact Assessment (EIA), which is an abbreviated EIS or a summary of the principal environmental impacts, concluding, necessarily, that the impact of the proposed action is not significant.[16]

Thus, the decision on whether to prepare a rather cursory EIA or a detailed, time-consuming EIS hinges on the word "significant." In the EPA rules, a project is not considered "significant" unless it may significantly change air or water quality; may affect unique assets such as wetlands, endangered species, parks, historic sites, etc.; or "is likely to be highly controversial."[17]

In the rules specifically promulgated for wastewater treatment plants, however, the interpretation of "significant" is expanded to include proposed actions in

which:

> (a) the treatment works or plant will induce significant changes (either absolute changes or increases in the rate of change) in industrial, commercial, agricultural or residential land use concentrations or distributions. Factors that should be considered in determining if these changes are significant include, but are not limited to: the vacant land subject to increased development pressure as a result of the treatment works; the increases in population which may be induced; the faster rate of change of population; changes in population density; the potential for overloading sewage treatment works; the extent to which land owners may benefit from the areas subject to increased development; the nature of land use regulations in the affected area and their potential effects on development; and deleterious changes in the availability or demand for energy.[18]

Except for the reference to the potential for overloading sewage-treatment works, this rule would seem to describe the proposed SCCSSA project to the letter. In sizing the plant, the planners hoped to induce growth--in fact, needed to induce growth to make the project financially viable. The municipalities certainly hoped to induce significant changes in industrial land use, as exhibited by their claimed aggressive development of industry.[19]

To some, the very purpose of the project might appear to be to induce growth. However, the EPA on March 29, 1977 issued a negative declaration announcing that no Environmental Impact Statement would be required for the SCCSSA project.[20]

According to EPA personnel, a letter of April 6,

1977 was the only response to the negative declaration.[21]

In due course, the Environmental Impact Assessment was issued. (The EIA is undated but, allowing for the 15 working days prescribed by the regulations, it probably appeared late in April.) The EIA was a six-page summary, following a printed outline, that covers the principal environmental issues. The language is very similar to that of the "Facility Plan," including the assertion that "lack of available land would necessitate transport of wastes for over 10 miles to land-application site." The EIA also refers to the "new construction moratorium in Bath and DeWitt Townships." The Assessment addresses the fact that the project would induce growth:

> The type of growth that will be induced is generally the higher density residential growth rather than rural type residential development prevalent without sewer services. A relatively large increase in industrial construction is also planned due to installation of collection and capacity for industrial flows. A total of 858 acres has been zoned industrial and commercial in the planning area to the year 2000. Presently there is only 90 acres existing.
>
> . . . Growth will also be controlled by the adopted zoning ordinances in the Townships and the plant is sized according to these zonings [sic].[22]

Notes--Chapter VI

[1]National Environmental Policy Act of 1969, U.S. Code, vol. 42, secs. 4321 et seq. (1970).

[2]U.S., EPA, Guidance, p. 12.

[3]Fishbeck et al., "Facility Plan," pp. 106-119, 137-47, 150-53, 181-4, 192-5, 201-203, and 206-208.

[4]Ibid., pp. 107, 111, 115, 193, and 206. The apparent lack of evidence for this assertion is discussed in Chapter III of the present study.

[5]Ibid., p. 18.

[6]Ibid., pp. 152, 201, and 106.

[7]This figure is based upon a standard 36-section township at 640 acres per section, totaling 23,040 acres per township. Calculations by the author.

[8]Ibid., p. 184.

[9]Ibid., p. 202.

[10]U.S., Department of Commerce, National Technical Information Service, "Total Urban Water Pollution Loads: The Impact of Storm Water" (Washington, D.C.: Government Printing Office, 1974).

[11]Thomas L. Kamppinen to Herman Openlander, Watertown Township Supervisor, Jan. 20, 1977, files of Watertown Charter Township, Wacousta, Mich.

[12]Thomas A. Doan, P.E., Fishbeck et al., to Tri-County Regional Planning Commission, Nov. 17, 1976. Tri-County had written to the engineers: "Nowhere in the report do you mention the secondary impacts caused by stormwater runoff of developing or developed areas. We feel this should be included as an environmental effect." (Thomas P. Looby, Tri-County Regional Planning Commission, to Fishbeck et al., Nov. 5, 1976.) Doan responded: "Additional information regarding the secondary impacts of storm water runoff from developed and developing areas

will be added in the environmental evaluation of the proposed project." Apparently, this refers to p. 230 of the "Facility Plan" final draft, a reference to the detrimental effect of runoff and suggestion that "if necessary in the future, storm water collection and treatment facilities may be required to insure adequate protection of the Looking Glass River."

[13]Fishbeck et al., "Facility Plan," p. 193.

[14]Roger Slykhouse, P.E., Slykhouse and Associates, review of proposed extension costs. Interview with Roger Slykhouse, Jan. 21, 1981.

[15]U.S., EPA, Guidance, p. 24.

[16]U.S., EPA, Regulations, Federal Register 40(72) (April 14, 1975).

[17]Ibid., Sec. 6.200.

[18]Ibid., Sec. 6.510 (Subpart E of the Regulations).

[19]Fishbeck et al. to U.S. EPA, March 16, 1977: Both DeWitt and Watertown Townships "have active programs for the promotion and development of industry within their areas."

[20]Kent Fuller, Chief, Planning Branch, Region V, U.S. EPA, Memorandum, "To All Interested Government Agencies and Public Groups and Citizens," re SCCSSA, Proj. No. C262792, March 19, 1977.

[21]Theodore L. Powell to Kent Fuller, Chief, Planning Branch, Region V, U.S. EPA, April 6, 1977. This letter objected to the project proceeding without further study on the issues of (1) size of the expansion, (2) proceeding without the 208 report, which was forthcoming shortly, (3) cost to users, possibly promoting urban sprawl by forcing people farther out into the country, (4) sludge-disposal location, (5) private treatment systems in use, (6) energy consumption, (7) lack of provision for recharging the local aquifer, and (8) ignoring zero-discharge goal. The EPA's first answer (Sara J. Segal, Region V, U.S. EPA, to Theodore Powell, May 4, 1977) indicated that no further study had been made except that the engineer had been contacted on sewer costs.

In a May 10, 1977 letter, attorney Clark Shanahan objected to the lack of an EIS on the grounds that the EPA had ignored Sec. 6.510 of its regulations regarding induced growth. Segal's response (June 10, 1977) did not answer that particular issue; Segal advised that "the Agency stands by its decision of April 29, 1977, not to prepare an environmental impact statement on the referenced plan."

According to the 1975 Report of the Council on Environmental Quality, published while the "Facility Plan" was being reviewed, the SCCSSA case was not unique. "EPA's program review analyzed 43 projects for which no environmental impact statement had been prepared. In no case had an adequate environmental assessment been undertaken prior to making a negative declaration." (Council on Environmental Quality, Sixth Annual Report (Washington, D.C.: Government Printing Office, January 1976).)

[22]U.S., EPA, "Appraisal" (n.d.), p. 2A.

CHAPTER VII

THE REVIEW PROCESS

The EPA's Guidance document lists three stages of review for a facility: review by the A-95 Clearinghouse Agency; by the state DNR; and by the EPA. The completed facility plan is to be submitted to the governmental agencies in that order, and moves along the chain only after the approval of each preceding agency.

A-95 Clearinghouse Agency

The "A-95 Review" is a common term for the process outlined by the federal Office of Management and Budget (OMB).[1] The Intergovernmental Cooperation Act of 1968 requires that "all viewpoints--National, State, regional and local--shall, to the extent possible, be taken into account in planning Federal or federally assisted development programs and projects." In central Michigan, the Tri-County Regional Planning Commission is the area-wide clearinghouse for Clinton, Eaton and Ingham counties.[2]

A year before the SCCSSA planning process (a Section 201 plan) was started, the Commission was also named Area-wide Water Quality Planning Agency for the three counties and awarded a $704,000 federal grant to prepare a detailed 208 Water Quality Management Plan. (The 208 planning process derives its name from Sec. 208 of the

Federal Water Pollution Control Act Amendments of 1972, which authorized 100 percent funding of the area wide planning program.)

An integral part of the 201 and the 208 planning programs is that each was intended to recognize the other. While the area-wide planning process (208) may have been more beneficial had it preceded planning for construction projects (201),[3] both programs became law at the same time, and some wastewater plants were under construction while the EPA was still developing the regulations for the new concept of area-wide water quality management.[4]

The EPA attempted to define the relationship between the two programs in February 1976. The EPA said, in effect, that if a 208 plan exists, 201 planners should use the projections already developed and generally conform to the area-wide plan, while if a 208 plan has <u>not</u> been completed, 201 planners are to keep the 208 agency informed (but construction projects are not to be delayed by the water quality management planners).[5]

The first documentation of the Tri-County Regional Planning Commission's review process uncovered for the present study was a three-page letter from Thomas P. Looby, Engineer/Planner for the Commission, to Fishbeck et al. three weeks before the first public hearing was held.[6] The letter contained sixteen specific comments. Some of them corrected typographical errors, and some noted minor

omissions. Six of the comments involved three more substantive issues. These are discussed below.

1. Stormwater Pollution Caused by Projected Development. Looby's letter requested that the "Facility Plan" discussion of local water quality, drought flows, etc., include a comment on "the suspected degraded quality of stormwater runoff." The 208 water sampling and modeling program had not been completed, but Mr. Looby suggested that the Looking Glass River is a "sensitive stream" which may require additional controls or other steps to meet the 1983 water quality goals. "Nowhere in the report do you mention the secondary impacts caused by stormwater runoff of developing or developed areas."[7]

In the engineers' response two weeks later, Thomas A. Doan of Fishbeck et al. agreed to insert a statement about storm-water degradation into the "Facility Plan."[8] The final plan contains references to the suspected low quality of storm-water runoff entering the river.[9] Apparently, no consideration was given, at this late stage of the planning process, to reducing the pollution loadings caused by the concentration and discharge of wastewater from a large area to a single point on a "sensitive stream."

2. Population Projections. Looby's letter criticizes the "Facility Plan" for a tendency to embellish the population growth projections:

> We completely disagree with the second to the last sentence on the page. We know of no sound projections indicating that future growth is going to exceed that experienced during the 1960's for this region.[10]

The engineers' response was to delete the referenced sentence.

Refering to the population trends projected in Table 6 of the "Facility Plan," Looby commented that:

> For DeWitt Township we agreed upon a figure of 18,000 to 20,000 max. population for the year 1996.
>
> Therefore, the figure of 22,000 for the year 2000 is probably within the maximum limit. To make sure that the record is straight, we do not expect that additional growth will take place.[11]

In response, the engineer wrote that the Township "could approach a figure of 22,000 people by the year 2000," a conclusion "based on discussions with the DeWitt Township Board."[12]

A final concern regarding the accuracy of growth projections was expressed in Looby's letter. He suggested that Table 8 of the "Facility Plan" (Table 4 in the present study) did not reflect the forecasted wastewater flows discussed a few months before. Looby requested that another table be inserted into the "Facility Plan" as "part of the record."

Doan's response was that the original projections "will be included with this letter, and the data sheet will be included as an appendix in the final facilities plan." No such data sheet appears in the "Facility Plan" appendix;

nor was the sheet located with Doan's letter in the Commission files, so the extent to which the "Facility Plan" flow projections differed from earlier figures is not known.

3. Industrial and Commercial Projections. The Commission's criticism in this area opens the most complicated and puzzling aspect of the review procedure:

> The acreages zoned for industrial use are much greater than expected development. We have tabulations of the existing and 20 year growth for those entities in Table 5. If you would like this data, please request it. This may reduce your future wastewater loads and flows.[13]

The Fishbeck firm replied that, again, projections were based upon discussions with each township and that the projections concurred with all parties' "feelings." The engineers did ask to receive the Commission's tabulations.[14]

A review of pertinent Commission files and discussion with current personnel indicate that the data in the 208 Water Quality Management Plan, Interim Outputs,[15] was generally held to be the best information available at the time. This report, published three months before the communications between Looby and Fishbeck et al. just cited, indicated total industrial and commercial land usage in the four municipalities by 1996 to be a projected 227 acres, not the 858 acres shown in the "Facility Plan."

The next reference to industrial flows in the

Commission file is a letter of March 15, 1977 from Looby to EPA Region V indicating that the engineers' projections of over 700 acres of industrial and commercial land use by 2000 were "not unreasonable."[16] Enclosed with the letter was a copy of a worksheet detailing the computations (see Figure 7). They reveal some noteworthy assumptions. For instance, existing (1976) commercial acreage in DeWitt City is listed as 48.63. Actual commercial acreage at the time was only about six, according to the City Manager, and was listed in another Commission publication as 6.18. On the other hand, Watertown Township was credited in the computations with 55.96 acres of industrial and commercial land; a Township official reported that the correct figure was about 1,200 acres, the same as today.[17]

The method used for projecting the 1976 figures to 1996 is also puzzling; there is the possibility of an arithmetical error. For example, the acreage for commercial land in DeWitt Township is given as follows:

DeWitt Township
(excluding City of DeWitt)

	1976		1996		
LK 23	-0-		-0-		
LK 34	15.91		15.91		
LD 35	56.74		110.58		
GR 10	21.86		21.86		
GR 12	5.37		22.45		
	99.88	±	170.80	≐	270

S. Clinton Land Use Projections
by TCRPC – 3/15/77.
(Extracted from Clinton Co. Land Use Projections)

		Commercial		Industrial		PROJ Flow
	Watertown Township	1976	1996	1976	1996	
located all	LK 6	0	9.48	0		
	LK 21	0	9.48	24.11	62.36	
located all	GR 8	0	4.27	31.85	72.54	
	Total	0 +	23.23 = .23	55.96 +	134.90 =	191
			11,615 gpd			381,720
	DeWitt Township (excluding City of DeWitt)			1976	1996	
located all	LK 23	0	0	0	1.22	
	LK 34	15.91	15.91	0	0	
located all	LK 35	56.74	110.58	0	12.20	
	GR 10	21.86	21.86	0	0	
	GR 12	5.37	22.45	10.72	14.38	
	Total	99.88 +	170.80 = 270	10.72 +	27.80 =	38
			135,340 gpd			77,040
	DeWitt City	1976	1996	1976	1996	
	Lk 29	0	0	9.24	9.24	
	LK 30	12.59	14.49	0	.02	
	LK 33	36.04	41.75	0	.08	
	Total	48.63 +	56.24 = 04	9.24 +	9.34 =	18.5
			52,435			37,160
	Bath Township	1976	1996	1976	1996	
	LK 49	0	5.19	0	.06	
	LK 51	20.08	20.08	10.01	10.10	
	LK 57	0	0	0	.03	
		20.08 +	25.27 = .25	10.01 +	10.14 =	20
			32,675			40,960
			442			536,380
			222,065 gpd			267.5

758,445 gpd = .76 MGD = 51% of design projections

TOTAL Industrial & Commercial = 442 + 267.5 = 709 acres

Design = 158 + 700 = 858 a

Flows: TRI-CO DESIGN
comm 222,000
ind: 536,380
1.47

Figure 7. Tri-County (Looby) Worksheet.

One might conclude that the 1996 figures are cumulative, and that the totals of the two columns would not be added together. In other words, the amount of commercial land in section LK 34 and section GR 10 was expected to remain the same, while the amount in LD 35 would nearly double. To assume that the 1996 figures are not cumulative would indicate that the planners' methodology was so precise as to predict the doubling of acreage in some sections to the 1/100th of an acre. The "accidentally cumulated" theory gains credibility from the fact that the columns are totaled in different handwriting (underlined data above), with the decimal places rounded off, suggesting that someone other than the original statistician added the columns by mistake. The cover letter reflects a 709-acre figure which can be reached only by adding the 1976 and the 1996 columns. In three meetings with this author, Commission personnel have failed to find an explanation for this.[18]

On the basis of these calculations, the Commission recommended, and the EPA agreed to, a 25-percent increase in the size of the SCCSSA treatment plant.

State DNR

The EPA guidelines outline the mechanics (number of copies, etc.) for submitting the facility plan to the state, and specify that the state must review and approve it before sending it to the EPA.

According to a DNR officer, in Michigan's case the state's function was somewhat more detailed than the guidelines contemplated, since the EPA had delegated primary responsibility for facility-plan review to the state DNR. The EPA had planned to reduce its function to that of oversight, with the DNR conducting the cost-effectiveness analysis and other detailed studies.[19]

The DNR was also responsible for implementing the state's law[20] which provided a 5-percent grant for eligible sewer projects.[21] However, the eligibility requirements for state aid were tied directly to the federal requirements, so this function was mainly procedural.

The review functions that were unique for the state, and for which the DNR was responsible, were checking for compliance with regional-planning boundaries and with regional water quality goals established by the Water Resources Commission.

At the time when the SCCSSA was being processed by the DNR, the volume of applications for federal water pollution control grants was at its highest level ever.[22] The impoundment of federal funds by the Nixon administration had recently been overturned by the U.S. Supreme Court,[23] and the Detroit Federal District Court had released funds for at least 70 projects in Michigan.[24] The SCCSSA project was relatively small,[25] the proposed method of treatment was not unusual, and, once the Wacousta

collection system was severed from the central plant, the DNR found no glaring inconsistencies in the "Facility Plan."

As for the matter of excess capacity, the DNR reviewer recalled that the plan "allowed for more growth than is common, but we thought the engineers' evaluation was justified."[26] The plan was approved and submitted to the EPA in February 1977, and, reportedly, the review was rather routine after the Wacousta change; there were no memoranda, checklists, or other records of the review process on file.[27] Among the three agencies' reviews, the DNR's was probably the least controversial; later criticism of the plan was directed to the EPA.

Federal EPA

The EPA's Guidance book summarizes, in eleven points, the key regulations governing facility planning. In the Region V EPA office, the review process is aided by the use of a "Facility Plan Review Sheet," which acts as a checklist of the important criteria, including these points.[28] The six-page "Review Sheet" covers routine procedural questions as well as substantive questions, requiring a close scrutiny of the plan.

The SCCSSA plan was reviewed by the EPA's Mike Mikulka on March 2, 1977. The only adverse comments in the preliminary review were related to the proposed treatment plant size. In three places on the review sheet, the

EPA engineer questioned items relating to plant capacity or wastewater flow projections. For instance, the population-growth projections were characterized as "marginally acceptable," while the observation was made that in order for demand to reach the project's design capacity, "a high rate of growth must continue in the area." Conclusions on demographic and economic projections and the section on flow forecasts were also termed "marginally acceptable."[29] This concern about potential excess design capacity resulted in a letter on March 8, 1977 from the EPA to the SCCSSA requesting more information.[30] First, the EPA requested a study of phased construction: "In that the design flow is over two times the present flow, a phasing period of a maximum of ten years should have been considered."[31] Second, the EPA pointed out that more than 25 percent of the proposed plant capacity was based upon industrial flows:

> None of this industrial flow presently exists in the study area, as all is projected based on the amount of land zoned industrial in each township. This industrial projection is excessive as a full 25% of the future flow to the plant is based on non-existent flow. In order to justify this flow, letters of commitment should be obtained from the industries that intend to tie into this facility.[32]

By March 16, the engineers had completed and mailed to the EPA the phased-construction study with the irrefutable conclusion that a 7 percent interest rate is less than a 10 percent assumed inflation rate.[33] The record

does not show why the EPA accepted that reasoning in the phased-construction study without considering other possibilities--for example, that no expansion would be required.

The resolution of the corollary problem of excessive industrial flow predictions was discussed earlier in this chapter. EPA files indicate that this matter was also discussed with Looby by telephone and that Fishbeck et al. reaffirmed the flow projections in a letter dated March 16, 1977.[34] In the letter, the engineers claimed that the high flow projections were endorsed by the Michigan DNR and that DeWitt and Watertown Townships both have "active programs for the promotion and development of industry within these areas."[35]

Following the apparent resolution of these two problems, the EIA was prepared by the EPA Region V office. Issuance of the EIA might have concluded the EPA review, but the issue was repeatedly addressed in inquiries from Clark Shanahan, an attorney from Owosso, Mich. Shanahan hoped to force the EPA regional office to implement a land treatment system. After repeated correspondence with EPA officials in both Chicago and Washington,[36] Shanahan was notified on Nov. 9, 1977 that the EPA "is now reevaluating the facilities plan for the project with respect to the consideration given to all alternatives, including land treatment."[37]

A meeting between EPA officials, municipal officials, and the consulting engineer was held at the DeWitt Township hall on Nov. 14, 1977. EPA officials toured the area, visited potential land treatment sites, and reviewed the engineers' 13-page reevaluation of land disposal.[38] The review continued in the Chicago EPA office with a 24-page "verification" study by Mikulka.[39]

In these reevaluations, it was acknowledged that land might be available less than ten miles from the existing plant site, and specific sites and costs were examined in great detail. It is apparent that the subject of land treatment in Clinton County by spray irrigation received a thorough analysis. Although the cost disadvantage, compared to the conventional treatment system, was projected as being less than in the original "Facility Plan," land treatment was still deemed to be more costly by $160,800 per year.[40]

On March 16, 1977, the SCCSSA signed a contract with Fishbeck et al. for preparation of the final construction plans,[41] and a month later, a bonding attorney was hired to expedite the sale of the bonds for the new plant.[42] Official confirmation that the project was approved by the EPA was not received until May 19, 1977.[43]

Construction

The Step III grant money for construction was expected in September, but was delayed by a Detroit

Federal District Court case[44] and possibly, also, by the alternative land treatment review initiated in response to inquiries from Clark Shanahan.[45] On Nov. 29, 1977, the SCCSSA was notified by Sen. Donald Riegle's office that the final grant was approved; official notice was not received from the EPA, however, until Feb. 7, 1978. The grant was for $7,068,825 to fund the treatment plant and the City of DeWitt interceptor only, since seven of the eight sewer-main extensions proposed in the "Facility Plan" had been postponed or cancelled.

Construction of the new components began in 1978, and the plant was essentially complete by the fall of 1980. The final cost was $11,884,700, 80 percent funded by state and federal grants. The plant was certified as having met all applicable standards and was approved by all relevant governmental agencies after inspection.[46]

Performance records indicate that in January 1982 the plant operated at 19.2 percent of design capacity and produced a final effluent of much higher quality than called for in the design standards:

Parameter	Design Goal[47]	Performance[48]
Biological Oxygen Demand	10 mg/l	1 mg/l
Suspended Solids	10 mg/l	1 mg/l
Total Phosphorus	1 mg/l	0.73 mg/l
Dissolved Oxygen	5 mg/l	7.7 mg/l

Operation and maintenance costs were budgeted at $620,725 for 1981, including a $112,000 allowance for equipment replacement.[49]

Notes--Chapter VII

[1]U.S., Office of Management and Budget, "Circular A-95," implementing the Intergovernmental Cooperation Act of 1968, Sec. 401, Federal Register 38, Sec. 32874 (Nov. 28, 1973).

[2]Tri-County Regional Planning Commission, "Comments and Recommendations of Regional Clearinghouse," Memorandum regarding "Expansion of South Clinton County Wastewater Plant," Sept. 25, 1975.

[3]Diane L. Donley, "Section 208 and Section 303 Management: Where Is It Now?" Environmental Law Review (October 1976). See also Chapter III of the present study.

[4]"EPA failed to publish applicable guidelines due January 16, 1972, until September 14, 1973. This caused delays in designating and approving planning organizations.

"For maximum effectiveness, areawide planning should precede and provide a management tool for implementation of the point source discharge permit and construction grants programs." (U.S., Comptroller General, "16 Air and Water Pollution Issues Facing the Nation" (Washington, D.C.: U.S. Congress, Oct. 11, 1978).)

[5]U.S., EPA, "Relationship Between 201 Facility Planning and Water Quality Management (WQM) Planning," Program Requirements Memorandum No. 75-38 (Washington, D.C., Feb. 9, 1971).

[6]Thomas P. Looby, Engineer/Planner, Tri-County Regional Planning Commission, to Paul Thompson, Fishbeck et al., Nov. 5, 1976, files of Tri-County Regional Planning Commission, Lansing, Mich.

[7]Ibid., para. 15.

[8]Thomas A. Doan, P.E., Fishbeck et al., to Tri-County Regional Planning Commission, Nov. 17, 1976, files of Tri-County Regional Planning Commission, Lansing, Mich.

[9]The engineers suggested that, "if necessary in the future, stormwater collection and treatment facilities may be required to insure adequate protection of the Looking Glass River." (Fishbeck et al., "Facility Plan," p. 230; see also p. 32.)

[10]Looby to Thompson, Nov. 5, 1976, para. 2. The following "Facility Plan" language is referenced by Looby:

> The southern area of Clinton County is developing at a very rapid rate because of urban pressures evolving from the adjoining City of Lansing. The Townships have urbanized at a rapid rate resulting in population increases in excess of 100% during the past decade.
>
> During the decade of the 60's alone, the region had experienced an explosive growth rate.

The Tri-County Regional Planning Commission and the U.S. Census Bureau report that the largest population increase for any of the municipalities over ten years was 57 percent, achieved by Bath Township during the 1950s and matched by DeWitt Township during the 1960s. Total population growth for the area during the 1960s was 47 percent. See Table 4 of the present study.

[11]Looby to Thompson, Nov. 5, 1976. Looby was probably referring to the meeting of June 8, 1976 at the DeWitt Township Hall between himself, one of his staff members, the Township supervisor (then Dale Emerson), and Paul Thompson of Fishbeck et al. His notes refer to a population projection of 18,000 to 20,000. The notes reflect Township plans to serve Michigan Beef Company and the Peach Orchard subdivision, both requiring as-yet unplanned sewer extensions, and the new Capital City Airport complex, a relocation of the airport terminal which was being suggested at the time for the year 2000. (Files of the Tri-County Regional Planning Commission, Lansing, Mich.)

[12]Fishbeck et al. to Tri-County Regional Planning Commission, Nov. 17, 1976, files of Tri-County Regional Planning Commission, Lansing, Mich.

[13]Looby to Thompson, Nov. 5, 1976, para. 6.

[14]Fishbeck et al. to Tri-County Regional Planning Commission, Nov. 17, 1976, files of Tri-County Regional Planning Commission, Lansing, Mich.

[15]Tri-County Regional Planning Commission, "208 Interim Outputs" (Lansing, Mich., August 1976).

[16]Thomas P. Looby, 208 Project Coordinator,

Tri-County Regional Planning Commission, to Mike Mikulka, Region V, U.S. EPA, Chicago, March 15, 1977, files of Tri-County Regional Planning Commission, Lansing, Mich.

[17]Interview with Herman Openlander, Watertown Charter Township Assessor, March 4, 1982.

[18]Meetings with Tri-County Regional Planning Commission staff, Lansing, Mich., as follows: Doris Farr, Jan. 16, 1981; Robert Boller, Feb. 6, 1981; and Steven Sandstadt, March 20, 1981.

[19]Interview with Fred Cowles, DNR, April 13, 1982.

[20]Act 329 of 1966.

[21]The grants were funded by a state bond issue and the law actually provides for grants up to 25%. At one time, grants of that amount were provided, but when the 1972 Amendments increased the federal share to 75%, the state dropped its share to 5%. (Interview with Richard Hinschon, DNR, Feb. 26, 1981.)

[22]Highlights 12(3) (March 1975).

[23]Ibid.

[24]U.S. v. City of Detroit, et al., U.S. Dist. Ct., Eastern Div. of Mich., Civil Action #7-71100. (Order issued Sept. 14, 1977; case continuing under administrative injunction.)

[25]The estimated $16-million cost was 4 percent of the Detroit project's $400 million pricetag.

[26]Interview with Fred Cowles, DNR, April 12, 1982.

[27]Ibid.

[28]Interview with Elaine Greening, Chief, Michigan Facilities Planning Section, Region V, U.S. EPA, Dec. 15, 1980.

[29]Mike Mikulka, Region V, U.S. EPA, "Facilities Plan Review Sheet" regarding SCCSSA, March 2, 1977, p. 2.

[30]John Kelly, Chief, Michigan Project Evaluation Section, Region V, U.S. EPA, to SCCSSA, March 8, 1977.

[31]Ibid.

[32]Ibid.

[33]Fishbeck et al., "Phased Construction" (n.d.). The phased-construction report is discussed in detail in Chapter VI of the present study.

[34]Fishbeck et al. to Region V, U.S. EPA, Marhc 16, 1977, files of U.S. EPA, Region 5, Chicago.

[35]Ibid.

[36]There were at least 16 letters between Shanahan and the EPA regarding this project. Files of Theodore L. Powell.

[37]Valdas V. Adamkus, Deputy Regional Administrator, Region V, U.S. EPA, to Clark Shanahan, Nov. 9, 1977.

[38]Thomas A. Doane, P.E., Fishbeck et al., "South Clinton County Review of Land Disposal" (Lansing, Mich., Nov. 12, 1977).

[39]Mike Mikulka, Region V, U.S. EPA, "Verification of Fishbeck, et al. Review of Land Disposal Alternative for Southern Clinton County" (n.d.).

[40]Ibid., p. 24.

[41]SCCSSA, Minutes of Meetings, Meeting of March 17, 1977.

[42]The bonding attorneys were Dickerson, Wright, McKean, Cudlip & Moon of Lansing, Mich. The financial consultant was Stauder, Barch and Associates of Ann Arbor, Mich., who had done several studies for the member municipalities in the past. (See SCCSSA, Minutes of Meetings, Meeting of April 29, 1977.)

[43]SCCSSA, Minutes of Meetings, Meeting of May 19, 1977.

[44]SCCSSA, Minutes of Meetings, Meeting of Sept. 22, 1977.

[45]SCCSSA, Minutes of Meetings, Meeting of Nov. 8, 1977. Notice had been received that the EPA was reviewing the project. The SCCSSA contacted Sen. Donald Riegle, Rep. Robert Carr and Rep. Brown to request their assistance.

[46]SCCSSA, Minutes of Meetings, Meeting of Feb. 12, 1981.

[47]Water Resources Commission Effluent Limitations. See Table 2.

[48]SCCSSA, "Final Effluent Sheet," January 1982.

[49]SCCSSA, "1981 Budget" (n.d.).

CHAPTER VIII

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The objective of this investigation was to determine the extent to which the facility-planning process and the decision to construct the Southern Clinton County Wastewater Treatment Plant complied with appropriate provisions of the Federal Water Pollution Control Act Amendments of 1972.[1] Appropriate provisions, in this context, are the guidelines promulgated by the U.S. Environmental Protection Agency to implement the grants section of the Act, as published in the Federal Register[2] and summarized in the EPA document, Guidance for Preparing a Facility Plan.[3] Most of the ten major sections and 58 subsections of the regulations have been cited in this study, and an attempt has been made to determine what action was taken by the SCCSSA planners in response to each provision.

Can compliance with each of these sections be evaluated and assessed on some objective basis? What relative importance should be assigned to the various provisions (some being procedural and some being substantive)? What number of failures, or what degree of shortcoming, would support the hypothesis that many of the provisions of the Act were ignored or circumvented during the planning process? In reaching a conclusion, the

overall standards to be considered are delineated in the Foreword to the EPA's Guidance publication: "The purpose of the facility plan is to assure that the treatment works built under this program are environmentally sound and cost effective."[4] This goal could conceivably be attained even if some procedural guidelines, such as those governing interagency coordination or the routing of paperwork, were violated. Even such sensitive matters as public participation could seriously fall short of the regulatory requirements without affecting the cost effectiveness or environmental soundness of the project. For the purposes of the present study, then, attention is concentrated on the guidelines that most directly affected the cost effectiveness and environmental soundness of the treatment system developed by the SCCSSA in its facility-planning process.

By these standards, then, the "Facility Plan" appears to be deficient in seven major areas.

1. Assessment of Current Situation

The SCCSSA planners insufficiently assessed the then-current situation. Existing treatment facilities for more than half the population were ignored, including the fact that nearly 600 people were being served by the City of Lansing. Instead of concentrating on a current inventory, this portion of the plan contains at least four references to a need for a regional treatment plant.[5]

The EPA's guidelines do not call for reaching such a conclusion until after a current inventory has been conducted.

2. Assessment of Future Situation

This portion of the SCCSSA plan was extremely deficient. The industrial and commercial zoning data presented was very inaccurate. One map shows DeWitt Township industrial land in an area where it had never existed[6]: the actual industrial area would not have been accessible to sewers after the completion of the project. Population growth for the area is described as "explosive," and as having been 100 percent in one decade[7]: neither statement is supported by the facts. Industrial growth projections were highly optimistic, again without empirical support. It was forecasted that 85 to 95 percent of the new and existing population would be connected to the sewer, but the cost and environmental effect of that undertaking were not explored.

As a more conservative, albeit arbitrary, scenario, if the population growth rate for the area over the 20 year planning period is 42 percent, as predicted by the Tri-County Regional Planning Commission; if all of that growth is in the sewered area; if the existing commercial area doubles in 20 years; and if the existing industrial area proposed for sewer service quadruples in 20 years, wastewater flows will still be only 40 percent of the 5 mgd

predicted by the engineers (see Table 11).

3. Evaluation of Alternatives

The development of the ten regional options consumed 45 pages of the "Facility Plan," attempting to prove that it is usually more cost effective to pump water uphill than to design for gravity flow, particularly if gravity takes the flow across certain political boundaries.

The data used to develop the cost comparisons were not available for the present study. No justification could be found for the planners' explicit conclusion that the construction of four miles of force main to the SCCSSA plant is cheaper for Watertown than a 2,000-foot gravity extension to Lansing sewers (the latter estimated in 1971 to cost $50,000).[8] Sewer-use rates for Lansing were less than one-third the rates proposed for SCCSSA system use in the "Facility Plan."[9]

At the other end of the three-township area, the owner of the Dutch Hills Mobile Home Park elected to pay the total cost of connecting to the Meridian Township system, less than a mile away, although the "Facility Plan" concluded that an extension from the SCCSSA plant was more cost effective. As the present study was being completed, part of the southeast Bath Township extension was being built, and the Dutch Hills project was to be required to abandon the Meridian Township connection and connect instead to the SCCSSA system. Sewer treatment

TABLE 11

REVISED WASTEWATER FLOW FORECAST

First Year			Mgd
Residential population served by sewer system[a]			
Existing Bath/DeWitt Twp.		6,800	
Existing City of DeWitt		2,254	
King Arthur's Court		1,000	
Dutch Hills		600	
Watertown Twp.		50	
TOTAL POPULATION:		10,704	1.07
Commercial--500 gal/day/acre			
DeWitt Twp.	100 acres	50,000 gal.	
Bath Twp.	30 acres	15,000 gal.	
Watertown Twp.	40 acres	20,000 gal.	
TOTALS:	170 acres	85,000 gal.	0.085
Industrial--2,000 gal/day/acre			
Watertown Twp.	50 acres	100,000 gal.	0.10[b]
		TOTAL FLOW:	1.255[b]

Twentieth Year	Mgd
Residential--10,704 (first year pop.) x 42% (Tri-County Regional Planning Commission projections) = 4,496; 10,704 + 4,496 = 15,200	1.52
Commercial--first year flow, 0.085 x 2 =	0.17
Industrial--first year flow, 0.10 x 4 =	0.40
TOTAL FLOW:	2.09

[a]The municipal figures were taken from the "Facility Plan"; the population of the two mobile-home parks was developed for the present study; the Watertown figure is based upon a 1980 study by Stauder, Barch & Associates, municipal bond consultants. When the Watertown Township extension is complete, there will be a total of 17 residential customers, according to that study. The table includes the assumption that all five residential areas will expand by 42 percent over the next twenty years. As of March 15, 1982, Dutch Hills and Watertown were not connected.

TABLE 11--continued

[b]The Stauder, Barch & Associates study predicted a flow of only 0.009 mgd from the Watertown printing company and a total flow of less than 1.0 mgd for the entire system. The estimate above favors the "Facility Plan" projections. January 1982 flow was 0.9606 mgd without Watertown or Dutch Hills.

costs for Dutch Hills are expected to triple when the connection is completed,[10] but Bath officials justified the connection as necessary to increase sewer revenues and to protect the solvency of the Township and the SCCSSA system.[11]

4. Phased Construction

The engineers initially dismissed this possibility, but were later required to conduct a phased construction study during the review process. The study showed that the savings in O&M costs would offset the additional cost of building in two phases--assuming the second phase would be necessary. If the second-phase expansion turned out not to be necessary, the Authority would save $250,000 per year throughout the planning period.

In contradiction to EPA guidelines, the engineers rationalized the larger plant by assuming an inflation factor for future construction. Five years later, the EPA reviewer said that "the EPA made a mistake"[12] in approving this calculation. The engineer said, "It got by the EPA."[13]

5. Evaluation of Costs

While projecting a 10 percent inflation factor for construction costs, the engineers allowed for less than 1 percent inflation for O&M costs. In answer to specific questions about future energy costs, the engineers responded: "The operation and maintenance costs used in the Facility Plan were developed based on anticipated costs in the year 1990."[14]

Nevertheless, operation costs for the first year, 1981, are projected to be equal to the 1990 estimates--with only one-third of the projected 1990 flow.

6. Environmental Evaluation

The "Facility Plan" adequately covered the prospect of temporary noise and dust from construction, and concern for the Sandhill Crane was expressed.[15] The environmental evaluation was notably deficient in three other areas:

(A) River Water Quality. While concluding that the new treatment plant would improve water quality in the Looking Glass River, the opposite is true. The collecting of all of the wastewater from the three-township area for discharge from a single treatment plant will have a negative effect on the river. Table 2 in the present study presents pollution-loading information for the two old plants. With the poor performance of the City of DeWitt plant, the combined discharge can be calculated

at 6,900 pounds of BOD, 5,190 pounds of suspended solids, and 384 pounds of phosphorus during a 30-day month. Applying a formula used by engineers as a rough "rule of thumb,"[16] a 5 million gallon per day plant operating at the tertiary-treatment standards mandated by the NPDES permit would discharge 12,000 pounds each of BOD and suspended solids and 1,200 pounds of phosphorus. Interpolating from SCCSSA monthly operating reports produces monthly loading projections somewhat lower than these, but still from 50 to 137 percent more than the discharge from the two old plants combined.[17]

Even without considering the effect of increased stormwater runoff from increased residential and industrial growth, the discharge projections raise concern about the impact upon a river that was described in the "Facility Plan" as a "sensitive stream."

(B) NEPA. The planning process ignored EPA guidelines for compliance with the National Environmental Policy Act. These regulations call for preparation of an Environmental Impact Statement when plant construction will significantly affect growth in an area.[18]

(C) Future Impacts. The third deficiency (one that might have been corrected by the preparation of an EIS) was the failure to consider the cost or impact of building enough sewers to satisfy the plant's capacity. This might be comparable to proposing the construction of a dam and

ignoring the fact that there will be a resultant lake.

7. Review Process

The review procedure was quite notably deficient. The Tri-County Regional Planning Commission at first objected mildly to the exaggerated growth projections, but finally accepted them, after the projected industrial usage figures were manipulated. The Commission said the "Facility Plan" is "in accord with the developing 208 Water Quality Management Plan and contributes to its implementation."[19] However, the 208 plan was a tautology that involved no study of the proposed capacity of any of the facilities planned and, in fact, included the statement that "201 projections were used in their prospective areas."[20] The only reference to 201 plans in the final 208 report was: "Local 201 facility plans that are completed should be implemented."[21]

If the Michigan DNR made more than a cursory review of the "Facility Plan," it must have been in complete agreement with it. No such records were found in the course of the present study, and no DNR personnel contacted could recall any controversy about the plan. The five-fold expansion seemed to the DNR to be unusual but justified,[22] and the fact that the Water Resources Commission of the DNR had suggested that Watertown Township look to Lansing for treatment apparently did not arouse any curiosity.

The U.S. EPA exhibited the most initiative among the reviewing agencies, requesting the phased-construction study and raising objections to the magnitude of the industrial-flow projections. Whether or not the phase study was read at the time was not discovered in the course of the present study.

In summary, it appears that the decision to renovate and expand the SCCSSA plant was made before the planning process started, that the preparation of the "Facility Plan" was an inconvenience that had to be accommodated to receive federal funds. The wording of the engineers' contract provides some confirmation of this view:

> The undersigned Fishbeck et al. proposed to furnish Professional Engineering Services required for expansion of the South Clinton County Wastewater Plant.[23]

Thus, it might seem that reaching a conclusion that no expansion was needed could have been at odds with the engineers' contract.

This language was described by two EPA officials as being common at the time. They said that standard contract forms, such as those recommended by the National Society of Professional Engineers, tend to emphasize specific performance rather than what might be interpreted as nebulous inquiries.[24]

With 42 miles of pipe already leading to the plant, it is likely that any study would conclude that the SCCSSA

plant should be retained, and possibly modified. However, the size and scope of the modifications must be questioned when compared to a realistic assessment of present and future water treatment demands. The deficiencies in the preparation of the SCCSSA "Facility Plan" were numerous enough and serious enough to support the hypothesis of this paper that many of the provisions of the Federal Water Pollution Control Act were ignored or circumvented in planning this project. These deficiencies substantially affected the cost effectiveness and the environmental soundness of the plan. If the EPA guidelines had been more closely followed, it is probable that a substantially different plan would have resulted.

Recommendations

The most pervasive problem found throughout the facility-planning process was that the municipal officials and their constituents who pay for this type of project have to rely for advice upon the very people who make their living selling sewer plants. The engineers were paid $507,329 for their efforts[25]; the municipal financial consultant was paid $29,012.50 for two studies that confirmed the findings of the engineers[26]; and the bonding attorney passed judgment on the legality of the bond issue for $9,250.[27]

While the EPA and DNR are less directly affected by the outcome of a single plan, personnel within those

agencies are employed to approve construction grants, not counsel against them. Continued funding for the local planning agency is not dependent upon the approval of sewer projects, and yet its people found the lure of another public-works project irresistable.

Qualified people who do not have direct interests in facilities' construction should be called upon for an opinion while a project is being developed. A percentage of the projected professional fees could be allocated to hire an environmental group or other experts to play "devil's advocate" and alert local officials to potential problems.[28] Such participants might favorably affect the level of responsibility among the other consultants.

Closely related to the issue of institutional loyalties is the apparent fear of political annexation to other municipalities. Watertown officials made it plain that their decision not to seriously consider sewer service from Lansing was due to the threat of annexation. For several years, municipal sewer service was not available on the south side of Herbison Road because the City of DeWitt (north side) did not make necessary political arrangements with DeWitt Township (south side). Dutch Hills Mobile Home Park will have to abandon its Meridian Township connection in 1982 to have its sewage treated in the SCCSSA plant, 13 miles away, at three times the cost. The state should mandate implementation of geographical

and economic solutions to utility-service problems without regard to political boundaries. The monetary and environmental cost of maintaining the sanctity of municipal sovereignty should be brought to the public's attention and compared to the cost of regional services.

A further recommendation is that an oversight or "feedback" process be established within the Michigan DNR and the U.S. EPA so that the agencies can evaluate the success of their projects. EPA personnel told this investigator that they have no way of knowing which projects were financial or environmental failures and compared the process to a physician diagnosing an illness from the textbook but never learning whether the patient lives or dies.[29] A one-day, on-site study requiring the completion of a form no more elaborate than the "Facility Plan Review Sheet" or "Environmental Impact Assessment" used to approve the project in the first place might in some cases be sufficient.

It should be noted that the Clean Water Act Amendments of 1977 addressed some of the problems in facility plan preparation, and that the Amendments of 1981 drastically changed the facility-planning procedure. Whether the new regulations resolve the problems seen in the planning process for the SCCSSA facility is an issue beyond the scope of the present study.

Notes--Chapter VIII

[1]Federal Water Pollution Control Act, Amendments of 1972, U.S. Code, vol. 33, secs. 1254-1376 (Supp. III, 1973) (Public Law 92-500).

[2]Federal Register 39(29) (Feb. 11, 1974).

[3]U.S., EPA, Guidance for Preparing a Facility Plan (Washington, D.C.: Government Printing Office, May 1975).

[4]James L. Agee, Assistant Administrator, U.S. EPA, "Foreword," in ibid.

[5]Fishbeck, Thompson, Carr & Huber, Inc., Consulting Civil Engineers, "Facility Plan for Southern Clinton County Sanitary Sewer Authority" (Lansing, Mich.: Southern Clinton County Sanitary Sewer Authority, November 1976), pp. 6, 23, 28, and 33.

[6]Ibid., p. 52.

[7]Ibid., p. 19.

[8]The Watertown Township contract, including the collector system which was not included in the Lansing engineer's estimate, was let on Oct. 28, 1981 for $2,726,100. (The State Journal (Lansing, Mich.), Oct. 29, 1981, p. B-5.)

[9]Interview with George Swanson, Public Service Department, City of Lansing, Feb. 2, 1981. Lansing rates are based on water usage, and averaged about $7.00 per quarter in 1976.

[10]Interview with Jan Davis, Manager, Dutch Hills Mobile Home Park, April 12, 1982.

[11]Interview with Richard Brooks, Supervisor, Bath Township, March 24, 1982.

[12]Interview with Mike Mikulka, Region V, U.S. EPA, Chicago, April 2, 1982.

[13]Thomas E. Doan, P.E., Fishbeck et al., remark at the SCCSSA meeting, Feb. 27, 1981, notes of Theodore L. Powell.

[14]Fishbeck et al., "Comments Made Concerning the Facility Plan at the Public Hearing, Nov. 29, 1976," Memorandom, Dec. 23, 1976, files of SCCSSA, DeWitt, Mich.

[15]Fishbeck et al., "Facility Plan," p. 17.

[16]Interview with Kurt Guter, P.E., Snell Environmental Group, March 1, 1978. The formula, an expression of the relationship between liters, gallons and pounds, is millions of gallons times concentration (mg/l) times 8.34 equals total pounds of pollutants.

[17]Extending the results of the January 1981 report to 5 mgd at federally mandated concentration limits produces BOD and suspended solids loading predictions of 9,300 pounds, and a prediction of 910 pounds of phosphorus. The Michigan Department of Natural Resources (DNR) concluded that water-quality goals will not be met "if the proposed regional wastewater treatment plant is constructed . . . unless it also achieves an effluent phosphorus level of 0.3 mg/l." ("Looking Glass River Study Below DeWitt" (Lansing, Mich.: Michigan DNR, March 1979).)

[18]U.S., Federal Register 40(72) (April 14, 1975). A U.S. General Accounting Office study the year before criticized the EPA for a lack of Environmental Impact Statements. It found that only six EISs were required for 1,218 grants. (U.S., Comptroller General, "Federal, State, Local and Public Roles in Constructing Wastewater Treatment Facilities" (Washington, D.C.: U.S. Congress, Dec. 5, 1975).

[19]Tri-County Regional Planning Commission, "Regional Clearinghouse/208 Agency Comments and Recommendations," Memorandum, Nov. 29, 1976.

[20]Tri-County Regional Planning Commission, "208 Water Quality Management Plan--Interim Outputs" (Lansing, Mich., August 1976).

[21]Tri-County Regional Planning Commission, "208 Water Quality Management Plan" (Lansing, Mich., August 1977).

[22]Interview with Fred Cowles, Michigan DNR, April 2, 1982.

[23]Fishbeck et al., "Engineering Agreement with SCCSSA," dated Jan. 9, 1976; signed Jan. 15, 1976.

[24]Interviews with Mike Mikulka and Allen Kraus, U.S. EPA, Region V, Chicago, April 1982.

[25]SCCSSA, "Budget Information" (U.S. EPA forms): fees for the "Facility Plan" were $63,799.50. SCCSSA, "Engineering Agreement Amendment #6": fees for the preparation of detailed drawings (Step II) and supervision of the two-year construction project were $443,550.

[26]SCCSSA, Minutes of Meetings, Meeting of Feb. 27, 1981.

[27]Ibid.

[28]The seed for this thought comes from the testimony of Rep. Guy VanderJagt (R-Mich.) before the U.S. Senate Environment and Public Works Subcommittee, June 22, 1977. Rep. VanderJagt suggested that facility-plan regulations require that separate engineering consultants perform the studies for conventional systems and land-treatment systems. He suggested that there was an "economic incentive to take the old conventional blueprint off the shelf."

[29]Interview with Allen Kraus, Region V, U.S. EPA, Chicago, April 2, 1982.

EPILOGUE

Since the preparation of the initial draft of this paper, the SCCSSA has announced that actual operating costs for the first year were $452,648, instead of the $620,725 budgeted. The $112,000 budgeted for equipment replacement was not set aside, since the SCCSSA board concluded that warranties covered much of the equipment, so O&M was adjusted to $340,648. Because overall costs were less than the budget estimate, the Clinton County Department of Public Works (still ultimately responsible for the bonds) announced that the SCCSSA plant was operating "below projected costs."[1] However, total flow was 332 million gallons for the year, resulting in treatment costs of $1,027 per million gallons, 71 percent more than the "Facility Plan" predicted for the first year.

The budget for the second full year of operation was adopted by the SCCSSA since the present study was made, and O&M expenses were projected at $529,855, just under the original "Facility Plan" estimate for the year 1990. The new budget reduced the repair reserves to $50,000, or less than half of one percent of the $11 million cost of the facility.

A "Facility Plan Amendment" presented by Fishbeck et al. to the SCCSSA board on Dec. 10, 1981 implies that

the sludge-handling facilities of the one-year-old plant are inadequate. The Amendment presents, among others, the following conclusions and recommendations:

> 1. The existing anaerobic digesters will not be capable of handling a wastewater flow greater than 1.8 MGD.
>
> 2. As per the Resource Conservation and Recovery Administration, the present plan to landfill unstabilized sludge is unacceptable.
>
> 3. Adding a centrifuge ahead of the existing digesters will not result in the need for further digester construction.
>
> [4, 5 and 6 are other physical recommendations.] . . .
>
> 7. The total estimated project cost is $580,300. After receiving grants for these improvements, it is estimated that the share allocated to the Sewer Authority is $76,100.
>
> 8. The estimated operating and maintenance costs for this project are $157,200 per year when the waste flow is 3 MGD.[3]

Thus, the $8 million facility already needs a half-million-dollar renovation. Operation and maintenance costs are projected to increase by 25 percent, and previous O&M estimates have been understated by at least half.

Notes--Epilogue

[1]The State Journal (Lansing, Mich.), April 7, 1982, p. 6B.

[2]First year O&M costs for 1 mgd (365 million gallons per year) were estimated at $218,000, for a rate of slightly under $600 per million gallons. The plan shows total treatment costs, including a 20-year amortization of capital investment, declining to $580 per million gallons by 1990 as volume increases. Fishbeck et al., "Facility Plan," p. 209 (Table 24).

[3]Fishbeck et al., "Facility Plan Amendment," Dec. 10, 1982, files of SCCSSA, DeWitt, Mich.

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