

FACTORS AFFECTING INNOVATION IN WATER QUALITY MANAGEMENT:
IMPLEMENTATION OF THE 1968 MICHIGAN CLEAN WATER BOND ISSUE

by

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ABSTRACT

This report focuses upon factors affecting innovation in the implementation of the 1968 Michigan Clean Water Bond Issue. The Joint Legislative Committee on Water Resources Planning which sized the Bond Program did not consider nutrient removal or any treatment beyond secondary in its determination of the fiscal resources necessary to meet 1980 Water Pollution Control objectives. Consequently, the fiscal resources were limited from inception. Innovation which would be responsive to changing conditions is resisted by the inherent desire for maintenance of the status quo and resistance of actions which involve uncertainty and non-programmed decision making. Administrative fragmentation provided limited perspective on the water quality problem. Technological obsolescence in administrative agencies resisted innovative solutions. An ineffective and noninnovative planning process dominated implementation of the Bond Issue funds. Four case studies demonstrated the inherent resistance to innovation led to a suboptimization of systemic pollution control goals, a reliance upon the interceptor-centralized plant model of regionalization, and basically a lack of incentives which promote planning and comprehensive analysis.

The report indicates that the net effect of the Clean Water Bond program maintains a 1968 status quo situation. Factors resisting innovation are identified. Factors enhancing innovation are identified. An automated information storage/retrieval system for monitoring wastewater treatment facility

funding is developed. Structural and process changes for future innovation are recommended.

DESCRIPTORS: *Water Quality Management, *Innovation,
*Michigan 1968 Clean Water Bond Issue, *Water Resource
Planning

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PREFACE

In November, 1968 Michigan voters approved the "Clean Water Bond Program" by an overwhelming majority. The program provided for the issuance of General Obligation bonds by the State of Michigan for the sum of 335 million dollars. Once the voters approved the Bond proposal, the basic task facing state officials was implementation of the program. On February 24, 1969 The Engineering Society of Detroit sponsored a day long conference entitled "Water Bond Implementation". Speakers represented the Governor's Office, the legislature, the federal government, several state bureaus, and financial experts in the field of bonds. The representative from the Governor's Office indicated that the purpose of the bond issue was to stop pollution in streams, lakes, and rivers. Pollution is getting ahead of municipalities. Lake Michigan would become a dead lake like Lake Erie unless corrective measures were taken. This individual went on to indicate four specific objectives of the Bond Program:

1. Solve the finance problem - provide funds to enable local units of government to build necessary facilities.
2. Speed up the water quality program by providing sufficient cash to initiate more projects.
3. Enable the state to take advantage of federal funds (up to 50% over time)
4. Enable small communities (< 5,000 population) to build collecting sewers, interceptors, and treatment plants (\$50 million - earmarked for this purpose).

Other speakers at this meeting touched upon the legislation which was pending regarding policy procedures for allocation of the bond money and also indicated the administrative prerequisites which each applicant would have to meet in order to obtain a portion of the State Bond Money for a specific project.

Three of the State Legislators who were present and were participants in the meeting, Senator Gordon Rockwell, Representative Raymond Smit, and Representative Thomas Anderson raised the question of cost-effective implementation of the bond program. As Representative Smit said, "How do we accomplish the most for \$335 million. How do we do the job best?" For Senator Rockwell, the problem facing the officials in the implementation of the Clean Water Bond Issue was "how can we do the very best job with the money available?" Representative Anderson expressed concern that the implementation procedure must avoid "pork barrel" situations. It is of interest to note that different perceptions were expressed at this meeting regarding the adequacy of the state bonding program. On the one hand, Mr. John Voit of the State Health Department stated that there were "funds enough to go around". In contrast, Representative Smit pointed out that new ideas were now under consideration in the field of wastewater treatment which had never been considered in sizing the State program. Nutrient removal and advanced wastewater treatment were concepts which had not be utilized in estimating the program.

Accordingly, these funds would not be sufficient to meet these new pollution control requirements. It is against this background that this research project was formulated with the specific objective of studying innovation in the implementation of the 1968 Michigan Clean Water Bond Issue.

This report addresses innovation and change, politics and bureaucracy, individual and group behavior, institutional and social interaction, financial and expertise resources, wastewater treatment technology, goals and values, structure and process. Because of the diversity of the subject matter, the intent is to bound the area of study, with the hope that the investigation will provide direction for further studies of more specific subject areas.

This study makes the assumption that diverse inputs of information are essential to develop and maintain an effective and efficient planning and management process. The report is intended to constitute one source of input and feedback into the water quality management system in the State of Michigan. While the tone of the report is generally critical, it is believed that the Michigan system has been one of the best pollution control efforts in the nation. The superlative nature and value of the water resources in Michigan, however, demand that the system function in the most optimal manner possible subject to the constraints prevalent in the physical and social systems. The principal way in which State institutions can move towards an optimal management system is to accept and take advantage of the benefits of change,

rather than expending scarce resources and energy to resist it. This study outlines factors which affected the use of innovative wastewater treatment processes as seen in the implementation of the 1968 Michigan Clean Water Bond Issue. It is hoped that the report will aid in outlining better mechanisms for processing change and encouraging adaptation in the future water quality management system.

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PART I -- BUREAUCRACY, INNOVATION, AND THE ENVIRONMENT

Although systemic form is visibly composed of an intricate structure of diverse components, the nature of a system is in large part a function of the interaction which takes place between subsystem units. Interaction takes the form of social and physical behavior. Thus, systemic direction is defined through conflict and cooperation, competition and coordination.

The intent of this report is to examine the interaction between the political bureaucracy and the process of technological innovation in water quality management. Systemic interaction focuses upon resource demand and supply flows. This study is concerned with the macro-resource of the water environment, and the micro-resource of the funds provided by the 1968 Michigan Clean Water Bond Issue. Accordingly, Chapter One outlines these resources as well as the processes of innovation. Chapter Two begins to examine the interrelationships between the political and administrative subsystems and the processes of innovation as evidenced in the allocation of the micro-resource.

This section, then, defines the bureaucracy-innovation interface. It does this by examining the implementation of the Bond Issue in terms of the perceived problems related to water quality maintenance and enhancement in the State of Michigan.

CHAPTER ONE -- INTRODUCTION

"The frog does not drink up the pond in which
he lives"

-American Indian Proverb

A system is the term used to describe a complex aggregation or assemblage of diverse objects joined in a regular pattern of interaction and interdependence. The universe is the ultimate system, spreading outward until an infinity of uncertainty or incomprehensibility overtakes it. Its diverse parts are joined in interaction designed so as to guarantee the continuance of the system. Each subsystem unit is bounded by the rules of its existence. Thus, order overtakes chaos, with survival emerging as the common goal.

Systemic order is prevalent at all levels, commencing with that of the atom. Indeed, life itself is defined in terms of the interrelatedness of its parts, working together to promote a common goal. However, survival is guaranteed only through order. When a unit alters systemic rules and bounds, entropy increases, homeostasis is destroyed. At the cellular level, when this occurs a cancer results, developing its own goals which will ultimately destroy its host and thus destroy itself.

Man is the only animal that has so extensively altered the bounds which had been created to guarantee survival of the natural system. He has done so through the use of tools, through the creation of technology. In this manner, the species has travelled through arboreal, terrestrial, and agricultural phases, culminating at present in an industrial

existence. These evolutionary changes were brought about through corresponding technological changes.

However, as systemic rules are changed, order becomes less clear, survival less certain. Physical factors which had once been barriers become resources, to be manipulated and controlled. Evidence of the shift in order has been slow in surfacing, due to an inherent system resilience in addition to a lack of vision and understanding on the part of the manipulators. Whether the convincing evidence comes from the loss of the clouds of passenger pigeons that once crowded Michigan skies, or the once-clear, now-putrefying streams whose fish lie belly-up in the accumulating scum, it is clear that the order has been shattered, the resources mismanaged.

In the State of Michigan, water is a primary resource. It supports a multi-million dollar recreation industry, second only to the automotive industry in State income-generation. It is used to supply the domestic needs of over 8-1/2 million people as well as to dispose of their wastes. Water is also used in diverse industrial processes, and provides habitat for an abundance of life. Michigan has more than 11,000 inland lakes and more than 36,000 miles of streams. In addition, it has more freshwater coastline than any other state.¹

In 1968, however, Michigan streams were suffering under a pollution load which had been discharged from a century of unchecked industrialization. Governor Romney stated:

"Because of pollution, Lake Michigan is aging at 300 to 500 times its normal rate.

"Michigan lakes, rivers, and streams are being befouled by acids, brines, oil slicks, chemicals, pesticides, and human waste which rob water of its purity and send bacteria counts to dangerously high levels.

"Beaches are becoming unusable because of the accumulation of algae along our lake shores".²

In Michigan, then, water as a resource had lost its innate value. Indeed, water was becoming a boundary once more. As seen in the Muskegon County Case (Chapter Seven), mismanagement of the water had created an overall atmosphere of stagnation in many places, limiting residential and industrial development and growth.

Recognition of the deteriorated quality of the State water system came largely as a result of a shift in public values. This shift is more extensively traced in Chapter Three, but basically involved an evolution of interests from those dominated by navigation and water supply, to those placing significant value on recreation and aesthetics. These shifts were reflected in the political arena in the form of federal and State policies and programs.

The program designed to resolve the water pollution problem provided treatment technology for State-wide waste discharges using Clean Water Bond Issue funds. Thus, while technology enabled Man to extend his bounds, yielding increasing levels of systemic stress, it was concurrently perceived as a solution to the resultant problems.

Technologies are defined as "codified ways of deliberately manipulating the environment to achieve some material objective".

In addition, supporting systems are defined as "the legal and economic arrangements through which such technologies become available and are subjected to social control".³

Thus, while physical-chemical methods of wastewater treatment constitute a technology, laws and administrative decisions regulating plant construction and design have been promulgated to accompany their social diffusion. In addition, technologies result in alterations in social institutions:

"Technology changes society by changing our environment to which we, in turn, adapt. This change is usually in the material environment, and the adjustment we make to the changes often modifies customs and social institutions".⁴

For example, advances in wastewater treatment technology has resulted in changed social values towards the use of reclaimed wastewater.

The innovation process is taken to encompass the "generation, acceptance, and implementation of new ideas, processes, products and services".⁵ The source of impetus initiating innovation has been under controversy in the literature. In the 1950's, the "innovation chain" idea was popular, suggesting that pure research initiates innovation in industry and economic growth. A model of this process is depicted in Figure 1.⁶ However, research in the 1960's, contradicted this model. Project Hindsight, a study of 835 significant innovations, concluded that:

"only 5 percent of [the innovations] could be designated as the results of research in its proper meaning. The rest are the results of controlled innovation activity, 71 percent of which had been initiated by an identifiable need..."⁷

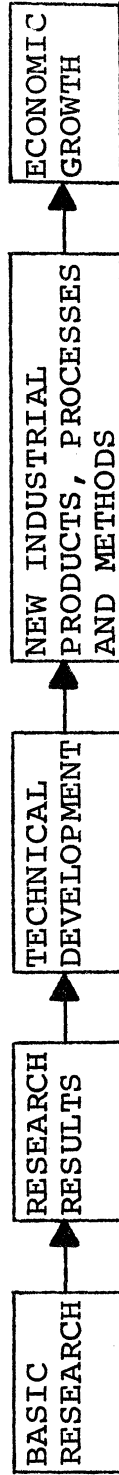


FIGURE 1 -- MODEL OF THE "INNOVATION CHAIN"

In addition, Myers and Marquis studied 567 commercially successful innovations:

"It was found that 45 percent of the investigated innovations were initiated as a consequence of a need noted in the market, 30 percent as a consequence of production requirements of different kinds, while only 21 percent could be described as the recognition of a utilisable technical possibility. Three-quarters of successful innovations can therefore be designated as having been need-stimulated".⁸

The model which is suggested from these two studies is contained in Figure 2.⁹ Thus, need specification appears to precede innovative activity.

This second model outlines one area of inquiry useful in analyzing the outcome of the implementation of the Bond Issue, i.e., how did decision-makers and political institutions perceive the need for innovation? If the need for innovative problem solutions is not perceived in the political arena, it is unlikely that innovation will be widely diffused into social practice. A second major area of inquiry concerns the response of the decision-makers to the perceived need, i.e., given that a need for action was perceived, how did policy-makers respond to this need? This report attempts to look at these questions of perception and response as evidenced in the implementation of the 1968 Clean Water Bond Issue.

For purposes of simplification, a two-stage model of the innovation process is used.¹⁰ Invention is the first stage, encompassing idea conception (whether motivated by need or research). The second stage is innovation, i.e., the process by which an invention or an idea is translated



FIGURE 2 -- MODEL OF THE "NEED-GENERATED" INNOVATION PROCESS

into society. It is primarily the second step that this report examines, i.e., how political groups influence (positively or negatively) the translation of innovation into public acceptance and use.

Technological innovation must be regarded carefully. Processes of assessment and choice must be methodical but in addition must be efficient. Trade-offs must be made between the likelihood of negative externalities resulting from an innovation, and the likelihood that the innovation will solve the perceived need state. This trade-off reflects the two dominant views of technology. Many economists have argued that continued technological change is necessary to restore, or perhaps synthesize systemic order. For example, Barnett and Morse suggest that product substitution and innovations in extraction methods will open the door to further growth and development: "Few components of the earth's crust, including farm land, are so specific as to defy economic replacement, or so resistant to technological advance as to be incapable of eventually yielding extractive products at constant or declining cost."¹¹

The second view of technology is one which recognizes that technological (and thus cultural) shifts, by changing the natural order, have caused the present-day problems. Thus, White suggests that a change in values is necessary to opposition to further technological change: "More science and more technology are not going to get us out of the present ecologic crisis until we find a new religion..."¹²

There is evidence that a shift in values is taking place to some extent in areas affluent enough to have basic needs satisfied. There is no doubt that this is part of the solution. However, a majority of the world's population is undernourished. Population numbers continue to soar. Basic resources are declining. Waste products are increasing. To aid in the resolution of these problems, technology must play a dominant role, accompanied perhaps by cultural changes. Thus, innovation must be sought by policy-makers to synthesize the order shattered by past technology. Nevertheless, innovations must be carefully assessed prior to use to insure against negative external effects.

Recent federal legislation reiterates the desirability of the use of advanced and innovative wastewater treatment technology. For example, Section 201(b) of the 1972 Amendments to the Federal Water Pollution Control Act (P.L. 92-500) states that:

"Waste treatment management plans and practices shall provide for the application of the best practicable waste treatment technology before any discharge into receiving waters...and shall provide for consideration of advanced waste treatment techniques".

The Act further states that for projects proposed for federal grant funding that:

"The Administrator shall not make grants...unless... the works proposed for grant assistance will provide for the application of the best practicable waste treatment technology over the life of the works...and allow to the extent practicable the application of technology at a later date..."
(emphasis supplied)¹³

Congress was reflecting in this subsection the knowledge that

the rate of technological change has been increasing over time,¹⁴ providing more effective treatment techniques. The rate of change is such that planning must shift to shorter-term, more flexible policies to allow for the capture of future technological innovations. Indeed, Gilbert White, in discussing strategies of American water management, stated that:

"...the means and instruments of handling water become increasingly complex, the concern with tracing environmental impacts more acute, the adjustments to human preferences increasingly sensitive and the demand for citizen participation heavier. The emphasis shifts from construction to scientific probing, and from long-term commitment to short-term flexibility."¹⁵

Thus, not only are there practical and economic mandates for the encouragement and adoption of technological innovation, but there are legislative requirements designed to guarantee that future innovation is included in the present planning process.

In 1968 when the Bond Issue was proposed to the voters, the studies of needs, which had been prepared by the Joint Legislative Committee on Water Resources Planning (JLCWRP) and the Water Resources Commission (WRC), had based their financial estimates on the State-wide provision of conventional secondary wastewater treatment technology. In February of 1973, after approximately 270 million dollars of Bond Issue funds had been either expended or committed for expenditure, an assessment of the water pollution control program was undertaken. It concluded the "state agencies cannot evidence to the Michigan taxpayer and citizen what that money has

bought in terms of impact on the economic, recreational or esthetic problems associated with water pollution".¹⁶

In response to the assessment, the Director of the Department of Natural Resources (under whom the Bureau of Water Management operates) sent a letter to the Director of the Bureau of Programs and Budget. The letter stated that "the impact upon water pollution problems consists of prevention and accordingly is identifiable only in terms of what pollution would have resulted from the preventative measures not having been applied".¹⁷ This statement coupled with the conclusions reached in the assessment suggests that after some 80.6 percent of the Bond Issue funds had been expended or committed for expenditure, no forward progress had been made to resolve the problems perceived prior to the Bond Issue campaign. Rather, the monies had allowed the State to maintain a status quo situation.

A similar picture of cost effectiveness emerges on the federal level. The 1971 Annual Report produced by the U.S. Council on Environmental Quality concluded that the BOD level of wastes discharged has remained roughly constant - largely due to the expenditures for treatment works. However, the Report concluded that "the overall quality of the Nation's waters probably has deteriorated because of accelerated eutrophication, increased discharges of toxic materials, greater loads of sediments, and other factors".¹⁸

Thus, these two sources reveal that water pollution is at approximately the same level as it was prior to the federal and State grant programs. Although BOD levels have remained

approximately constant, accelerated eutrophication, increased levels of toxic ions, and increased sedimentation have resulted in declining water quality. It should be reiterated that the estimates of needs were based on the provision of conventional secondary treatment at point-source discharges -- a treatment method which primarily removes organic waste constituents. Nutrient removal (which would slow down the accelerated eutrophication) was not included in the original cost estimates, although State WRC orders have subsequently made 80 percent phosphorus removal a State-wide requirement. However, nutrients carried in runoff are, of course, not affected by point-source waste treatment facilities. Toxic ions are also not significantly removed by biological secondary treatment. Increased sedimentation results largely from increased materials carried in runoff. In many urban areas most runoff is piped via storm sewers directly into the streams. In those other urban areas with combined sewers, the storm water runoff combined with raw sewage is discharged directly to the receiving waters when the flow exceeds the capability of the system to store it for treatment through the wastewater treatment plant.

Water pollution has not decreased because many of the causal factors have not been reduced. Conventional secondary treatment does not affect many of these factors. Alternative treatment methods however can reduce many of the otherwise untreated waste constituents. Nutrient removal can be achieved via the addition of chemicals which bind to nutrients

and precipitate them out of solution. Many toxic ions can be removed from wastewater materials via treatment methods such as ion exchange. Sediment carried in runoff can be reduced, for example, via the use of sedimentation ponds, erosion restriction techniques, and alternative development schemes. Thus, advanced methods of wastewater treatment can solve existing water pollution problems. In addition, alternative waste treatment methods promise less costly and more effective systems in the future.

The point of the discussion is that for practical, legislative, economic, and technical reasons, advanced and innovative wastewater treatment techniques are essential to resolve present water pollution problems. Their use is even more critical when one considers what will happen when all existing plants are providing secondary treatment capability: How will a status quo situation be maintained with increasing population and consumption trends? The intent of this report is to examine the implementation of the Bond Issue and ascertain to what degree innovative techniques were funded. In light of this data, the report then attempts to delineate factors which have either encouraged or resisted innovation.

CHAPTER TWO -- THE MICHIGAN CLEAN WATER BOND ISSUE

"The Clean Water program is aiming at water pollution control throughout Michigan by 1980"

-Bond Issue promotional literature

A. History, Intent, and Description of the Bond Issue¹

The Michigan Clean Water Bond Issue was proposed in 1968 largely in response to rapidly deteriorating water quality, federal requirements and incentives, and inadequate federal grant appropriations. A 1965 Public Health Service Report (more extensively described in Chapter Six) had concluded that interstate waters of Lake Erie were severely polluted and the Michigan was the primary source of this pollution. Point-source discharges or untreated or inadequately treated wastes were outlined as the major contributor to the widespread pollution. In addition, in the mid to late 1960's, a heightened level of public awareness and interest in pollution problems was developing concurrently with this new source knowledge. The public's concern was translated (largely due to the efforts of the Michigan United Conservation Clubs and the Michigan Municipal League) into legislative pressures to provide public monies to localities for the resolution of their pollution problems.

The second factor which provided impetus for the Bond Issue was that of federal requirements and incentives established under the Federal Water Pollution Control Act. The 1965 Amendments had required that the states adopt interstate water quality standards. The State complied with this requirement on June 28, 1967. However, to comply

with the standards, funds had to be provided to financially bolster affected localities. Governor Romney put the problem in context:

"Our most pressing pollution problem today is money - money to finance facilities to control municipal discharges of untreated or inadequately treated wastes.

"Some 150 communities are now in violation of Michigan's pollution control law. The major obstacle is that many of them lack the funds to live up to the law".²

In addition to the standards requirements, the federal legislation (1966 Amendments) provided incentives to the states to establish matching grant funds. Thus if the state provided a grant of at least 25 percent of project construction costs to the locality, the federal government would increase its grant contribution from 30 to 50 percent of project costs.

A third factor which intensified the demand for bonding action was the result of inadequate federal grant appropriations. Although monies had been authorized to be appropriated by Congress for the provision of grant funds, the actual Congressional appropriations did not match the prior authorizations. This fact caused a slowdown in wastewater treatment works construction due to the lack of local funds to prefinance the federal cost share. Indeed, this lag in receipt of federal monies continued to be a significant factor, retarding the achievement of effective Issue implementation.

In October of 1965, the Michigan State Legislature passed a resolution creating a Joint Committee on Water

Resources Planning. The Committee was instructed to study water-related problems of the State and to develop long-range comprehensive planning for use of water and related land resources. The resolution particularly emphasized the problem of water pollution. In December of 1966, the Committee reported its findings.³ It concluded that the State must develop a program of financial aid to municipalities for construction of sewage and waste treatment works.⁴ It noted that 25 percent State assistance would allow localities to receive 55 percent federal money (if also in accordance with a regional plan). The estimated cost to satisfy State-wide treatment works needs was determined to be 560 million dollars. Thus, to provide for 25 percent state funding, State monies would have to be committed totaling some 140 million dollars. The water quality strategy adopted in the Report was to provide all point-source discharges with the equivalent of biological secondary treatment. However, in spite of the Report's findings, no legislative action was taken.

In 1967, Governor Romney requested that the Water Resources Commission (WRC) investigate the State's needs to "abate" water pollution by 1980. The WRC also assumed that secondary treatment would be sufficient to "abate" pollution and accordingly came up with a need estimate of 568 million dollars. It is important to note that the 1967 WRC needs estimate did not include costs of phosphorus removal--costs which were subsequently incurred due to a State-wide requirement of 80% removal. As a result, the State pollution con-

trol campaign was underfinanced from its inception. The federal and local contributions were estimated at 25 percent each. This left a balance of 285 million dollars to be paid by the State. In addition, it was estimated that 50 million dollars was needed to aid smaller, rural communities with the construction of collecting sewers.

To finance the State program, Governor Romney proposed that 335 million dollars in State bonds be sold. The type of bonds to be issued were general obligation, and as such were supported by the full faith and credit of the State.⁵ The Governor announced the proposed Bond Issue to the public in January of 1968. Legislation authorizing placement of the bond issue on the November 1968 ballot was unanimously passed by the Legislature.

An extensive public education campaign was undertaken to build support for the Bond Issue. The result of the campaign was the passage of the proposal by a large margin of voters. DeSantis⁶ identified twelve generalizations responsible for the success of the Bond Issue Communication Campaign:

1. The campaign capitalized on a favorable climate for passage of environmentally-oriented legislation;
2. The use of public involvement built greater enthusiasm and support for the issue;
3. Assistance was solicited from known opinion leaders who were powerful when dealing with collective decision-making;
4. Leadership was focused in a single figurehead;
5. The inclusion of a diverse group of interests in the campaign yielded greater issue support;

6. Communication between individuals knowledgeable about an issue and those in need of information was helpful in educating the voters;

7. A maximum distribution of information gained support for the issue;

8. The minimization of controversy surrounding the issue helped to build support;

9. Various organizations and groups were stimulated to take the initiative in promoting the campaign;

10. Endorsements of admired political figures commanded extensive public attention;

11. Problems were specifically and simply identified for the affected public before remedies were prescribed; and

12. Promotion of the issue was greatly helped by extensive use of knowledgeable speakers.

The Bond Issue was essentially sold to the people by the State under the allegation that the provision of the 335 million dollars would allow the State to meet its goal of controlling water pollution by 1980. Figures 3 and 4 are reproductions of promotional literature used in the Bond Issue campaign.⁷ Figure 3 illustrates the expressed need for 210 new treatment plants and 125 improvements to existing facilities as well as the provision of sewers to 3.5 million people. The cost was to be 568 million dollars of which the State was to provide 25 percent (142 million dollars) to match 50 percent (284 million dollars) federal grant monies (see Figure 4). In addition, to speed the implementation the State was to prefinance half of the federal share, raising the State contribution to 285 million dollars. Nevertheless, the expressed intent of the Bond Issue was to control State-wide pollution by 1980.⁸

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MICHIGAN'S POLLUTION CONTROL PROGRAM

**THE
GOAL**

CONTROL POLLUTION BY 1980

**THE
NEED**

*210 NEW PLANTS
*126 IMPROVEMENTS TO EXISTING PLANTS
*SEWERS FOR 3 1/2 MILLION PEOPLE

**THE
COST**

*PLANTS - \$568 MILLION
*SEWERS & STORM WATER CONTROL \$641 MILLION

FIGURE 3 -- BOND ISSUE CAMPAIGN PROMOTIONAL LITERATURE

COST SHARING OF TOTAL PLANT CONSTRUCTION

**568
MIL.**

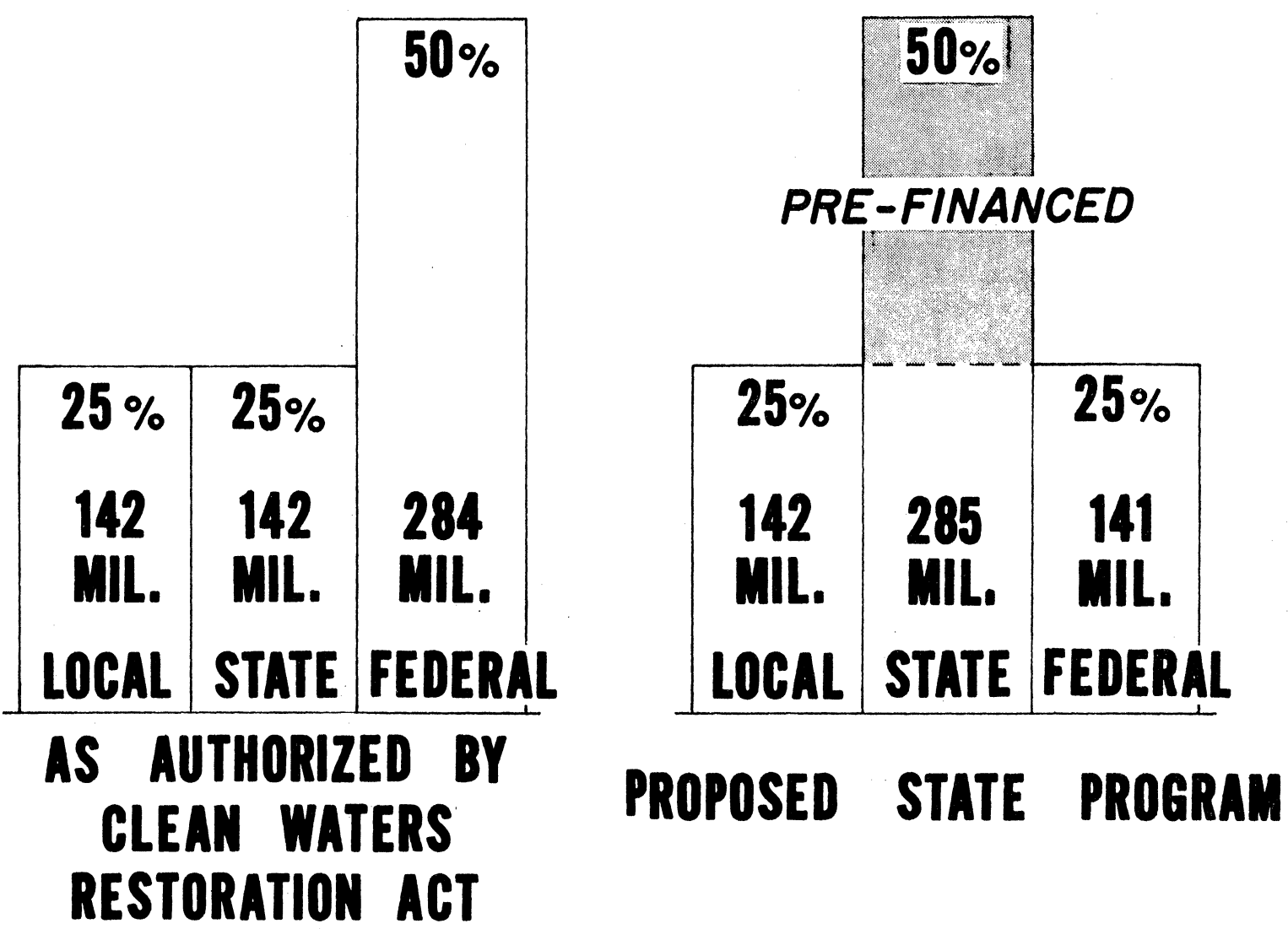


FIGURE 4 -- BOND ISSUE CAMPAIGN PROMOTIONAL LITERATURE

Following the passage of the Bond Issue, implementing legislation had to be drawn up and enacted. It was during this step that conflict arose between diverse views on the manner by which funds were to be disbursed. The control over 335 million dollars was at stake, offering considerable power to the allocation agent. A committee was set up to draft the legislation. It was decided to draft two bills, one to allocate the funds for treatment works (285 million dollars) the other to be concerned with the funds for collecting sewers (50 million dollars). The committee held hearings and conferred with the WRC staff and Governor Romney. Romney's desire to keep the implementation process "out of politics" was endorsed by the committee.

The question of which branch of government was to allocate the funds formed the main area of conflict in the drafting of the legislation. The State House of Representatives embraced the idea of vesting implementative authority in the WRC so as to prevent pork-barrelling. The Senate, on the other hand, claimed that politics couldn't be kept out of the implementation process if authority was vested in the executive branch, and thus favored placing allocation control in the Legislature, which was more open to public scrutiny. In addition, there was a growing resentment to increases in executive power.

To break the deadlock, a Joint Legislative Committee was formed to study and make recommendations on the disagreement. The compromise which was agreed upon and enacted in June

of 1969 let the WRC determine the order of priority by which projects would be funded.⁹ The Legislature would then determine the cut-off point, indicating the extent to which funds would be provided. In addition, to appease the Senate, the priority point system and the grant application procedure were included in the legislation so as to minimize areas of political vulnerability in the WRC. A copy of the enacted legislation is reproduced in Appendix I.

The procedure set up to determine the order of priorities by which projects were granted funds was based equally on financial need and pollution control need. Points were given for financial need based on the estimated project cost as well as the extent of outstanding financial obligations maintained by a municipality. Points were given for pollution control need based on the extent to which specific water uses were adversely affected and based on the status of the pollution, i.e., whether the locality was under orders or stipulation of the WRC. Thus, a maximum of 30 points could be assessed, giving the project top priority for receipt of available grant monies. Priority lists were established annually by the WRC comprised of all current grant applicants. These lists were then submitted to the Legislature for approval of all or a portion of the projects. The Legislature, however, was prohibited under Section 2 of the Act from approving projects of lower priority than rejected ones. Thus, the Legislature set the cut-off point, after which funding was not available.

Applicants not funded one year could refile their applications for consideration on future lists.

Projects had to be certified by the Environmental Protection Agency prior to the receipt of federal monies. Although funding was to be based on a 25 percent State, 50 percent federal grant break-down, the WRC initially funded projects on the basis of 5 percent federal funding. This enabled the initiation of construction of more projects, stretching the limited incoming federal funds. This tactic also acted to place additional pressure on the Congress to appropriate funds already authorized for wastewater treatment facilities.

B. Grant Data Compilation and Analysis

This portion of the report presents the results of an analysis of grant data from the Clean Water Bond Issue program. The primary intent of this effort was to determine to what degree advanced and innovative treatment techniques were funded by the program. While studying the disbursement of funds, the need for an advanced method of organizing relevant data became evident. Due to the proliferation of projects and the resultant scattered State funds, little could be done to analyze spending patterns or trends of funded levels of treatment, nor was it possible to adequately plan for future needs on a State-wide basis. The inaccessibility of program data became evident to the researcher when a manual search of the Bureau of Water Management's files had to be undertaken in order to establish the level

of treatment that was funded by the bond money. Accordingly, prior to the data analysis, a computerized data management system was constructed to aid in this segment of the study as well as in future grant planning activity. A description of the system is contained in Appendix II.

For the purpose of determining the level of treatment funded by the Bond Issue monies, projects were aggregated into five major treatment categories: 1) Primary; 2) Activated Sludge; 3) Trickling Filter; 4) Lagoon; and 5) Tertiary. A project would be assigned into the activated sludge category, for example, if the funds went to the construction of a new activated sludge plant, if the project consisted of the addition of activated sludge capability to an existing primary plant, or if the funds went to the construction of interceptors which connected into an activated sludge facility. Thus, the funds aggregated into a treatment category indicate the dollars spent which provided a segment of population with that level of treatment.

The data¹⁰ was compiled based on the treatment level and the priority list date. The priority list date refers to the dated list of projects which was constructed annually under which a portion of proposed projects was funded. Thus, the priority list data compilation offers insights into time trends of funding.

A summary of the analysis is printed in Table 1. It illustrates the percent of the total funds paid out under the Bond Issue program that went to each treatment type over time. The upper numbers are the EPA Grants, while the lower

TABLE 1 -- PERCENT OF TOTAL FUNDING BY PRIORITY LIST DATE

EPA GRANT
BASIC STATE GRANT

TREATMENT	ACT 329	53	70	71-71	71-72	72	TOTAL
PRIMARY	4.47	11.35	0.26	0.00	0.00	0.00	16.07
	4.68	13.30	0.48	0.00	0.00	0.00	18.46
ACT. SLUDGE	1.21	3.11	18.32	18.05	23.10	0.00	68.79
	1.31	3.38	28.31	12.01	18.78	0.00	63.79
TRKL. FILTER	0.46	0.54	0.69	0.02	0.24	0.00	1.94
	0.33	0.71	1.54	0.01	0.15	0.00	2.80
LAGOON	0.43	0.63	3.25	0.62	3.78	0.00	8.77
	0.42	0.71	7.13	0.45	2.43	0.12	11.25
TERTIARY	0.00	0.32	0.51	0.00	3.61	0.00	4.44
	0.00	0.33	1.10	0.00	2.27	0.00	3.70
TOTALS	6.62	15.94	23.02	18.68	35.74	0.00	100.00
	6.79	18.44	38.55	12.47	23.64	0.12	100.00

TOTAL EPA GRANT FUNDS: \$233,493,031
TOTAL BASIC STATE GRANT FUNDS: \$169,030,026

numbers are the Basic State Grants (not including the State advance on the federal share).

Table 1 shows that of the approximately \$169 million in basic State grants and \$233 million in federal monies, approximately 17 percent went to primary treatment, 66 percent to activated sludge treatment, 2-1/2 percent to trickling filter treatment, 10 percent to lagoon treatment, and 4 percent to advanced or tertiary treatment. Thus, some 96 percent of the Bond Issue monies went to treatment methods providing at most secondary treatment capability. More extensive data is contained in Appendix III.

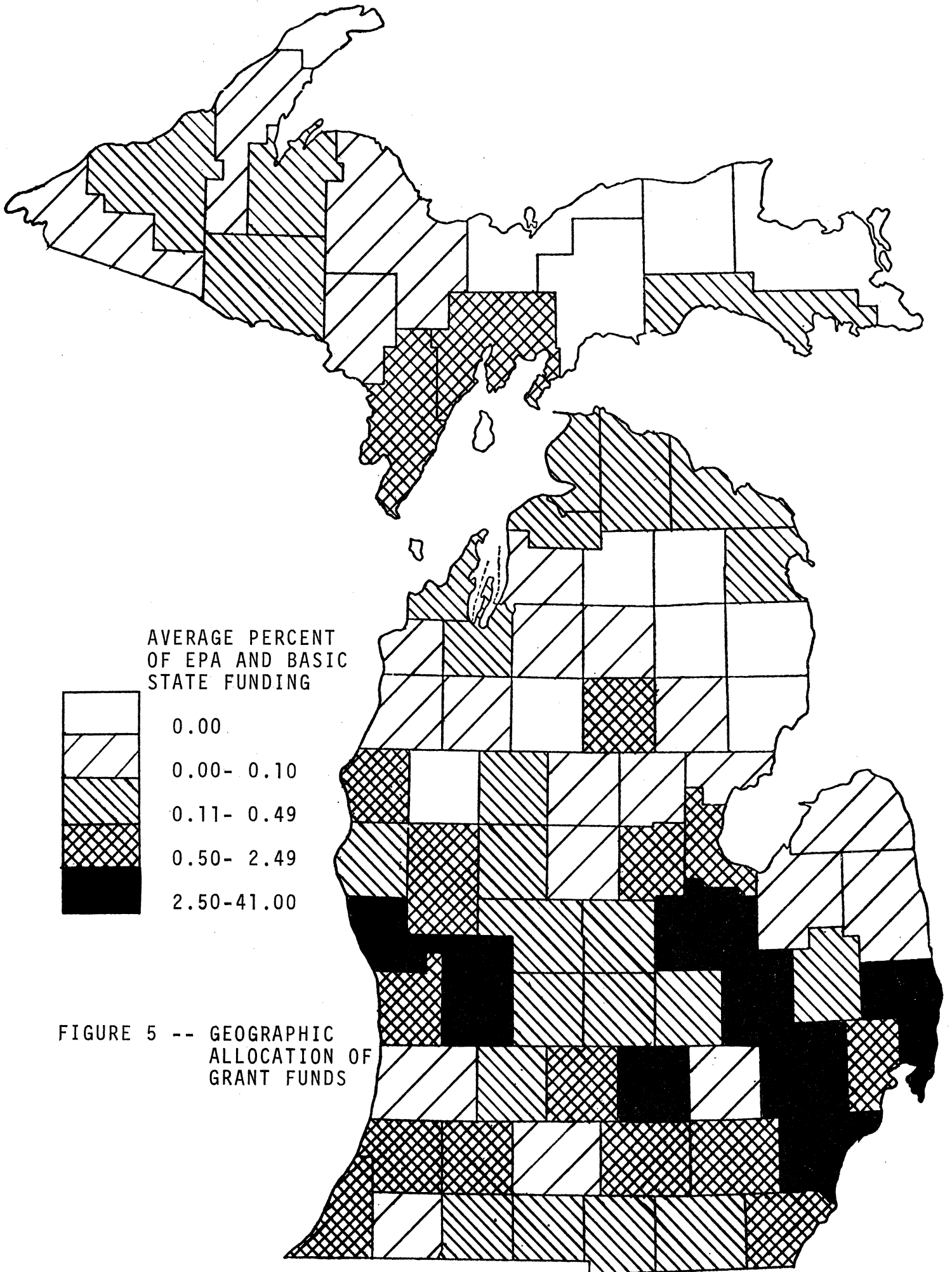
The funds which were used to provide tertiary treatment were distributed among six projects: 1) Charlevoix--microstraining; 2) Coldwater--sand filtration; 3) East Lansing--series lagooning; 4) Oakland County: Novi and Walled Lake--mixed media filters; 5) Petoskey--microstraining; and 6) Saline--sand filtration. The Owosso project (Chapter Eight-A) is not included in this group because it hasn't yet received grant funds.

A project doesn't necessarily have to be categorized in the tertiary treatment class to be considered innovative. For example, the Muskegon project is considered in this analysis as a lagoon with spray irrigation. However, of the 233 non-tertiary projects, only the Muskegon project appeared to be innovative in a technical or administrative sense. Thus at most 7 out of the 239 funded projects can be considered to be innovative.

Figure 5 contains a map of the State of Michigan showing the percentage of funds distributed across the State by counties. The distribution shows the general pattern of funding projects in densely populated areas. Thus, a majority of funds went to the more densely populated areas of Southeastern Michigan. Some 40 percent of the funds, for example, went to Wayne County (Detroit).

To further test the hypothesis that greater percentages of funds went to more densely populated areas, joint distributions were run between population density and percentage of grant funds allocated to counties. Graphs of the results are contained in Figures 6 (Basic State Grant data) and 7 (EPA Grant data). While the analyses are not statistically significant due to high numerical variance, the regression lines do show a strong positive correlation between the two variables. Thus, it appears that the intuitive hypothesis, that treatment projects are funded near areas of denser population, is borne out by the Bond Issue data.

In summary, the major conclusion which is illustrated by the grant data compilation is that approximately 96 percent of the funds went to projects providing at most secondary treatment. A maximum of 7 out of 239 projects could be described as innovative. Why was so little innovation funded? Were innovative processes proposed by localities and resisted by the State water agencies? Were funds available to support innovation? Simply, how was



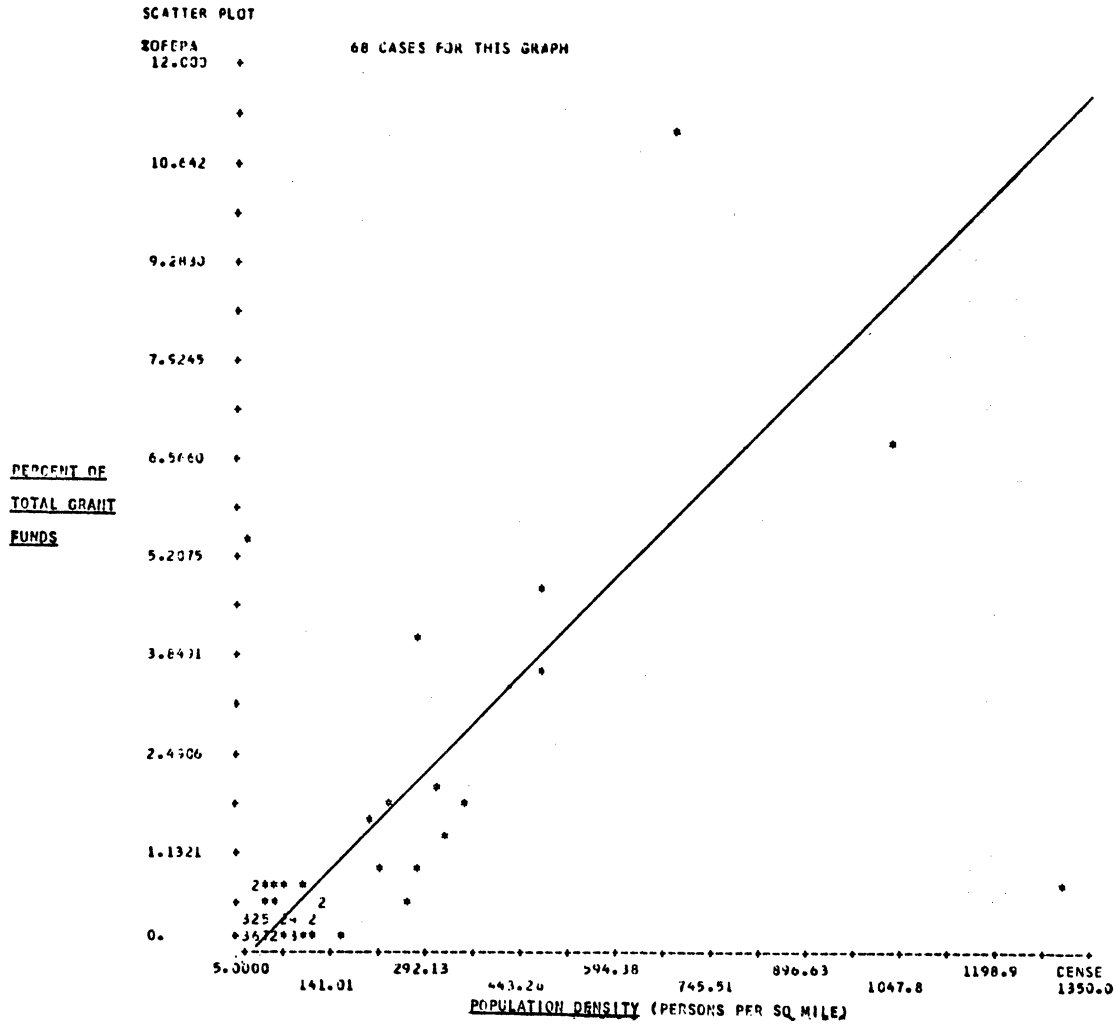


FIGURE 6 -- DISTRIBUTION OF GRANT FUNDS BY COUNTY POPULATION DENSITY: EPA GRANTS

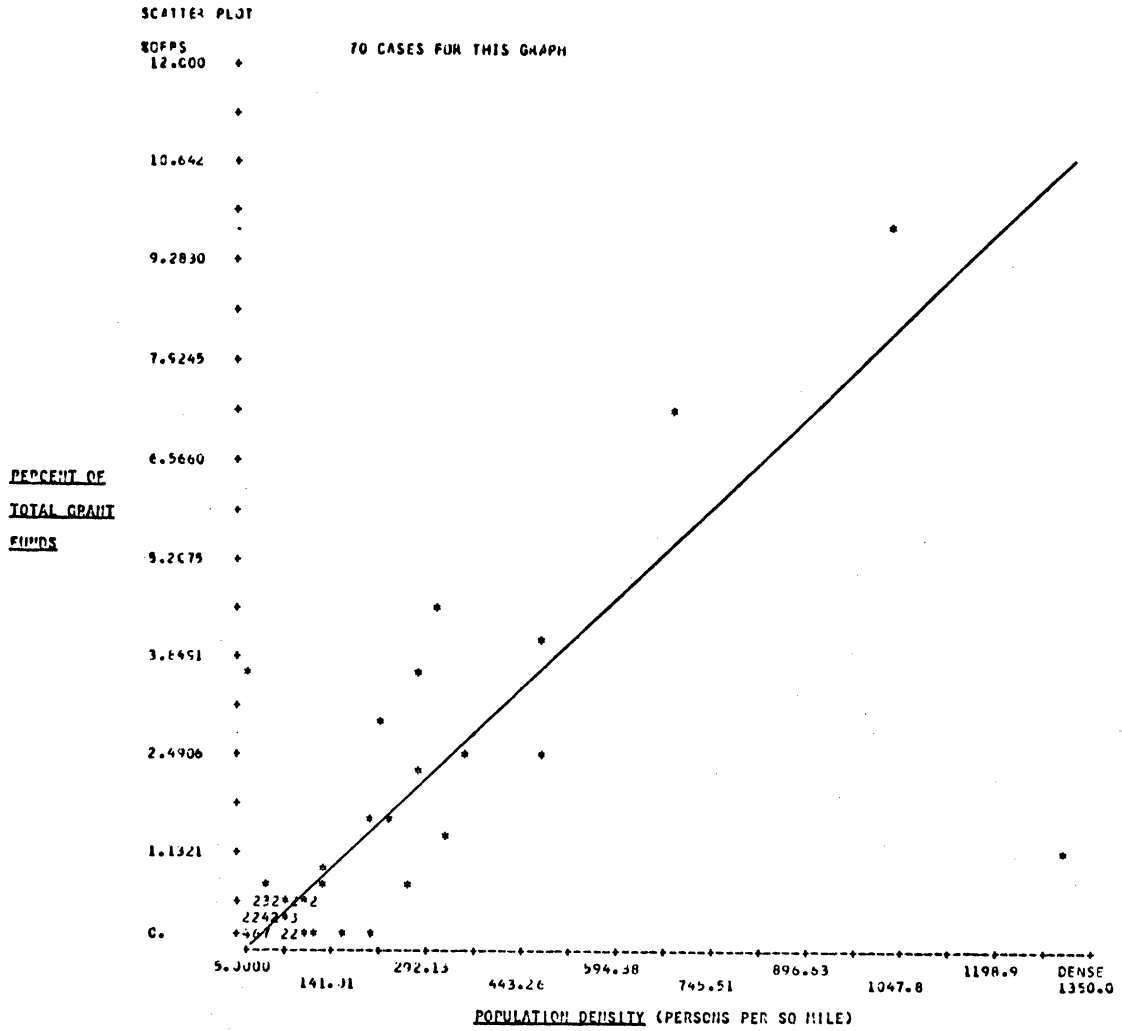


FIGURE 7 -- DISTRIBUTION OF GRANT FUNDS BY COUNTY
POPULATION DENSITY: BASIC STATE GRANTS

innovation reacted to? The remainder of this report attempts to deal with these questions by examining the environment in which innovation takes place, as well as four case studies in Bond Issue implementation.

PART II -- ENVIRONMENT FOR INNOVATION

The processes of innovation in water quality management take place within an environment defined by the dimensions of physical space, time, resource flows, demand, waste discharges, quality parameters, and institutional structure and process. In its ideal form, the policy process serves as a medium in which these factors are coalesced, mitigating conflicting resource demands, providing a policy output which maximizes expressed group satisfaction. In fact, the policy process is heavily influenced by the institutions which have arisen to maintain order within the process. Institutions are generated and molded by past, present, and future patterns of political structure and process. The past is reflected in historical accounts; the present in on-going programs; and the future in strategies and goals. Accordingly, Chapter Three presents a description of both federal and State roles and goals in relation to water quality as they evolved over time.

Institutions are also molded by the psychological and sociological rules and rewards which underlie their organizational and interorganizational structure. Chapter Four contains a presentation of the psychosociologic bases for individual and organization behavior as they relate to innovation and change.

Subject to historical and psychosociologic considerations, a set of State institutions has developed which is concerned with water quality management. It is largely through the

intra- and interaction of these agencies/groups/interests that innovation takes place. Thus, Chapter Five attempts to model these institutions, defining them in terms of their past actions, their roles and goals, their internal structure, and their place within the polity.

This section, then, attempts to delineate the environment in which innovation has taken place. It is hoped that the insights gleaned from this description will help to explain the degree of innovation expressed in the implementation of the 1968 Bond Issue (as displayed in Chapter Two).

CHAPTER THREE -- HISTORICAL BASES

"Life must be lived forwards, but can only be understood backwards"

-Kierkegaard

Interest in water quality management as a government role can be seen to have expanded in close parallel to that of national and State economic development. Population migrations caused by a rapidly expanding industrial sector resulted in an increasing aggregation into the dense nodal patterns of cities. In the late nineteenth century, the technology to treat the massive concentrations of human and industrial wastes resulting from these patterns was not available, nor was the potential water quality problem even vaguely perceived by the public or the government. The shift to the cities and to an industrial economy rapidly caused a deterioration in national water quality. Local and state programs developed slowly in response to the problem, resulting in an increased interest in an expanded role by the federal government. Water is a resource so vital to life, however, that its management was perceived as lying distinctly within the realm of local regulation. The programs which developed, then, have been concerned largely with the attainment of the national objectives of water quality, while maintaining the integrity of local institutions. Local units of government, however, have been restrained from working towards water quality objectives by the concurrent economic interests which contribute resources to their existence.

The prevailing interests in the second half of the nineteenth century were those of resource exploitation and commercial development. Michigan had grown up on the milk of the lumber industry and was beginning to exploit its copper and iron deposits. Rivers were used as avenues of commerce for the transportation of resource products to market. This pattern prevailed over the settled areas of the United States, and accordingly, the first pieces of federal legislation dealing with water quality were aimed at preventing obstructions to navigation. The power for the federal program came largely from its duties under the commerce clause of the Constitution. In 1886, an Act was passed prohibiting the dumping of refuse into New York Harbor.¹ In 1899, amendments to the Rivers and Harbors Act of 1890 were passed, giving the Secretary of the Army the power to regulate discharges of refuse matter other than liquid wastes flowing into the navigable waters of the U.S.² Both of these measures were intended to safeguard the economic activity of navigation.

Between 1890 and 1920, manufacturing increased enormously in Michigan, largely producing wood-related objects such as furniture. By 1904, the State had taken the lead in automobile production. By 1920, the population had grown to 3,668,412, an increase of approximately 75 percent over the State population in 1890. The shift into a manufacturing economy caused a resultant shift of population into the cities. In 1890, 65 percent of the State's population was living in

villages or farms with 35 percent located in towns of 2500 persons and over. In 1920, however, the pattern had reversed itself, with 61 percent in the towns and 39 percent in villages and farms.³

The demand which these population shifts placed on the waste-assimilative capacity of Michigan streams was in many cases overbearing. The deteriorating water conditions led to problems with municipal water supply. Concurrently, medical science gained understanding of the properties of water-borne communicable diseases. These two factors caused an increased State and federal interest in the public health aspects of water pollution. Local programs developed concerned with water supply, health, and sanitation. However, local agencies suffered from a lack of resources to invest in research and treatment programs and a lack of coordination. Localities essentially solved their own problems by withdrawing water upstream and discharging their wastes downstream. Obviously, the impact of these uncoordinated local programs on the resolution of the larger system's water quality problems was insignificant.

In 1912, the U.S. Public Health Service was authorized to investigate the health effects of pollution in the navigable lakes and streams.⁴ However, no power was granted of a corrective nature. The prime resource of concern at the time was that of municipal water supply. Public interest behind this concern was great and led to the voluntary adoption of nationwide standards for treatment of drinking water.

Building upon the federal initiative, the State passed a statute in 1913 "providing for the supervision and control by the State over waterworks systems".⁵ Power was vested in the State Health Commissioner giving him supervisory power over water supply systems. All proposed systems had to be reviewed and certified by the State Health Department. The type of regulation lay the foundation for the basic element of the State water quality management program, that of regulation of point source water and wastewater activities, with little regard as to the location or extent (in terms of interlocality coordination) of facilities. The continued emphasis of the State program, then, became the guarantee that water treatment facilities would meet a set of standards determined to be adequate to attain desired water quality goals.

As national concerns shifted, so did the initiating factors underlying water quality maintenance legislation. In the early 1920's, damage was occurring to the coastal shellfisheries from oil discharged by ships. Accordingly, the Federal Oil Pollution Act of 1924 was passed, prohibiting the dumping of oil. The major interest again was economic, protecting the fisheries, public beaches, and docks and harbors (from the hazard of oil-generated fire).

Throughout the later part of the 1920's, Michigan enjoyed a period of prosperity generated by the booming automobile industry and the newly-exploited oil industry. Concentration of population into the cities continued with

only 31.8 percent of the State population living in villages/farms in 1930.⁶ Industrialization and urbanization had caused widespread deterioration in State stream quality. The effect of water pollution on interests other than those of navigation and public health were increasingly becoming evident including those of fish and wildlife, and conservation.

Nurtured by the atmosphere of prosperity, concern with stream quality grew. In 1929, the State Legislature passed Public Act 245, creating the Stream Control Commission. The Commission was composed of the Director of the Agriculture Department, the Director of the Conservation Department, the State Health Commissioner, the State Highway Commissioner, and the Attorney General. Public membership on the Commission was not provided. Needless to say, the interests represented by the five member organizations were limited. The primary interests considered in the 1929 Act were public health and fish life as was seen in Section 6: "It shall be unlawful for any person to discharge...any waste or pollution of any kind that will tend to destroy fish life or be injurious to public health."⁷

The Act gave the Commission control over the surface waters of the State. Although it had the power to force polluting municipalities to take action, it appeared to function primarily as a problem-identification organization. Although the 1929 Act would appear to be significant (since it was the only piece of State legislation that was not directly prompted by federal legislation), it was hampered

by its own narrow definition of unlawful pollution discharges, as well as by the Commission's lack of effective enforcement power. Its significance appears even less when compared with other state's water quality efforts, since by 1930, most states had already vested regulatory authority in one or more state agencies.⁸ Thus, the Michigan effort in 1929 could hardly be called significant due both to its ineffectiveness as well as to the lateness with which it surfaced.

With the advent of the New Deal social programs following the Depression in the early 1930's, considerable interest was generated in water pollution control. The surges of wastes produced by the economic prosperity of the 1920's had resulted in widespread stream quality degradation. National employment-generating programs such as the Civilian Conservation Corps and the Works Progress Administration brought with them positive externalities to water quality. The first piece of federal legislation dealing extensively with water quality management was introduced in 1935. The legislation advocated an extensive program which would become the backbone of the later-passed federal program, including the development of a comprehensive plan for improving the condition of U.S. waters, as well as a series of grant-in-aid and loan programs for water improvement purposes. In 1939, President Roosevelt stressed the importance of developing a national program for pollution control composed of four major segments: research; education;

enforcement; and grants and loans.⁹

Between 1940 and 1945, the war occupied most of the country's attention. Michigan's industries, previously geared for automobile production, expanded heavily into the production of war materials. The acceleration of industrialization brought with it a drastic decrease in water quality. Building upon the expanded federal role brought on by the New Deal and the War, Congress passed the first true legislative act which dealt with water quality management in the form of the Water Pollution Control Act of 1948.¹⁰ The federal role was explicitly delineated as being secondary to that of the states. Its prime responsibility was that of bolstering local pollution control programs with technical services and funds. "Congress' expressed hope was that through federal assistance and support, the local programs might be stimulated to handle effectively the nation's water quality problems".¹¹ Indeed, throughout the history of the federal and State water management programs, the pattern became one of federal stimulus, State response. In the State of Michigan, perhaps the primary reason that a State water quality program developed was to capture the benefits which were offered by federal support.

The 1948 Act provided for: 1) loan funds to localities for construction of wastewater treatment works; 2) grants to state and interstate agencies for research; and 3) limited federal enforcement powers. In order to receive a loan for

construction of wastewater treatment works, the locality needed the approval of the Surgeon General of the United States as well as the appropriate state pollution control agency. The enforcement procedure provided in the 1948 Act was so cumbersome as to prove ineffective. In essence, the Congress had wanted to guarantee to the states the primary responsibility for enforcement. The Act stated that any interstate pollution endangering the health or welfare of persons in a state other than where the pollution originated was considered a nuisance and subject to abatement. However, the enforcement procedure required that the state which housed the polluter must request the investigation as well as consent to a federal suit against the polluter should that action be necessary. The procedure was long and arduous including two sets of formal notices and a public hearing. Nevertheless, in spite of the Act's shortcomings, it was the first official recognition of the need for federal involvement in water quality regulation.

The requirements contained within the 1948 Act for "approval by appropriate State water pollution control agency" necessitated a change in water management institutions in the State of Michigan. Two major legislative acts were enacted at the State level to respond to the federal initiative. Act 219, P.A. 1949 was passed,¹² extending the State Health Commissioner's role to that of supervision and certification of sewage treatment plants. Thus, the role of the State Health Department in approving and licensing

sewage treatment plants was established. The Commissioner's power, however, did not extend to industrial or commercial establishments.

The second legislative act¹³ abolished the Stream Control Commission and replaced it with a Water Resources Commission (WRC). The membership of the Commission was expanded to include three citizens appointed by the Governor in order to add the "public point of view".¹⁴ The citizen members were to represent industrial, municipal, and conservation interests. The authority of the Commission was expanded to include control over surface and subsurface waters of the State. The interests to be protected by the WRC were expanded from the 1929 Act. The definition of pollution was revised:

"Sec. 6. It shall be unlawful for any person to discharge...any substance which is injurious to the public health or to the conducting of any industrial enterprise or other lawful occupation; or whereby any fish or migratory bird life or any wild animal or aquatic life may be destroyed or the growth or propagation thereof be prevented or injuriously affected or the value of lawfully taken fish or game be destroyed or impaired as the consequence of said pollution."

Thus the water quality interests in the State were expanding significantly beyond the initial concerns of a health-related nature.

Prior to 1968, the WRC primarily met its responsibility of protecting State water resources by determining which local agencies were unlawfully discharging, and issuing orders to these units to cease their unlawful activities. In 1967 and 1968, water quality standards were adopted for Michigan

inter- and intra-State waters respectively. Between 1949 and 1968, then, the WRC viewed each case independently to determine what standard of waste discharge was unacceptable in various river segments. The project-by-project nature in which the enforcement program was undertaken can not be regarded as the comprehensive State-controlled program which the federal legislation had intended to stimulate. Indeed, State needs and goals in relation for water pollution control were not outlined until a study was undertaken in 1966 by the Joint Legislative Committee on Water Resources Planning.¹⁵

In addition to the Acts affecting the Health Department and creating the WRC, Act 222, P.A. 1949¹⁶ was also passed in response to the federal legislation. This Act authorized localities to accept grants and loans from the U.S. government for the purpose of prevention and abatement of water pollution. The federal aid program, however, never got fully off the ground. No appropriations were made for 1949, and in the period of 1950 to 1952, only 9.4 million dollars were appropriated of the authorized 83.4 million dollars. This perhaps gave the states and localities a taste of the future as restricted federal appropriations continued to hamper the success of the pollution control program. In 1953, the 1948 federal Act expired and was extended to June 30, 1956.

In 1956, the 1948 Water Pollution Control Act was replaced by legislation which provided for a more intensive and well organized federal pollution abatement program.¹⁷ However, the Declaration of Policy (Section 1) reaffirmed the principle

of a secondary federal role. Yet the magnitude and variety of assistance and the stiffening of federal pollution abatement powers indicated an expanding federal role. The 1956 Act differed from the 1948 legislation in four major areas: 1) it strengthened the research and training aspects of the federal program; 2) it provided a new plan for grant-in-aids to assist state and interstate agencies in their pollution control programs; 3) it replaced the wastewater treatment works construction loan program with a grant program, providing for a maximum grant of 30 percent of project cost. The main thrust of the program was aimed at providing financial assistance to small municipalities; and 4) a more complicated enforcement scheme was adopted, including a conference stage between the discovery of pollution and the public hearing. The primary purpose of the procedure was to alert local control authorities to the alleged pollution and offer them the first chance at corrective action. The procedure was made slightly more viable by removing the consent of the polluting state clause and inserting the consent of the polluting or damaged state.

In response to this federal legislation, the State Legislature passed Act 13, P.A. 1956, which authorized the WRC to take all actions necessary to comply with the federal legislation. Specifically, it appropriated the federal funds to be received by the State to the WRC.

Section 6(b)(4) of the 1956 federal Act provided that "no (wastewater treatment works construction) grant shall be

made for any project under this section unless such project is in conformity with the state water pollution control plan...".¹⁸ Indeed, Section 5 of the federal Act provides that payments to the state can be stopped if there is a failure to comply or a major deviation from the state plan. However, Davies states that "state plans for water pollution control are more fiction than reality...within many states political pressures are more important than planning in determining which localities receive priority for the grants".^{19,20} In the State of Michigan, it is hard to determine what might have constituted such a state plan. As was mentioned earlier, a study of needs and goals was not conducted until 1966. As will be articulated below, priority lists for funding projects were established under a 1966 State Act.²¹ These lists established the order in which treatment works projects would be given grant funds in order to work towards some goal of desired water quality. What goals guided the construction of these lists? The 1966 Act stated simply that "the basis for eligibility for and payment of state grants shall be the same as for federal grants..."²² The basis for eligibility for federal grants, however, was that the project conformed with the state plan.

The only other semblance of a state plan would be the water quality standards and use designation areas adopted in 1967 and 1968. However, these standards were constructed in response to the federal requirement in the 1965 Water Quality Act, not in an effort to establish a state plan.

This indicates that funds disbursed through the WRC between 1956 and 1966 were allocated in violation of the federal requirements. This interpretation, of course, depends on what constitutes a state plan.

In the 1950's, changes were made in the authority granted to a majority of state water pollution control agencies. The direct impetus for these changes came largely from the "Suggested State Water Pollution Control Act" published by the U.S. Public Health Service.

In the late 1950's, considerable federal interest arose in eliminating the federal construction grant program. This was largely due to the report of the Joint-Federal-State Action Committee which recommended that the financing of public waste treatment facilities was a matter of local concern that should be left to the states and localities.²³ However, this movement was defeated with the change of administration in 1961. "Kennedy came into office sharing the dominant Democratic view that financial assistance for waste treatment plant construction was an important and necessary function of the federal government".²⁴

Between 1950 and 1960, the population of the State of Michigan increased by almost a million and a half persons. The post-war baby boom was evident not only in growing population numbers but also in increased urbanization and industrialization and heightened economic growth. The relative prosperity that prevailed in the early 1960's and the increasingly dominant federal role played by the Kennedy/

Johnson administrations launched a major national water pollution program outlined by four major federal legislative acts of the 1960's.

Two 1961 studies, one prepared by the National Conference on Water Pollution²⁵ and one by the Senate Select Committee on National Water Resources, highlighted the importance of an active federal water quality role. These studies helped to provide the impetus for the enactment of the Federal Water Pollution Control Act Amendments of 1961.²⁶ This Act made several changes in the 1956 legislation: 1) it changed the administrative responsibility from the Surgeon General to the Secretary of Health, Education, and Welfare; 2) it intensified research activities; 3) it raised program grant authorizations; 4) it raised ceilings on and authorizations for construction grants; and 5) it expanded the pollution situations subject to abatement to include those occurring in "navigable or interstate waters in or adjacent to any state or states". Thus, the federal government was invading a previously inviolate area of state authority, that over totally intrastate waters.

"In the early 1960's, Congress was still discontented with the pace of pollution control. It was felt that the states were not doing an adequate job, and that the Public Health Service, the federal agency responsible for administering the Water Pollution Control Act, was unwilling or unable to push them into taking more action."²⁷

This discontent was translated into legislative action by the Water Quality Act of 1965.²⁸ The 1965 Act was the strongest statement of a more dominant federal role yet. This was

evidenced by the change in Section 1(a), Declaration of Policy. Previously, this section stated clearly that the federal role would be secondary to that of the states. The 1965 Act, however, eliminated this language completely, and substituted a statement establishing a national water quality policy:

"(a) The purpose of this Act is to enhance the quality and value of our water resources and to establish a national policy for the prevention, control, and abatement of water pollution."²⁹

This shift in federal policy was highly significant in light of what has been presented above. A dominant federal role in water quality management was not desired and was greatly resisted by the Congress. The restrictions which Congress placed on the federal role were entirely self-imposed. The constitutional power provided to the federal government was adequate to justify an expanded federal role. Yet increased federal programs were resisted because of the prevailing sentiment that water is a local commodity. The hearings preceding each federal legislative act reiterated time and time again the lack of desire by Congress to enter dominantly into water quality regulation. The point is that the continued reluctance of the states to take control over their own water quality problems forced the federal government to take an increasingly dominant role.

The avenue of change was carved largely by an increasingly informed and aroused populace. The institutions which had been created to process change and create order within the system had failed on the state level to meet current public

needs. The economic and political pressures which state and local policy makers are subject to are understandably enormous. Yet Hines makes the point that "as public awareness of the seriousness of the pollution problem increases, the ability of special interest groups to sidetrack reform efforts decreases markedly".³⁰ In the 1960's, positive education programs were undertaken to inform the public of the pollution problem. The relative economic prosperity of the time allowed the growth of public activism in the water quality area. The inadequacy of most state programs caused a great deal of this public energy to be transformed into pressure on the federal level. It was through the vector of public pressure at the federal level, as a result of the inaccessibility or inadequacy of state change agents, that change did come about.

The 1965 federal legislation made the following major alterations to the Act which had evolved: 1) it transferred administrative responsibility to a newly-created Federal Water Pollution Control Administration within the Department of Health, Education, and Welfare; 2) it raised the ceiling on and authorizations for construction grants; 3) it provided an incentive of an additional 10 percent grant if a project conformed with a "regional plan"; and 4) it created a timetable for state creation of water quality standards for interstate waters. If the states failed to establish standards, the Secretary was authorized to formulate standards himself/herself.

Following the enactment of the 1965 federal bill, the State of Michigan amended the Water Resources Act³¹ to broaden the definition of unlawful pollution again reflecting the changing interests of the State:

"Sec. 6 (a) It shall be unlawful for any person directly or indirectly to discharge into the water of the state any substance which is or may become injurious to the public health, safety or welfare; or which is or may become injurious to domestic, commercial, industrial, agricultural, recreational or other uses which are being or may be made of such waters; or which is or may become injurious to the value or utility of riparian lands; or which is or may become injurious to livestock, wild animals, birds, fish, aquatic life or plants or the growth or propagation thereof be prevented or injuriously affected; or whereby the value of fish and game is or may be destroyed or impaired."

This change is significant when the narrowly defined interests of the first legislation, i.e., navigation and public health, are remembered.

In 1966, the State adopted two pieces of legislation which constituted the first State actions to provide incentives to local agencies to construct pollution abatement projects. This action was largely taken in response to the federal construction grant programs which had evolved. Act 329, P.A. 1966³² provided State grants for sewage treatment facilities. The program provided that no project would receive a total federal and State grant of more than 30 percent of project cost. The Act allowed a higher percentage if federal legislation would authorize it. This built-in modifiability was undoubtedly constructed to take advantage of the increased grant percentages provided in the 1966 federal legislation which was passed several months later.

Indeed, it is possible that the primary motive behind Act 329 was to capture the additional federal funds which became available if the State had such grant programs.

The second piece of State legislation to be enacted in 1966 was Act 222, P.A. 1966.³³ This Act provided the incentive of exemption of water pollution control facilities from certain taxes. The law provided for certification by the WRC of facilities which would qualify as bona fide water pollution control facilities.

The 1966 Clean Water Restoration Act built upon the 1965 legislation and was further evidence of the increasing federal role. The major provisions of the bill had the effect of: 1) increasing construction grant authorizations while removing the grant ceiling limit; 2) providing incentives to the states to adopt water quality standards³⁴ as well as programs to provide matching state grants. The legislation allowed a maximum federal grant of 55 percent of project cost if the state agreed to pay at least a 25 percent matching grant and if water quality standards had been established "for the waters into which the project discharges, in accordance with (the 1965 standard-setting requirements) in the case of interstate waters, and under state law in the case of intrastate waters"³⁵; 3) providing for federal reimbursement for construction projects begun at a time when federal funds were not sufficient. This paved the way for state prefinancing of the federal grant share which was used extensively in the Michigan construction grant program;

and 4) raising research and program grant authorizations.

In 1965, the Michigan State Legislature created a Joint Committee on Water Resources Planning to study water-related problems of the State. The Committee published its report of needs for water pollution control works in December, 1966. The Committee's report was significant in that it was the first effort at delineation of needs to be undertaken by the State. Further, in its considerations, the Committee assumed that secondary biological treatment would be sufficient to handle the State's water quality problems.³⁶ This assumption was highly significant in that the true policy of the State became that of upgrading treatment plants to the equivalent of secondary treatment without regard to alternate methods of treatment (which could conceivably better resolve the problems).

As seen above, the federal program which had evolved up to 1967 required state adoption of interstate water quality standards by June 30, 1967, and encouraged state grant programs and the adoption of intrastate water quality standards. Not surprisingly, the State of Michigan passed Act 329, P.A. 1966 to capture the additional federal funds. In response to the Section 10 amendment to the Federal Water Pollution Control Act threatening federal action if the states did not adopt interstate water quality standards, the State adopted such standards.³⁷ The WRC formally adopted the standards on June 28, 1967, only two days before the June 30 federal deadline. The guidelines for such standards set by the federal legislation were few, but they did require

that states take into consideration the use and value of the waterways for public water supplies, propagation of fish and wildlife, recreational purposes, and agricultural and industrial uses.³⁸ Not surprisingly, the State considered the water uses of water supplies, fish and wildlife, recreation, agriculture, and commercial.

Similar standards were adopted for intrastate waters on January 4, 1968. It should be reiterated that this action allowed the full capture of 55 percent federal grant funds as provided under the 1966 legislation.

The image which emerges from the preceding chronology is that of a State government which was strongly reluctant to take over the responsibilities of an active state water pollution control program. The federal government, consistently hesitant to take a dominant role in water quality management, appears to have been forced into such a role as a result of the public pressures generated by the impotence of state control programs. Actions which were undertaken by the State government were initiated only in response to federal stimuli. An exceptional lack of initiative was expressed by the State policy makers throughout enacted programs. A persistent theme which state officials reiterated time and time again in hearings conducted on the federal legislation was "give us money and technical assistance but leave us otherwise alone". Up until 1965, the federal government was willing and desired to function in a subdued role.

It was into this environment that the 1968 Michigan Clean Water Bond Issue was born. The actions of the past precondition the behavior of the future. There is every reason to believe that the historic role of the State helped to mold the implementation of the Bond Issue. It seems fairly clear from Part I of this report that the same characteristics of low initiative and resistance to change were evident in the implementation stage. Institutions of political power within the State guided the Bond Issue's implementation. If the characteristics expressed above were seen in the patterns of fund allocation, it was due to factors within and between these institutions. The character of an institution is molded by the behavior of individuals within the institution, as well as by that of the organization as a distinct entity itself. Accordingly, the following chapter attempts to describe personal and organizational behavior characteristics as they relate to innovation and change.

CHAPTER FOUR -- PSYCHOSOCIOLOGIC BASES

"...all experience hath shewn that mankind are more disposed to suffer while evils are sufferable, than to right themselves by abolishing the forms to which they are accustomed"

-U.S. Declaration of Independence

Innovation is sought and utilized by an organism (defined as an individual or an organization) in an effort to enable it to better cope with the surrounding environment. The adoption of an innovation may enable a company to attain competitive superiority in terms of production costs or product desirability. It may also enable a person or organization to more effectively attain a goal or resolve a perceived problem or discrepancy in the surrounding environment. For example, the attainment of water quality goals may only be possible if innovative wastewater treatment methods are adopted.

However, innovation implies novelty, and novelty implies risk:

"The vast majority of biological mutations are said to be harmful. When as in human affairs, enormous numbers of random possibilities are eliminated by rational choice, the chances of harm rather than good resulting are reduced, not eliminated. The harm consists in both cases in making the individual or organization less fit to survive in its environment than was its predecessor. Very often, the environment of the person or organization is itself changing, so that even to maintain the same degree of fitness for survival, people and institutions may have to change their ways. So the risks attendant upon change may have to be weighed against other risks arising from maintaining the same state of affairs".¹

Thus, innovation is adopted to enable the organism to more ably survive an existing environment or to cope with a

changing environment.

DeFleur et al² identified four major factors in the surrounding environment that stimulate change: 1) The Physical Environment - for example, the diminishing resource quality of Michigan streams caused a problem state which necessitated changes in the long term practice of waste disposal by dispersion through discharge into receiving waters of partially treated wastes; 2) Population Growth - for example, the crowded conditions of cities has caused a behavior modification of reduced stimulus response in order to cope with sensory overstimulation; 3) Ideology - for example, the increased number of federal water pollution control programs in the 1960's was the result of the increased acceptance of the idea that a dominant federal role was consistent with the goals of the people; and 4) Leadership - for example, the change in waste treatment policy effected in the Muskegon County Case (Chapter Seven) was largely due to the influence of a single individual.

Changes in the external or internal environments, then, become the stimuli which create problem states. If the change in the environment is exactly in the direction of an organism's desired goal state, little or no behavior re-adjustment is necessary to maintain an equilibrium state with the environment. Most changes, however, affect the path of goal attainment and thus necessitate shifts in behavior direction. Indeed, even if the environmental change is favorable to an organism, it may need to alter

its behavior in order to fully capture the available benefits of the change.

Most environmental shifts, then, cause a further displacement (or a displacement in a different direction) between the present system state and the desired future state. Thus, tension (the difference between the present state of the system and its goal for the future) results. Bulkley³ states that "tension is the driving force in all complex adaptive systems". In the problem-solving model of an organism reproduced in Figure 8,⁴ tension or discrepancy, triggered by an environmental stimulus, forms the driving force behind the model.

When presented with a problem state, the model illustrates that an organism goes through a long series of steps in order to approach its resolution. This procedure requires the expenditure of energy and time. As the number of problem states requiring mastery increases, the channelization of behavior is necessary in order to continue operation:

"(An organism) cannot be continuously expending his energies and undergoing crises in making decisions. Judgements once made must serve as guiding precedents. A large part of his behavior of necessity becomes quasi-automatic involving little deliberation or judgement".⁵

Thus, an organism tends to develop attitudes which enable him to cope with repeatedly-encountered stimuli:

"As man in his finite world is repeatedly forced to cope with the same object, the repeatedly evoked cognitions, feelings, and response dispositions become organized into a united and enduring system -- for man is an organizing and conserving animal. This entire 'package' of particular beliefs, feelings, and response tendencies is henceforth

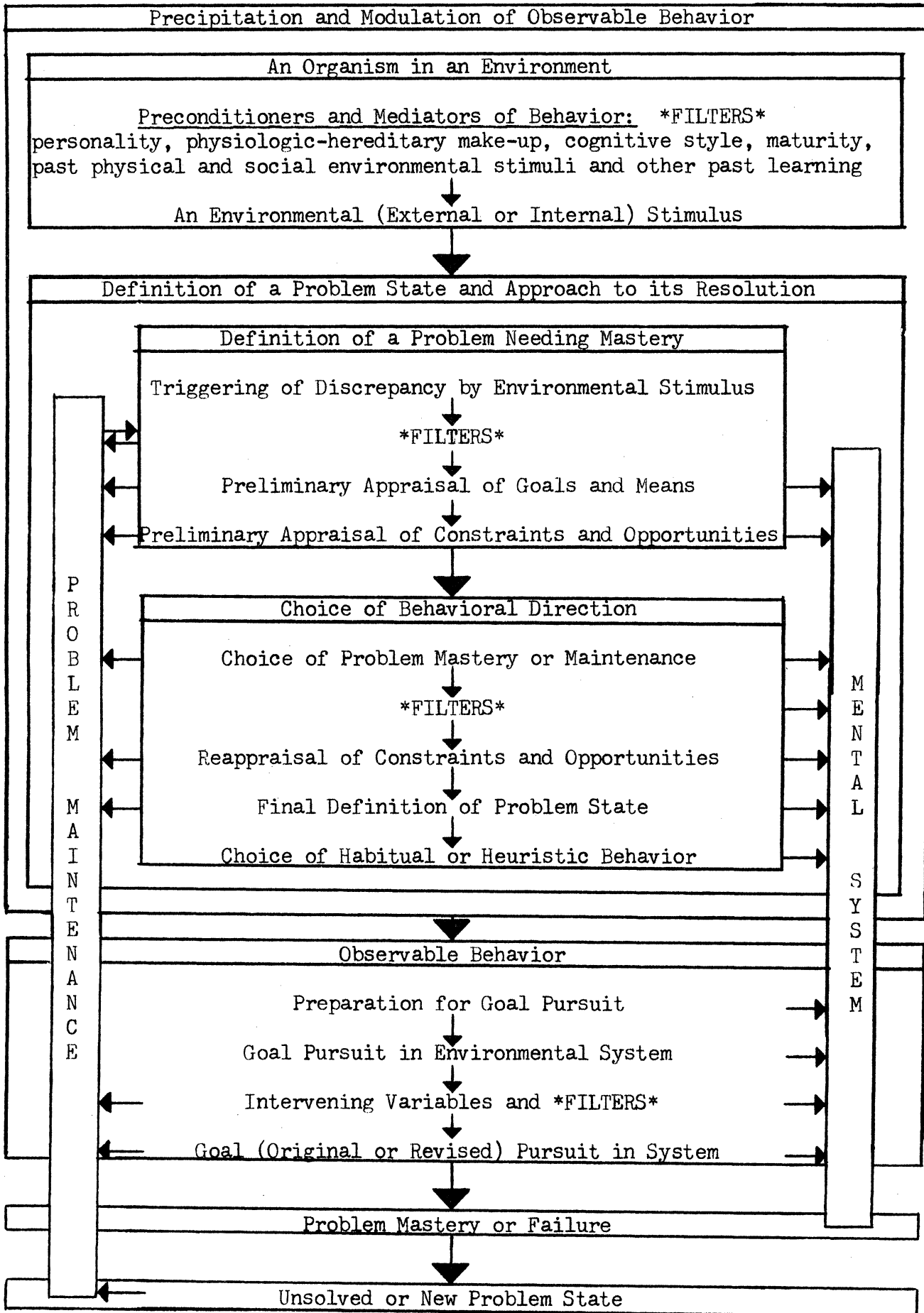


FIGURE 8 -- PROBLEM SOLVING MODEL OF AN ORGANISM

always there, on the ready, whenever the individual is confronted by the appropriate object".⁶

Attitudes become conditioned responses which become habits. Habitual behavior offers social stability as well as energy conservation in that predictability and consistency become possible. Stern suggests that "an organism's personality becomes relatively at ease when it has attained an element of equilibrium with the objects and persons with whom he comes in contact". Indeed, he goes on to state that "personality becomes bound up with environment by sentiments of intimacy. ...There is an emotional and aesthetic feeling of happiness derived from identification with the customary forms when these forms provide a minimum of gratification of human wants".⁷

An innovation shatters the equilibrium which an individual has attained. It requires behavior reconditioning and personality reorganization to meet the needs of the new situation. New demands are placed on the organism; new decisions are required. The complexity of life increases as the change creates a need for nonpatterned behavior. Thus, a curious situation has developed in which the evolution of decision and behavior patterning was necessary in order to cope with increased environmental stimuli, while the innovations necessary to resolve the increased environmental tension became threatening to the stability which had evolved.

The perpetuation of existent society is dependent upon the transmittal of values and behavior patterns from one

generation to the next. The socialization process, thus, more deeply entrenches past programming, making the threat value of innovation even more intense:

"It seems that society conspires to prevent and retard social change, especially in the realm of attitudes and ideas. This conspiracy is the natural result of our socialized form of living. Parents teach their children, by example as well as by instruction, the customs, habits, and attitudes which they themselves possess. As the child progresses in school, he learns the morals, the skills, and the folkways of his society from teachers who likewise transmit the common or typical norm of behavior. As an adult he may be freed from the restrictions of formal instruction only to find himself the victim of strong motivation to conform to the behavior of his social colleagues. This is the process of transmission of culture which gives historical unity and stability to our society".⁸

Education, then, is the medium through which habit and behavior patterns are transferred. Stern states that "education in the United States appears to do little to facilitate or promote receptivity to technological innovation and is rather occupied with the organization and perpetuation of past experience and tradition".⁹ Thus, an inherent psychological resistance to change has developed to foster social stability and energy conservation. This pattern of resistance is effectively transmitted over time by socialization and education processes.

As the individual progresses further away from his ties with parents and teachers, the influence of group behavior plays a larger role in his own behavior patterns. Individuals aggregate into groups largely for the attainment of common goals, joint attainment of separate goals, or for the social

interaction itself.¹⁰ Group norms and goals develop in much the same way as individual values and attitudes (as described above). Roles are maintained and reinforced within the group and give it a sense of order and predictability. Innovations are disruptive in that they affect members of the group which influence the behavior of all of whom they come in contact. "There is in consequence group resentment against innovators because they disturb established regulations, upset routines, and cause temporary confusion".¹¹ Social pressure, in the form of criticism, ridicule, economic discrimination, social ostracism, and violence is placed upon the innovator to suppress his socially-deviant behavior.

In order to avoid such pressures, most persons refrain from supporting changes which might threaten or alter group norms, attitudes, or behavior. A prime factor in determining the power of coercion which a group maintains lies in its size and in its degree of dispersion. Thus, a large group will often be less cohesive and will enable innovators to find support in its community. As group size decreases, however, peer pressure and other forms of group influence are more direct, thus restraining the conception of change.

The adoption of an innovation is largely a function of the two variables of demand and resistance.¹² Group pressures which limit the conception of change not only provide resistance to innovation, but also effectively disrupt the process by limiting social demand. Thus, an innovation might meet with restricted success due to ignorance or to erroneous information about its nature. For example,

the tomato was thought to be poisonous for a considerable period of time. Erroneous ideas may be perpetuated through group prejudices for which adoption pressures are usually highly intense. Thus, group inertia is a potent force which is extremely difficult to counteract.

Bureaucracy is the system of organization, administration, discipline, and control which arose to replace the feudal system.¹³ The structure which prevailed combines the hierarchical role relationships of the feudal system with the goal and reward systems of group behavior. It is no wonder, then, that bureaucracy exhibits many of the same attributes of resistance to change and desire for predictability that were seen in individual and group behavior. The problem lies in the fact that bureaucratic institutions have been generated to guide the system in its goal formulation and attainment-seeking activities. If change in social action is required in order to cope with an environment that is changing more rapidly over time,¹⁴ as Chapter One seems to indicate, then an inherent resistance to innovation in social institutions is counterproductive and will cause an increasing level of tension within the system. Indeed, the Manager of the Detroit Metropolitan Water Department's 1968 statement that "the average man changes before the institutions that govern him change"¹⁵ indicates that not only does government not promote the innovation necessary to resolve society's problems, but it exhibits an acceptance time lag greater than that of the individual.

The factors which cause this bureaucratic resistance to change are connected largely with bureaucracy's internal structure, rules, and roles, as well as with its external relationships, constructed for mutually-rewarding purposes. Large bureaucratic organizations exhibit to some degree a stereotype described by Max Weber as a monocratic organization.¹⁶ The stereotype describes the organization as a great hierarchy of superior-subordinate relations in which the individual at the top is omnipotent, giving the orders which initiate all activity. Orders are passed downward through successive chains of command. Roles are narrowly defined in terms of duties or jurisdiction and minimize overlap, thus increasing predictability and accountability. Responsibility increases vertically.

In practice, the bureaucratic agency-framework consists of two primary units: the politically-appointed leadership and the career bureaucrats and experts. The latter group works as an ensconced group of specialists while the former attempts to maintain agency status and influence, while coordinating agency direction with that of the chief executive officer. Thus, two relatively distinct groups of individuals are juxtaposed within a bureaucratic agency. The political leadership of the agency represents the accountable parties for agency action. They comprise the uppermost echelons of agency personnel. In order to be efficient and to insure desired direction, appointed personnel must be able to mobilize support from the career

personnel in their agency. If they fail at this, then their mission will fail. At the same time, while they want to maximize vertical intra-agency communication, they also want to minimize lower echelon, horizontal communication flows. This is done largely through narrow role definition. In this way, political bureaucrats are able to maintain control over the agency while presenting a united and "desired" picture to extra-agency parties. This in effect guarantees their own survival.

In the stereotype, since the top leadership comprise the only true source of legitimacy, conflict cannot be legitimate.

"The inability to legitimize conflict depresses creativity. Conflict generates problems and uncertainties and diffuses ideas. Conflict implies pluralism and forces coping and search for solutions, whereas concentrated authority can simply ignore obstacles and objections. Conflict, therefore, encourages innovations. Other things being equal, the less bureaucratized (monocratic) the organization, the more conflict and uncertainty and the more innovation".¹⁷

Thus, Thompson points to the factor of conflict as being a driving force behind innovation. This is related to the idea that conflict not only drives the policy process, but underlies the degree of effectiveness and efficiency which it represents.

The desire for control, predictability, and conservation of resources has led to an increased programming of more and more activities within the organization. Thompson states that "if a person's activities are even partially unprogrammed, he is partially out of organization control

and under self-control".¹⁸ Thus, role programming leads to a minimization of conflict and a maximization of control. Activity programming not only yields predictability but it allows for a conservation of resources as well. Thus, agencies attempt to classify actions into what Simon¹⁹ calls programmed decisions. These are routine, repetitive decisions with a high degree of predictability of outcome. Non-programmed decisions constitute the other end of the spectrum, being unique, heuristic, and low certainty situations. Because of their fear of such situations as well as the inherent political volatility of non-programmed decisions, agencies often shirk the responsibility of dealing with these types of problems and will attempt their resolution by allowing them to filter through existing mechanisms to handle programmed decisions. In this manner, major policy decisions are put off or submerged. If a site-specific water quality problem exists, it is much easier to automatically approve a conventional activated sludge wastewater treatment facility, than to deal with the uncertainty that results from the adoption of an innovative, alternate form of treatment, even if the alternate treatment method is more effective or less costly in the long run.

The monocratic stereotype yields centralized control over agency resources. It controls through extrinsic rewards such as money, power, and status. Intrinsic rewards (such as "joy in work") would admit interests other than those of the organization, and thus some control would be lost over agency members. Reliance upon such extrinsic rewards forces

the organization to make its hierarchical positions rewards for compliance. Thus, the potential for advancement in terms of status, money or power becomes the primary incentive for individual compliance.

The hierarchical advancement scheme and the top-down chains of authority encourage the perpetuation of the same management practices and norms. The specialist is brought onboard in a low level position to perform a specific job which presumably requires his pre-entry training skills. Yet to "succeed", he finds that he must give up work for which he is trained, and enter management -- work for which he has no training.²⁰ Thus, as an individual rises in the bureaucratic hierarchy, his technological training becomes outdated and obsolete, his dependence on the organization becomes greater. Innovative technology presents not only uncertainty, but also a personal threat to the manager who is unfamiliar with the current processes. Since policy flows from top down, it is understandable why innovative wastewater treatment processes are resisted. In essence, they constitute a threat to the survival of the people at the top.

The goal of bureaucracy increasingly becomes one of survival. The reward systems become geared to this function. Thus, the normal feedback processes which would insure direction toward, for example, a water quality goal, become perverted towards the redefined goal. "One of the most widespread mechanisms of changing behavior involves the threat of punishment, or frustration".²¹ Yet if an agency is

achieving its survival goal at the expense of its legislative goal, it is succeeding. Frustration from a nonrealization of mandated goals does not result, thus corrective feedback is not placed upon the agency's behavior. As the bureaucracy ages, idea stagnation increases; emergence of survival as a primary goal activity intensifies. Thus a lag between social needs and agency action results. The time lag between proven working model and adoptive maturity has indeed been considerable. Ogburn estimated that the time lag for important technological inventions has averaged some thirty-five to fifty years.²² The impact of this lag on the attainment of social goals in light of a rapidly changing environment is highly significant. If innovations necessary to achieve goals are delayed by resistance, social problems will worsen, goal attainment, i.e., "the light at the end of the tunnel", will be pushed further and further off.

A National Academy of Sciences report²³ identifies two primary approaches used by regulatory agencies in restricting change. The first approach places on the innovator the burden of proof that the new technology will be harmless. This is of course necessary and desirable. However, a problem arises in that the approach creates a presumption in favor of the status quo. There is no adequate degree of testing which will provide 100 percent assurance that an innovation is completely safe. "There may well be

a bureaucratic tendency...to demand ever greater numbers of tests and demonstrations of safety. After all, the agency will never be faulted for suppressing a technology which might be beneficial, but it will be blasted if it ever permits a dangerous innovation to get by."²⁴ The alternative approach is seen in an agency charged with the promotion of a specific technology, while at the same time maintaining responsibilities for assuring that the technology is free from adverse externalities.²⁵ This amounts to a built-in conflict of interest, and clouds the agency's ability for technology assessment.

The second major factor which yields an inherent bureaucratic resistance to change lies in the external relationships which are constructed with interest groups:

"A first and fundamental source of power for administrative agencies in American society is their ability to attract outside support...The lack of such support severely circumscribes the ability of an agency to achieve its goals, and may even threaten its survival as an organization".²⁶

Agencies and interest groups bind together through mutually-rewarding relationships. They cultivate these relationships by exchanging support for the objectives of each other. Ties are necessary to insure long-term survival of the organization. Therefore, agencies ally with those groups that they regulate or serve. Although an alternate source of power could perhaps be obtained via creating a generally favorable attitude towards the agency in the public at large, the predictability of support from such a source is low,

thus forcing agencies to seek power from more homogeneous and predictable constituency groups.

The groups from which a bureaucratic agency can receive the most support are those with the most power. Power is derived from a group's resource base in terms of money, expertise, and influence. Money, a resource which can buy expertise and influence, comes from productivity (in a material or a nonmaterial sense). High levels of productivity accrue to those groups whose outputs are currently in highest demand. The status quo situation is the condition that is demanded by the most powerful groups. Thus, powerful groups have a vested interest in a state of non-change. Since bureaucracy allies with these groups, it also adopts the goals of status quo maintenance. Thus, "a particularly potent obstacle to change is the opposition to innovation by strong, organized groups that stand to lose by the change".²⁷

From the preceding discussion of psychological, social and organizational behavior, it appears that there is little to stimulate the adoption of innovation. Indeed, there appears to be an inherent desire for maintenance of the status quo, and for the resistance of actions which involve uncertainty and nonprogrammed decision-making. The prime factor which encourages innovation in the industrial sector, that of economic advantage, is not prevalent in the governmental bureaucracy. The result is the continuance of governing institutions whose actions lag behind the interests of society. Since an agency is rarely

"put out of business" as a result of being behind the times, these patterns prevail, making the resolution of social problems artificially more difficult.

The interplay between institutions generates policy. Institutions are molded by past roles and performance, and by individual and group behavior. Subject to the conditions described in this chapter and those of the preceding one, a set of State institutions has developed which generate State water quality management policy. Accordingly, Chapter Five outlines these groups.

CHAPTER FIVE -- INSTITUTIONAL BASES

"I think that some have been quite correct in saying that water pollution is one part water and one part politics"

-Stewart Udall

An institution is defined as a significant and persistent element in the life of a culture that centers on a fundamental human need and occupies an enduring social position.¹ Institutions are in effect ritualized habit patterns which have meaning beyond that of a personality or an organizational structure. They have been created to maintain social order, generating predictability, thus conserving social energy. However, since one goal of an institution is to maintain order, there is a latent predisposition to the order of status quo, and thus an inherent resistance to change.

The political process is the social institution which has arisen to mitigate the conflicting and competing demands which groups place upon scarce resources. The political arena acts to allocate limited resources to present and future users.

The 1968 Michigan Clean Water Bond Issue represented a resource of considerable magnitude. The Bond Issue was proposed to aid the State in reaching its 1980 pollution control goals. For reasons developed in the first chapter of this report, innovative allocations of the limited Bond Issue funds were critical to the attainment of its water quality goals. Yet Chapter Two illustrated that little innovation was funded. To explain this, historical,

psychological, sociological, and organizational factors which resist change were cited. However, the implementation of the Bond Issue took place within an environment that was also defined by the agencies and groups from whose interaction allocation decisions were made. This chapter attempts to describe these political actors, and how they related to innovative implementation.

It should be noted that the analysis which follows reflects the institutional arrangement which guided the implementation of the Bond Issue from its conception in 1968, to the beginning of 1973. By Executive Order in January of 1973, Michigan Governor William Milliken reorganized environmental functions within the State Department of Natural Resources.² In addition, the Federal Water Pollution Control Act Amendments of 1972 were enacted in late 1972, and took effect in early 1973. These two actions will have significant effect upon water quality management in Michigan, and will be discussed briefly in the closing chapter of this report. The structure which is described below is however the arrangement which guided implementation, and thus can serve to explain the results of the Bond Issue.

It is the intent of this report to keep the descriptive material in this chapter as factual as possible, and to document impressions and opinions as carefully as possible. However, to develop a water quality management model which is realistic, it was necessary to interview persons both in and affected by the system. Thus, part of the material which follows is based on impressions generated from a composite of two years

exposure to diverse elements of the water quality management system.

The regulatory and managerial capabilities of the State government in water quality restoration and maintenance are contained primarily within two agencies, the Water Resources Commission (WRC) and the Department of Public Health (DPH). Since its evolution from the Stream Control Commission in 1949, the WRC has been held strictly and directly responsible for State water quality. Thus, views about the WRC range from both ends of the approval-disapproval spectrum. Persons within the administrative structure expressed a dominant belief that the WRC is doing an excellent job. On the other side, a number of individuals felt that the agency has failed in its overall mission. Dworsky suggested that:

"Certainly, the Water Resources Commission does not have illicit ties to the groups it attempts to regulate, but there has been evidence of what Sax has called the 'insiders' perspective'.³ Even if this can not be documented, it is still clear that the heavy users of water feel that the Commission has done a good job; conservationists disagree".⁴

The WRC consists of seven persons, including the Director of the Departments of Natural Resources, Public Health, State Highways, and Agriculture. The other three members are appointed by the Governor and represent municipal, industrial, and conservation interests. It is interesting that all of these groups, with the exception perhaps of the Department of Natural Resources, represent the principal single-purpose exploiters of the State's water resources. Agriculture, municipalities, highways, and industry are the

prime contributors to the water pollution problem. The DPH is primarily interested in guarding against a water-borne health hazard. The conservation representative is drawn from the Michigan United Conservation Clubs, whose membership is composed of a large number of sportspeople, concerned chiefly with fish and game production.

One reaction to the membership in the WRC maintains that since these interests are the primary users of the water system, that it is proper and efficient to have them setting policy for the system. Indeed, members of the Commission appear dedicated and conscientious in pursuing objective policy-making. However, it is likely that their viewpoints are biased by their long-time immersion in their specific single-purpose interests. Dworksy's comments on Sax's insider perspective phenomenon point this out. In addition, other current uses of the waterways exist; are they represented adequately? Are uses and users of the future represented? What is needed in a state where water is such a vital and diverse resource is a broad policy-making view. Can representatives with single-purpose backgrounds present such a view?

To answer these questions, one can only point to conclusions reached in a 1970 front page article in the New York Times:

"Most of the State Boards primarily responsible for cleaning up the Nation's air and water are markedly weighted with representatives of the principal sources of pollution.

"Membership of air and water pollution boards in 35 states is dotted with industrial, agricultural,

municipal and county representatives whose own organizations or spheres of activity are in many cases in the forefront of pollution.

"The possibility that board members' personal connections could prejudice objective handling of pollution problems is deplored by Federal officials. They say privately that the composition of such boards is perhaps a major reason why abatement has not progressed faster.

"Although there is no precise way to measure the impact of such boards on pollution problems because conditions vary so widely from state to state, there is abundant circumstantial evidence that they do not expedite pollution abatement.

"Federal Water Quality Administration Commissioner David Dominick stated that 'where a statutory board has responsibility as part of state government to establish standards for pollution abatement, the public is ill-served to have representatives of private vested interests passing judgement on such regulations. I think there's enough expertise in the public sector where no conflicts of interest would occur. The whole board should represent the public'".⁵

The Times article corroborates the idea of an insider perspective. For evidence to support its allegations, the Times points to the fact that the nation has made little headway in its battle against water pollution.⁶ Pollution board membership is not the sole causal factor contributing to the lack of control progress, but it certainly has been one element of the problem.

The WRC meets for two days each month in various locations around the State. With such a small amount of time in which to conduct its business, the Commission exhibits two dominant characteristics. First, because of the time constraint, the WRC is heavily dependent on its staff, the Bureau of Water Management (BWM). This reliance destroys one of the positive values provided by the two part board - staff organizational structure, that of separate vantage points.

A commission can provide a broad policy outlook that a staff bureaucracy often lacks. A staff organization can aggregate the expertise and talent that are required to effectively implement the commission's policies, as well as providing one source of input into commission deliberations. The merger of these groups can limit the efficiency of policy output. A part-time commission composed of laypersons requires a supportive technical staff. A staff which functions as a management agency develops agency viewpoints as a function of its bureaucratic nature. Therefore, the merger of a supportive staff with a managerial agency contains a danger of limiting information input to the decision-making commission. In Michigan, evidence of limited information flows due to staff activity is prevalent and will be discussed below.

The second factor which the limited Commission meeting time raises is that of non-Commission ties. For 18 to 20 working days of each month, the Commissioners go back to being members of their constituency groups. Four out of seven Commissioners return to upper-level positions in other State bureaucracies. This situation forces these members to be responsive to the groups for whom they are employed. A difficult position would result if one of these Commissioners supports a WRC decision contrary to his/her employing agency's wishes. This is especially significant since in all cases second- or third-level agency bureaucrats have been sent to the WRC to represent the Directors of the State agencies. This fact means that when these representatives return to their agencies, they are responsible to agency higher-ups.⁷

The effect of overlapping representation has been to promote a forum for mixing existing agency viewpoints, rather than providing an independent focus for a fresh water management outlook. Competitive pressures generated from conflicting agency and group positions have been mitigated, reducing the efficiency of an adversary political process. Thus, substantial inertia results, yielding a considerable predisposition to status quo maintenance.

The WRC and the BWM are housed within the State Department of Natural Resources (DNR). The Executive Secretary of the WRC is also a Deputy Director of the DNR. In fact, however, the WRC has acted relatively autonomously. Prior to the 1973 Reorganization, the BWM was composed primarily of three divisions: 1) Water Quality Control -- administers the water pollution control program; 2) Water Development Services -- performs water resources planning functions; 3) Hydrological Survey -- advises and supervises localities, industries, and individuals on water and related land problems. Organizational charts of the DNR before and after reorganization are contained within Appendix IV.

The water quality management strategy which is pursued by the WRC and the BWM centers around the Use Designation Areas and Inter- and Intra-State Stream Standards adopted in the late 1960's (see Chapter Three). The standards were established largely in response to federal requirements and incentives, and not directly as a means of pursuing a water quality goal. Several sources stated that the use designation

areas were set relatively arbitrarily. Indeed, there is some evidence that changes in the use designations and standards were used to force compliance with State wishes. For example, the designation of Ford Lake as a total body contact recreation area in the Huron River Interceptor Case (Chapter Six) can be seen as an effort to force the closure of the Ypsilanti and Ann Arbor wastewater treatment facilities. In the Owosso Case (Chapter Eight-A), the adoption of a previously unset ammonia limit mitigated against the use of a proposed tertiary treatment facility. Incrementally-changing standards make it difficult to effectively plan for the future. Miller and Starr suggest that incremental decision-making can lead to a suboptimization of system objectives.⁸ Certainly this type of arbitrary standard-setting counteracts any potential for the use of innovative techniques, since risk is involved. Thus, rather than pursuing an innovative project, a locality would much rather utilize conventional treatment known to be acceptable to State agencies, and which is less costly in the short-run (until the standards are incrementally upgraded in the future).

The use designation areas concept must also be regarded carefully since it is based on the idea of acceptable use. It is indeed difficult from a technical point of view to judge what uses are acceptable in a particular geographic area. The designation process is certainly based on political and economic considerations. Since acceptable use is defined in the political arena, effective lines of communication must be constructed to insure that all potential users are

heard. It is difficult of course to determine who speaks for the music of a wilderness waterfall or the revitalizing feeling of self-actualization in an unborn backpacker. Resource value has been defined in terms of current use, and accordingly must take into account all perceived uses in an effort to predict future uses. Information flows should be promoted rather than restricted.

There is evidence that communication has been restricted between the WRC and the public. For example, a letter from the Executive Secretary of the WRC to the Office of Public Affairs, U.S. Environmental Protection Agency, advocated restriction of public participation. A copy of this letter is reprinted in Appendix V. It has been stated previously in this report that comprehensive information is a pre-requisite to effective planning. The limitation of information input into the decision-making process serves to maintain status quo resource use and value.

The use of standards and acceptable uses as the basis of a water management strategy creates a problem-oriented management system. Thus when a stream or lake segment is violating water quality standards, a problem exists. A lengthy enforcement procedure is available to force a locality or an industry to clean up its effluent. While court action can be sought, "voluntary compliance" is achieved in upwards of ninety percent of the cases. Thus the enforcement norm is one of negotiation rather than litigation.

Administrative action in place of court activity is of course more efficient in terms of the expenditure of system

resources. However, it is not certain that negotiation between the administrative agency and the violator is more effective in terms of social goals. Thus, for example, the U.S. Food and Drug Administration and the chemical industry negotiated the cyclamate question for some nineteen years after adverse biological effects were discovered which were caused by the chemical.⁹ Similarly, in a case documented by the University of Michigan Environmental Law Society, the WRC and the BWM failed to correct a pollution problem caused by a Fowlerville plating company over a period of approximately twenty years. A short summary of the chronology of the case is reprinted in Appendix VI. The enforcement chronology was summarized from material contained in the WRC's files current to June 1972. In a 1972 Livingston County case demonstrating further WRC enforcement laxity, a Circuit Court Judge imposed higher standards on a sewage treatment facility than those set by the WRC:

"I took a position that the standards set by the Water Resources Commission would still constitute a polluting effluent," (Circuit Court Judge) Mahinske said. "For that reason I had to move away from those standards".¹⁰

Enforcement procedures based on compromise allowed the continuation of a serious problem in the plating company case. Although the WRC claims that it will not hesitate to seek court action, the threat seems to have little impact on a locality to force treatment plant expansions. Court action has turned into a non-threat for two reasons: 1) the WRC hesitates to use this tool; and 2) the economic burden on a community is often of such magnitude that a court couldn't

force the construction of further treatment capability. The threat of court action bordered on the absurd in the Owosso case whereby the City threatened that it might as well shut down its treatment plant altogether since it had spent several hundred thousand dollars in engineering studies and had requested the go-ahead with construction of a tertiary treatment facility. A court would find it difficult to cite the City for lack of action!

The Owosso case brings another point into focus, that of a dichotomy between enforcement and grant allocation management functions. A locality can be ordered to provide upgraded treatment facilities, yet be turned down in a request for financial help. The courts find it difficult to enforce WRC orders when they constitute a hardship to the local community. Thus, the success of the management program has hinged upon the availability of grant funds.

The fragmentation between fiscal and enforcement responsibilities becomes more critical in the case of regionalized plans. The federal legislation promised an additional ten percent grant if a project was in accordance with a "regional plan". The State of Michigan has attempted to capture this incentive by promoting "regionalization" where geographically possible:

"The Commission (WRC) encourages and the federal government requires that the efficiency and economics of regional systems be considered", said WRC's executive secretary, Ralph W. Purdy.

"If studies show such systems are more economical, the commission and the federal government insist that state and federal grants go only to regional projects".¹¹

The WRC cannot order a locality to connect into a larger system, but it does wield the club of money. In the Owosso, Traverse Bay, and Huron Valley experiences, the WRC defined "regional plan" as one which follows the model of a centralized treatment facility connected to outlying areas via interceptor sewer lines. In the Traverse Bay case, for example, the consulting engineering firm designed its plans under the impression that only an interceptor-type of system would be funded by the State.¹²

Although a regionalized plan could conceivably be, for example, one in which small, satellite treatment facilities are used, the WRC appears to have attached itself to the interceptor-centralized plant method of regionalization. The explanation for this could lie in the graphically-obvious regionalization which interceptors provide, or in the fact that centralized plants are easier to monitor and manage. In any case, the fiscal/enforcement administrative dichotomy becomes more critical in these cases because of the tremendous complexity of the regional schemes. A primary problem found in all of the cases lay in the unification of the diverse units of government represented in the projects:

"WRC has encountered resistance to the regional concept in some communities.

"In Lansing, for example, city policy for years had denied extension of sewerage service into neighboring township territory unless the area to be served is annexed to the city. That position collides headon with WRC's policy against using sewage disposal facilities, built with state and federal aid, as a lever to force municipal annexation".¹³

Past annexation policy generated considerable hostility between outlying townships and core cities. Since the WRC

essentially required their inclusion into a regional plan prior to a core city's plant expansion, the townships and surrounding localities found themselves becoming increasingly powerful in controlling the city-township interaction. In several cases, the outlying units resisted connection with the central cities. A notable example is the resistance presented by the City of Warren, located north of Detroit, against tying into the Detroit metropolitan waste management system.¹⁴ In the Traverse Bay case, a significant financial burden was placed on existing township residents to pay for an interceptor line which was necessary largely to handle future development. Rarely has the question of whether further development is desirable been examined closely. Yet by promoting the interceptor-central plant regional schemes, the WRC is indirectly encouraging growth. Several writers have recently suggested that service functions promote development¹⁵ and recommend that land use planning be coordinated with water and wastewater service planning.

In many cases, then, different values, growth policies, and resource outlooks produced considerable tension between the diverse units of government within a "regional" area. The definition of a regional approach as one characterized by the interceptor-central plant model appears to have slowed the implementation process. The use of an innovative process at the centralized facility would compound the difficulties of regionalization. In the Muskegon case, an enormous amount of energy was expended to keep the political units in support

of the spray-irrigation plan. In the Owosso experience, the coalition fell apart several times.

In these cases, the problem lay not only in questions of technical and political viability, but also in difficulties of financial arrangements. In both Muskegon and Owosso, EPA Demonstration Grant monies were used to maintain activity on the projects. In the Owosso area, the lack of a guarantee that the townships would receive grant monies for sewer lines connecting into the Owosso plant placed pressure on an already fragile coalition. The point is simply that if the WRC promotes regionalized interceptor schemes, it should finance the regionalized systems as entire units. One means for accomplishing entire system funding would be by financing through larger units of government or through authorities or councils composed of representatives of all of the local governmental units. One viable unit is the county level of government since councils are often plagued by local unit provincialism. For example, in the Muskegon experience, the County government led the way for planning in a regional context. All of the participants in the Owosso case were contained within Shiawassee County. Action by the WRC to promote county-level planning might help expedite the regional planning process.

Another area of fragmentation in the water quality management system lies in the location of wastewater treatment expertise. Prior to the 1973 Executive Reorganization, wastewater treatment expertise was concentrated within the Department of Public Health. Several problems resulted.

For example, standards could be set which would not be attainable using technology approvable by the DPH treatment experts. Or a project could be technically approvable, but funds would not be available. Or a project could be approved and funds made available, but the standards would be increased. Thus, the political management model which emerges is one plagued by administrative fragmentation.

To cope with this sort of management system, it appears that officials in charge of Bond Issue funds reacted by defining their management strategy as providing point source waste discharges with the equivalent of secondary treatment. This was of course the strategy outlined in the 1966 Study of Needs.¹⁶ The problem with this management strategy, however, was that the State was financially behind from the start. Phosphate removal was not included in the estimates, nor were funds limited to projects with time horizons of the 1980 goal date. To compound the problem, the inflation rate was much higher than estimated and federal monies were not appropriated in parallel with the State's commitment of its funds.¹⁷ For example, rather than providing the full fifty percent federal project cost share, federal aid as of early 1972 had ranged from only 5 to 14 percent. The State went ahead and prefinanced up to 55 percent of the project cost.¹⁸ The result was that the State's financial reserves diminished much faster than was anticipated.

The Michigan Department of Public Health (DPH) is the second major component of the State water management system

(prior to reorganization). The DPH has an older role in water management than the WRC and is concerned largely with health aspects of water pollution. The DPH has the responsibility for the supervision and licensing of wastewater treatment plants and their operators and for the review and approval or rejection of proposed facilities. As a result of this permit-granting role, the DPH figured significantly in the implementation stage of the Bond Issue. Indeed, many sources felt that the wastewater division of the DPH had the most critical role in relation to the adoption of innovative techniques. Dworsky commented that "the Department of Public Health is perceived to be the most important State agency in regard to pollution management".¹⁹

The DPH has had a major input into the system not only because of its historic role and licensing powers, but in addition because it maintains a representative on the WRC and acts as a consultant to the Governor's Office and the State Legislature. Thus, the agency has been the major concentration of wastewater treatment expertise in the State government (although wastewater engineers and planners are employed in the BWM as well). The orientation of the wastewater group had historically been health-related. Since chlorination would eliminate the threat of bacterial hazard, little impetus was present to press for advanced treatment systems. Numerous sources indicated that the DPH unit became outdated in its expertise, closed to new ideas and resistant to change. Secondary treatment technology was considered adequate in eliminating a health hazard and was

predictable and easier to monitor (since DPH staff had had a long acquaintance with secondary treatment processes). A stagnation of technical understanding resulted. As an outcome, considerable resistance arose in response to proposed projects which utilized innovative treatment techniques. Advocates of the Muskegon scheme were successful only by circumventing the technical review process; instead they secured approval through the political process. Thus, federal influence at the Washington level effected DPH approval of the Muskegon project. In the Owosso case, proponents of the physical-chemical system worked closely with U.S. Environmental Protection Agency staff from the Cincinnati research center to explain the treatment processes to the DPH group. Essentially the DPH's technical decision was deferred to the Cincinnati EPA Office.

Technical idea stagnation is consistent with the bureaucratic model presented in the previous chapter. In addition, little stimulus to study innovative techniques comes from the political system due to a lack of political support. The most dominant constituency groups are those with a vested interest in status quo techniques. A latent constituency group for innovation normally is not recognized. The Muskegon case was successful partly as a result of the vested interest in land disposal held by the project's proponents. If a problem situation is resolved more effectively through the use of an innovative technique, society benefits as a whole. However, the communication process is slow, with the result that many promising innovations are submerged

for a considerable length of time. Quite simply, little political support was prevalent to encourage the DPH to embrace innovative techniques.

If innovation is not promoted by the State agencies, what groups do press for innovative techniques? Consulting engineering firms are a third significant element in the State water quality management system. Engineering firms share with the DPH the role of promotion of treatment techniques. These firms are in a competitive market and act as profit-maximizers. As such, an inherent desire for risk aversion becomes evident. The firms are dependent upon receipt of design contracts for their livelihood. Selection of a firm often depends upon its reputation in the field. An innovative process usually has a greater probability of failure than does a conventional system. If a system fails, the design engineers' reputation is greatly damaged. Thus, it is easier for a firm to utilize well-known existing technologies, than to opt for an unconventional treatment scheme.

The design of an innovative facility requires lengthier and more elaborate design procedures. This requires the expenditure of a considerable amount of a firm's resources, both in time, expertise, and money. In addition, the required expertise might be lacking to design an innovative plant, in which case talent would have to be brought in, or part of the design would have to be subcontracted out. In the State of Michigan, several sources indicated that only a few consulting

firms contain the required expertise at present to design advanced systems.

Beyond the extended commitments of time and expertise to the technical design work, the resistance of the State bureaucracy to unconventional treatment processes forces the engineering firm to press for approval in the political system. Political activity is expensive in that often the interaction extends over a considerable period of time, requiring repeated inputs of energy and continuous expenditure of time. Few engineering firms desire to get involved in this type of a situation.

Municipalities are the fourth major element of the water management system. Most local units of government have been hesitant to implement high degrees of waste treatment, due to a narrow viewpoint. A municipality can eliminate its own pollution problems by placing its waste outfall downstream of the community. Police responsibility evolved on the State and federal levels as a result of this insensitivity to negative external effects of an area's local actions. High orders of waste treatment require the expenditure of large amounts of money, and benefit downstream communities as much as the constructing unit. Accordingly, local initiative in the area of wastewater treatment has been limited.

The State and federal programs developed to stimulate local action. The Bond Issue was initiated to provide a major incentive for the construction of treatment facilities. An interesting phenomenon resulted in that little local action was undertaken without Bond Issue monies. Indeed,

several sources felt that the Bond Issue was the worst policy which could have been initiated, since local corrective activity was rarely undertaken in areas not able to receive monies from the limited Bond Issue funds.

The local units of government are often placed in a bind between State orders to upgrade treatment facilities, and a lack of resources to develop the necessary improvements. As a result of the WRC's lack of desire to follow the litigation enforcement route, localities are rarely under great pressure to upgrade their facilities. As long as planning of some sort is underway, the enforcement process usually stops. Thus, municipalities can continue to submit grant applications (demonstrating local activity) until they receive funds to finance the treatment facilities. This sort of activity can continue for a considerable period of time, due to financial problems cited above, allowing the continuance of pollution problems. Without grant funds, most localities cannot afford the necessary plant improvements. Courts are hesitant to enforce orders which will place a heavy financial burden on a municipality. As a result, non-grant local activity is not widespread.

The institutional environment described above results in crisis-oriented non-planning on the local level. Effective planning is dependent upon an adequate search for alternatives. Planning in response to enforcement orders and grant availability is rarely macro-goal-oriented (in the sense of minimizing systemic water pollution) but is rather micro-goal-oriented (in the sense of defining the local goal as

compliance with the order or capturing the grant funds). Planning in this context attempts to match problem resolution with minimum resource expenditure. Innovative techniques require greater investments of time, energy, and resources. In addition, with innovation there is a greater probability of failure to resolve the problem state, which results in non-goal-attainment. Thus, innovation is rarely thought desirable from the locality's point of view. In Muskegon, localities were stimulated into innovation largely through a promotional campaign provided by extra-regional parties. In Owosso, a strong City government provided the impetus for the physical-chemical system.

Municipalities finance their share of treatment projects largely through the passage of local bond issues. Because of this, they are dependent upon the interests of the bond market. An innovative project is less assured of accomplishing what it is designed to do. If a project fails, the locality would be left with its bonded indebtedness, while it would not be able to pay through revenues obtained from user fees. Serious economic problems result. Local units must consider the reaction of bond buyers to an innovative process. If the project is thought too risky in the bond market, the municipality may have difficulty selling the bonds to finance it.

The only source of revenue which is geared to risk and innovation is the EPA's Demonstration Grant Program. Both Muskegon and Owosso received funds under this program

to finance feasibility studies. However, monies are limited. The EPA's Technology Transfer Program is also oriented toward innovation, but operates primarily through education processes.

From the preceding discussion, it appears that little impetus for innovation is produced from the agencies, groups, and interests which comprise the institutional water quality management system. Thus, institutional as well as historic, psychological, sociologic, organizational, and bureaucratic factors tend to impede the adoption of innovative processes. Within an environment as hostile to change as that described above, there is little wonder that a small amount of innovation occurred. In the case studies which follow in Part III, these same environmental factors surface over and over again, and aid in explanation of the case outcomes.

PART III -- CASE STUDIES IN BOND ISSUE IMPLEMENTATION

Preceding sections of this report have attempted to define both the resources affected by the processes of innovation as well as the environment in which innovation takes place. Yet homogeneous activity does not result simply because a State or federal policy has been propagated, or solely as a result of the organization of a State water management agency. Activity is site-specific. Its character is a function of the micro-environment as well as a product of the macro-system. Thus to truly understand the dynamics of the water quality management system, it is necessary to examine actual case studies in Bond Issue implementation.

This section presents four case studies. Two of the studies illustrate cases where innovation was at the focal point of the local wastewater management controversies. Thus, Chapter Seven contains an analysis of the Muskegon Case, where an innovative regional spray-irrigation system was successfully implemented, while Chapter Eight-A presents an examination into the Owosso Case, where an innovative physical-chemical system was proposed, and is still in controversy.

On the other side, Chapter Six contains the Case of the Huron River Interceptor, an example of a noninnovative application of Bond Issue Funds, while Chapter Eight-B examines the Traverse Bay Case, where planning was effectively locked into one treatment model without a consideration of potentially innovative alternatives.

This section, then, attempts to place the preceding material in context. While each of the cases are heterogeneous in their appearance, persistent themes recur throughout the symphony. While some are in harmony, and some are in counterpoint, they provide meaning for what has transpired, and insights into the direction of the music.

CHAPTER SIX -- THE HURON RIVER INTERCEPTOR CASE

"Many are stubborn in pursuit of the path they have chosen, few in pursuit of the goal"

-Nietzsche

In the Huron River Basin of Southeastern Michigan, a wastewater management controversy has raged for more than a decade. Availability of State Bond Issue funds in 1968 hastened the search for an acceptable treatment strategy. The issue underlying the controversy which developed was whether wastewater management would be achieved via expanding existing plants and providing high orders of treatment at numerous regional locations, or whether treatment would be provided by pumping regional wastes through long interceptors to a single massive treatment plant located along the shore of Lake Erie. The plan which came to be supported by the State and federal governments followed the latter model.

In theory, effective planning is dependent upon an exhaustive search for alternative solutions, conditioned by the technology of the present and the near future. As the rate of additions to technological knowledge increases, effective problem resolution becomes both more possible and more complex. Effective planning, then, must take into account current advancements in technology, and must provide flexibility to allow for the capture of future technological innovations. In Southeastern Michigan (Figure 9), however, plan design was effectively set by a 1960 engineering study.



0 3 6 9 12 15 18
MILES

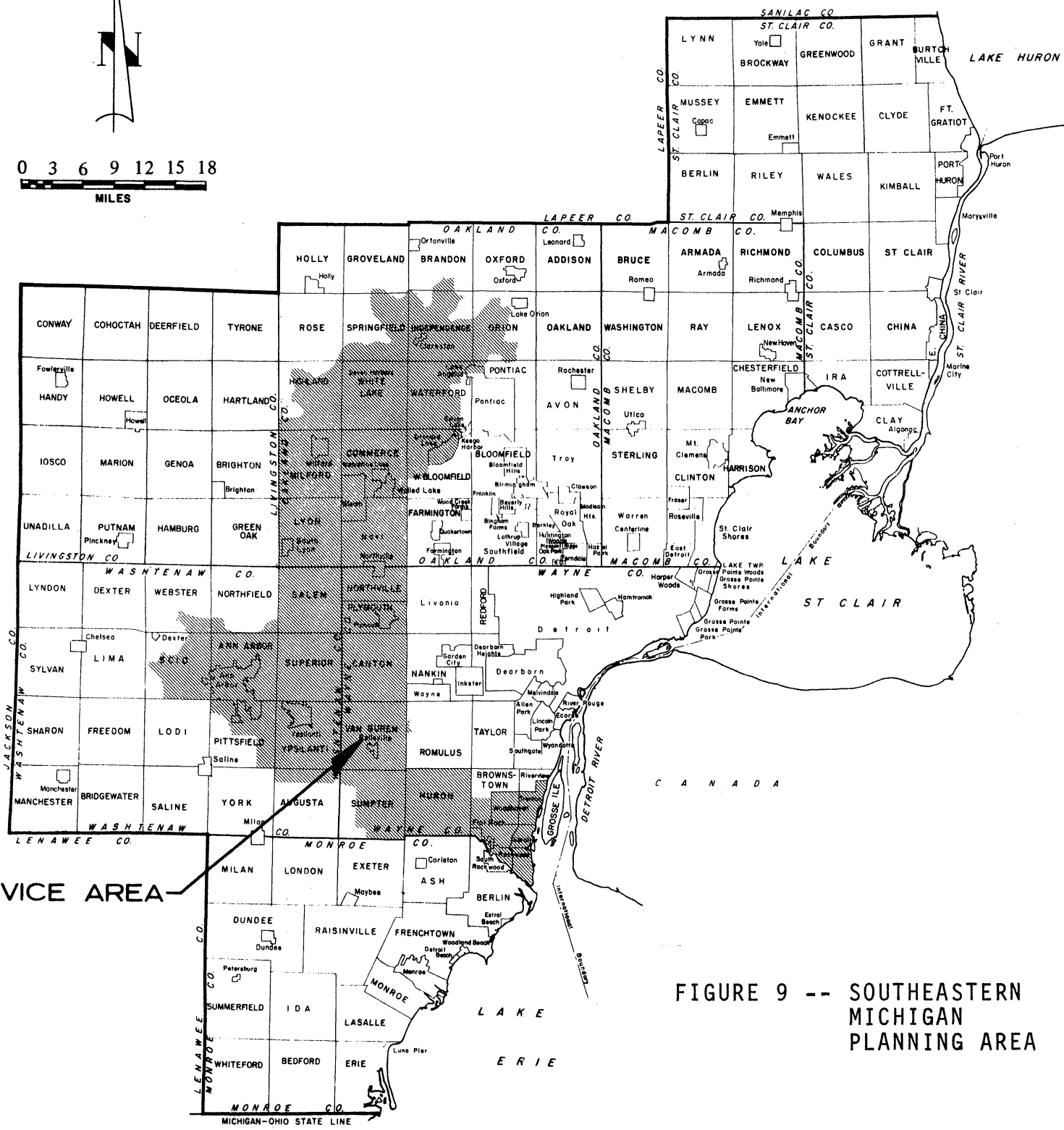


FIGURE 9 -- SOUTHEASTERN MICHIGAN PLANNING AREA

The lack of an effective search for alternatives was supported by a set of dominant vested interests in the maintenance of status quo technology. Thus, a situation where organizational commitment to outmoded plans dominated the decision-making process is illustrated in the Case of the Huron River Interceptor.

The first study examining question of wastewater disposal and water use in the Huron River Watershed was undertaken by Black & Veatch, Consulting Engineers of Kansas City, Missouri. The report was commissioned by the Huron River Watershed Inter-Governmental Committee (HRWIC). The Committee was formed in April, 1958:

"It arose in recognition of and response to the fact that the degree of water use in the basin has greatly increased due to population and economic growth, resulting in competition among the various water uses, some of which are incompatible. It was clear that communities, industries, and other water users could no longer effectively solve their water problems on an individual basis. Instead, there was need for a cooperative, basin-wide approach to the solution of these problems."¹

The Black & Veatch study was commissioned in 1959; its report examining waste disposal and water use in the downstream portions of the Huron River was published in 1960. In considering the effects of wastewater on other water uses (such as water supply and recreation), an assumption was made that set an upper limit on available treatment technology. Thus in predicting the future (1980) wastewater load, the Report stated that "after efficient primary and secondary treatment, the wastes from (the 1980 projected) population

will have a population equivalent of about 50,000 or approximately twice that of the 1959 waste discharges" (emphasis supplied).² The report further defines efficient primary and secondary treatment as reducing the BOD load by about 90 percent.³ Thus, the 1960 Report set a 1980 technology limit which subsequently has been proven incorrect. The availability of advanced treatment was not considered as a future option.

In examining water quality in relation to water supply, the Report concluded that "assuming that treated wastes continue to be discharged into the Huron in ever-increasing volumes, there is reason to doubt that the waters of the lower river will remain consistently acceptable as a public water supply source".⁴ Accordingly, in reviewing long-term water supply needs, the report cited a 1957 National Sanitation Foundation report and stated that "undoubtedly the Wayne County system offers excellent long-range possibilities as a supplementary source of water supply for the Ann Arbor-Ypsilanti area".⁵

In reviewing conflicts of wastewater disposal and recreation uses in the lower Huron River, the Report found that considerable investment had been made in recreation facilities. To allow further treated wastewater discharges would jeopardize these investments. The study's final conclusions were as follows:

"Water supply and recreation are current uses in the areas below major waste-water discharges. If these two important water uses of the lower Huron are to continue in the future then the long-range

objective of any wastewater disposal plan must be the protection of these water uses. To attain this, the plan should provide maximum protection of water quality which may be accomplished best through the eventual diversion of wastewater discharges from the lower Huron".⁶

The 1960 Black & Veatch Report thus laid the foundation for the construction of an interceptor system to divert wastes to Lake Erie where there would be a sufficient volume of water for effluent dilution. This conclusion was conditioned by the premise that a maximum of 90% BOD removal was possible. In addition, the Report set the stage for future Ann Arbor-Ypsilanti domestic water needs to be supplied by the existing Wayne County system. As will be seen below, this type of treatment scheme, combining interceptors with a Lake Erie treatment plant, was reiterated in practically all of the succeeding studies. Planning in 1972 basically utilized 1960 technology. Changing ideas of what would constitute a regional system were not incorporated into latter treatment plans.

The Technical Advisory Sub-Committee (HRWTAC) of the HRWIC reviewed the Black & Veatch Report and presented a Water Use Policy and Development program for the Huron River Watershed. With respect to wastewater disposal, the Policy stated that: 1) the lower Huron would be used for disposal of adequately treated wastewater until water quality trends indicate diversion is necessary; and 2) upper-Basin Huron uses should be designed to prevent pollution problems and future use conflicts.⁷ The policy was adopted by resolution of representatives from Ann Arbor, Belleville, Flat Rock,

and Ypsilanti, Ann Arbor, Huron, Pittsfield, Superior, and Van Buren Townships, and Washtenaw County. Noticeably absent from resolution support were representatives of Wayne County. The Michigan Department of Public Health accepted the policy statement and approved the expansion of the Ann Arbor, Ypsilanti, and Ypsilanti Township plants to serve the estimated 1980 population. The HRWTAC Report stated that "if the Huron River is to be utilized for ultimate disposal of treated wastes, it is imperative that the wastewater receive a high degree of treatment" (emphasis supplied). However, with the 1960 technology assumptions, the Report suggested that even with the best possible treatment, future pollution loads may overtax stream assimilative capacity. Thus, diversion may be necessary, the Report concludes, in which case flow augmentation would be necessary to maintain water levels below points of diversion.

Under Section 8 of the Federal Water Pollution Control Act, the Governor of any state may request that the Secretary of Health, Education, and Welfare call a conference on pollution of interstate or navigable waters if that pollution is endangering health or welfare. In December of 1961, Michigan Governor John B. Swainson made such a request to determine the need for a detailed investigation of the pollution of Lake St. Clair, the Detroit River, Lake Erie, and their tributaries within the State. The conference led to the initiation of a three-year investigation by the U.S. Public

Health Service (PHS). At the same time, the Supervisors Inter-County Committee, consisting of representatives of Macomb, Oakland, Washtenaw, Monroe, St. Clair, and Wayne Counties, commissioned two reports by the National Sanitation Foundation (NSF): one on sewage disposal problems⁸; and one on administrative affairs related to environmental problems in the Southeastern Michigan area.⁹

The NSF studies were completed in late 1964, six months earlier than the presentation of the Public Health Service's findings. The Reports concluded that "the present degree of treatment, namely primary, for municipal waste discharges into the St. Clair-Detroit Rivers Complex, will remain sufficient for some time to come".¹⁰ The Reports reiterated the idea that the solution to pollution is dilution and stated the "fortunately, nature has provided for this area, through the St. Clair and Detroit River system, a larger and more consistent amount of waste assimilating capacity than is found in most other localities".¹¹

The Reports go on to suggest that "it has not been established...that the capacity for assimilation of primary treated effluent from the Detroit Plant has been exceeded"¹² and that "The Board is reluctant to recommend at this time higher degrees of treatment for sewage, in order to prevent an aging process which will undoubtedly continue in Lake Erie, but whose manifestations are still minor".¹³ Contrast these statements with conclusions reached in two joint United States-Canada studies: One, published thirteen years earlier

by the International Joint Commission (IJC), concluded that:

"These waters are seriously polluted in many places on both sides of the boundary. The most serious pollution exists in the St. Clair River below Port Huron and Sarnia, in Lake St. Clair along the west shore, in the Detroit River below Belle Isle, and in Lake Erie's west end. There is progressive over-all degradation of the water between Lake Huron and Lake Erie".¹⁴

The second report, published jointly by the Canadian Centre for Inland Waters and the U.S. Environmental Protection Agency in 1972, corroborated the IJC's findings, and highlighted the nutrient problem:

"Phosphorous input to Lake Erie must be reduced immediately; if this is done, a quick improvement in the condition of the lake can be expected; if it is not done, the rate of deterioration of the lake will be much greater than it has been in recent years".¹⁵

These two reports certainly cast doubt upon the accuracy of the environmental conclusions reached in the NSF reports, yet the NSF studies were later cited as the regional plan.¹⁶

The NSF Board concluded that when future development requires system expansion, plans should follow the concept of a Huron River Interceptor system connecting to a primary treatment plant on the shores of Lake Erie.¹⁷ To administer the system, the Board recommended the expansion of the functions of the Detroit Department of Water Supply to cover the sewage interceptors and disposal facilities of the metropolitan area.¹⁸ Indeed, the Report states that should an expansion in the number of suburban representatives on the Detroit Board of Water Commissioners occur (as a geographic expansion would warrant), that Detroit representation should

continue to have the majority vote.

In contrast to the NSF findings, the Public Health Service's Report, published in April 1965, corroborated the two U.S.-Canadian studies cited above, concluding that the waters of the Detroit River were already severely polluted:

"Below the Rouge River and the outfall from the Detroit Sewage Treatment Plant, pollution...is constantly such that these waters should not be used for recreational purposes or domestic water supply. The high bacterial levels during wet and dry conditions indicate a serious health hazard to potential users of these waters. This seriously polluted zone extends to the mouth of the River and, under dry conditions, eastward from the United States shore a distance varying from 500 to 10,000 feet".¹⁹

The Report cited the Detroit Plant as being the major waste contributor: "The main treatment plant of the City of Detroit is the major domestic source of almost all waste constituents".²⁰ Furthermore, it called for the reduction of nutrient and organic waste discharges into Lake Erie.

"If these discharges are not halted, turbidity in the Lake may increase until it becomes unusable for most purposes".²¹

A major discrepancy between conclusions reached in the NSF Reports and the findings of the PHS Report (as well as those in the two joint U.S.-Canadian studies cited above) becomes evident. By way of explanation one can only look at the authors of the NSF Reports and examine the interests involved. Detroit currently sells water to more than 70 communities in the Southeastern Michigan area--better than 50 percent of the State of Michigan's population. In addition, Detroit treats the sewage of some 54 communities, while Wayne

County provides service for 37 additional localities. Water supply and waste treatment is a big business. The vested interest in the maintenance of minimal treatment facilities and maximal geographic authority is clear. The Technical Advisory Committee of the NSF Study was dominated by Detroit and Wayne County interests. Indeed, the Engineering Associate, who essentially wrote the reports, was on loan from the Detroit Health Department. The effect of this over-representation of Detroit's interests would appear to have resulted in an articulation of Detroit's goals with the resultant loss of an objective analysis.

With the path paved by the NSF findings, Detroit took the following stand:

"The City of Detroit which daily pours 540 million gallons of partly treated sewage into Lake Erie's main tributary expressed flat opposition to a federal proposal to institute 'secondary' treatment of the sort employed by upward of 50% of the nation's municipalities. The reasons cited were lack of 'data' and 'nobody could tell' how much the additional processing would reduce the severe pollution in the Detroit River".²²

This stand was underlain by a basic lack of desire on Detroit's part to commit municipal funds to the financing of further treatment capability.

In contrast to this opposition to increased treatment investments at the Detroit facility, the Detroit Water Service published a plan in 1966 that stated:

"To safeguard the purity of the many small streams in the region...planning should start now toward phasing out existing treatment facilities and orienting internal collection systems for connection to the sanitary interceptor system we (DMWD) propose to construct throughout the

regional watershed. The Michigan Department of Health, the Michigan Water Resources Commission, and the Federal Government subscribe to this policy".²³

The Detroit plan pointed to "increasing population densities, more complex industrial wastes and the accelerated aging of our lakes and streams" as the initiating factors behind a plan which promised to be "a new era in pollution control".²⁴ Strangely enough, nowhere was inadequately treated municipal wastes identified as a pollution causal factor. The statement regarding increased rates of eutrophication can be considered highly significant in light of the NSF Reports' allegations that its "manifestations are minor". The aging process must have suddenly become manifestly significant for Detroit to cite it as a problem condition.

To administer, operate, finance, and construct the system, the Detroit Plan points to the NSF Reports' recommendation that the Detroit Department of Water Supply expand its authority to include these functions. Modestly, the Detroit Plan praises Detroit's existing service system as "one of the best in the world"²⁵, citing itself as most competent and most available to take control of the massive interceptor system. It would appear, then, that the Detroit Water Service proposed the system not to "safeguard the purity of small streams", but rather to extend its own influence and control through the construction and operation of the interceptor-treatment plant system. It must be recalled that Detroit's original business was that of water supply. If water is taken out of a river, used for domestic and

industrial supply, and is put into a pipe rather than back into the river, the river's going to dry up below the water intake. The interceptor system would thus necessitate the supply of water from out-of-basin sources. Detroit Water Service would be available. Indeed, the DWS must have had this idea in mind when the cover for the Plan was designed. An image is reproduced which shows a community (presumably Detroit) located next to a river. Upstream, an intake pipe travels to a treatment facility which then flows to the City. A similar system is located on the downstream side of the City, with a pipe travelling from the City to a treatment facility and finally discharging back into the river. Both treatment facilities are clearly marked with a "DWS". Interestingly enough, although the upstream and City-side segments of the river are complemented by sailboats and treelined banks, the river segment below the treatment plant outfall is not shown! Indeed, the advantages of Detroit River dilution are cited by the Report:

"To avoid unnecessarily bankrupting ourselves by attempting unnecessary overtreatment of waste water, it will still be in the area's best interests to provide additional protection for our downstream neighbors by locating our treatment plant outfalls in a stream where abundant dilution is available, such as in the Detroit River..."²⁶

The 1966 Detroit Plan, then, strengthened the foundation for the development of an interceptor-centralized plant type of system. The proposed system would be operated and constructed by the Detroit Water Service. In all likelihood, the increased sale of Detroit water would be necessitated.

Perhaps one of the factors which stimulated Detroit's development of such a plan was the forthcoming federal grant monies provided under the 1965 federal legislation (see Chapter Three). In addition, the Plan was the first form in which State (WRC and DPH) and federal approval of the interceptor-form of system was alluded to.

In August of 1968, the Federal Water Pollution Control Administration published a plan for water pollution control in order to protect and restore Lake Erie. The Report corroborated the 1965 Public Health Service's findings:

"The highly useful crystal clear waters of exceptional quality in Lake Huron become so polluted as they pass through the Detroit metropolitan complex that when they enter Lake Erie they are deprived of much of their usefulness for recreational and water supply purposes...

"Lake Huron is quite low in nutrients, but the Detroit River is the single most important source of nutrients and other harmful materials causing the eutrophication of Lake Erie. Two-thirds of all phosphorus which enters Lake Erie originates from this area.

"The City of Detroit and Wayne County sewerage systems are the major source of phosphorous and oxygen-demanding wastes poisoning Lake Erie in addition to causing local defilement. This area by itself empties such tremendous quantities of contaminants into the lake that these discharges by themselves if unabated would suffice to maintain the present eutrophication and fish problems of the lake".²⁷

To solve the massive pollution problem, once again the NSF plan was aired. Indeed, the FWPCA identified the NSF proposal as the long-range water plan for pollution control in Southeastern Michigan.²⁸ The system suggested by the FWPCA would provide for secondary treatment at a Lake Huron treatment plant. A diagram of the system is provided

in Figure 10.²⁹ The Report further suggested that by 1990, tertiary treatment (defined as a process which removes in excess of 95 percent of the organic pollutants) should be a general basin-wide requirement.³⁰ However, since 1990 was the year in which the proposed system was to be at capacity, it would appear doubtful that tertiary treatment would have been added. This would appear to subvert any basin-wide goal of tertiary treatment since Southeastern Michigan was discharging almost two-thirds of the municipal wastes and one-half of the industrial wastes contributing to the pollution of Lake Erie. The FWPCA Report also identified the Southeastern Michigan Council of Governments (SEMCOG)³¹ as the agency given primary responsibility for the implementation of the Huron River Interceptor portion of the plan. The Report stated that SEMCOG had adopted the plan.

In November of 1968, the Bond Issue was passed. The availability of the Bond monies escalated the issue. The State had to make a choice; only one of the two alternatives could be implemented, either the interceptor system or the expansion of existing plants. September of 1969 was the deadline for application of Bond Issue funds. Both Wayne County (interceptor system) and Ann Arbor and Ypsilanti (expansion of existing plants) had submitted grant applications.

To implement the interceptor system, the State had to find a way to necessitate closure of the Ann Arbor and Ypsilanti treatment facilities. In 1970, a modification

PLANNED INTERCEPTORS

-  EXISTING
-  FIRST STAGE
-  SECOND STAGE

TREATMENT PLANTS

-  EXISTING
-  PROPOSED

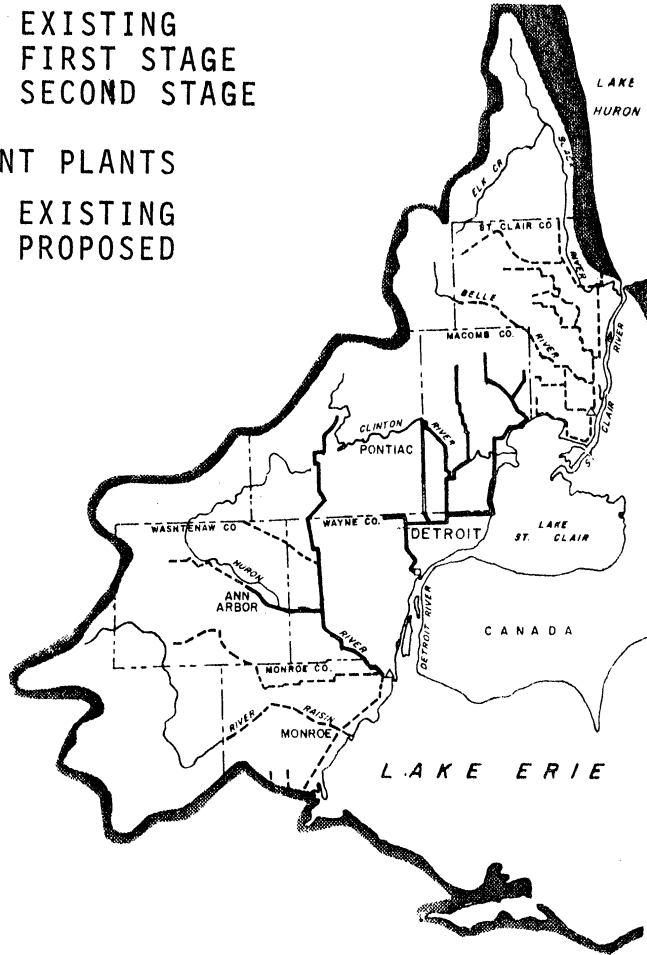


FIGURE 10 -- PROPOSED POLLUTION CONTROL SYSTEM FOR SOUTHEAST MICHIGAN (AS CITED IN F.W.P.C.A. LAKE ERIE REPORT)

was made to the IntraState Use Designation Areas to set Ford Lake aside for Total Body Contact recreational use. Ford Lake is downstream from Ann Arbor and Ypsilanti. The Ypsilanti sewage treatment plant is located on its shore. Figure 11 contains a map of the recreational Use Designation Areas in the State.³² It is clear that Total Body Contact is the exception rather than the rule as far south as Ford Lake. In addition, the designation of an urbanized lake with inputs from industrial, municipal, and urban runoff sources for Total Body Contact Use can hardly be called an ordinary practice and certainly conflicts with the historic role of the WRC as expressed in Chapter Five. The logical conclusion which is reached concerning the motive for the action is that the WRC wanted to force the abandonment of upstream treatment plants, i.e., those of Ann Arbor and Ypsilanti. Indeed, recent studies at the University of Michigan indicate that even without municipal and industrial waste inputs into Ford Lake, urban runoff would preclude the availability of the Lake for Total Body Contact recreational use.³³

Since the grant applicant for the Huron River Interceptor system was the Wayne County Road Commission, a mutual arrangement must have been reached between the Detroit Water Department and Wayne County because in the 1966 Detroit Plan, the Detroit Water Service was to have constructed and operated the interceptor system. One may speculate that an arrangement was made so that Wayne County would control the

AREAS DESIGNATED FOR RECREATION

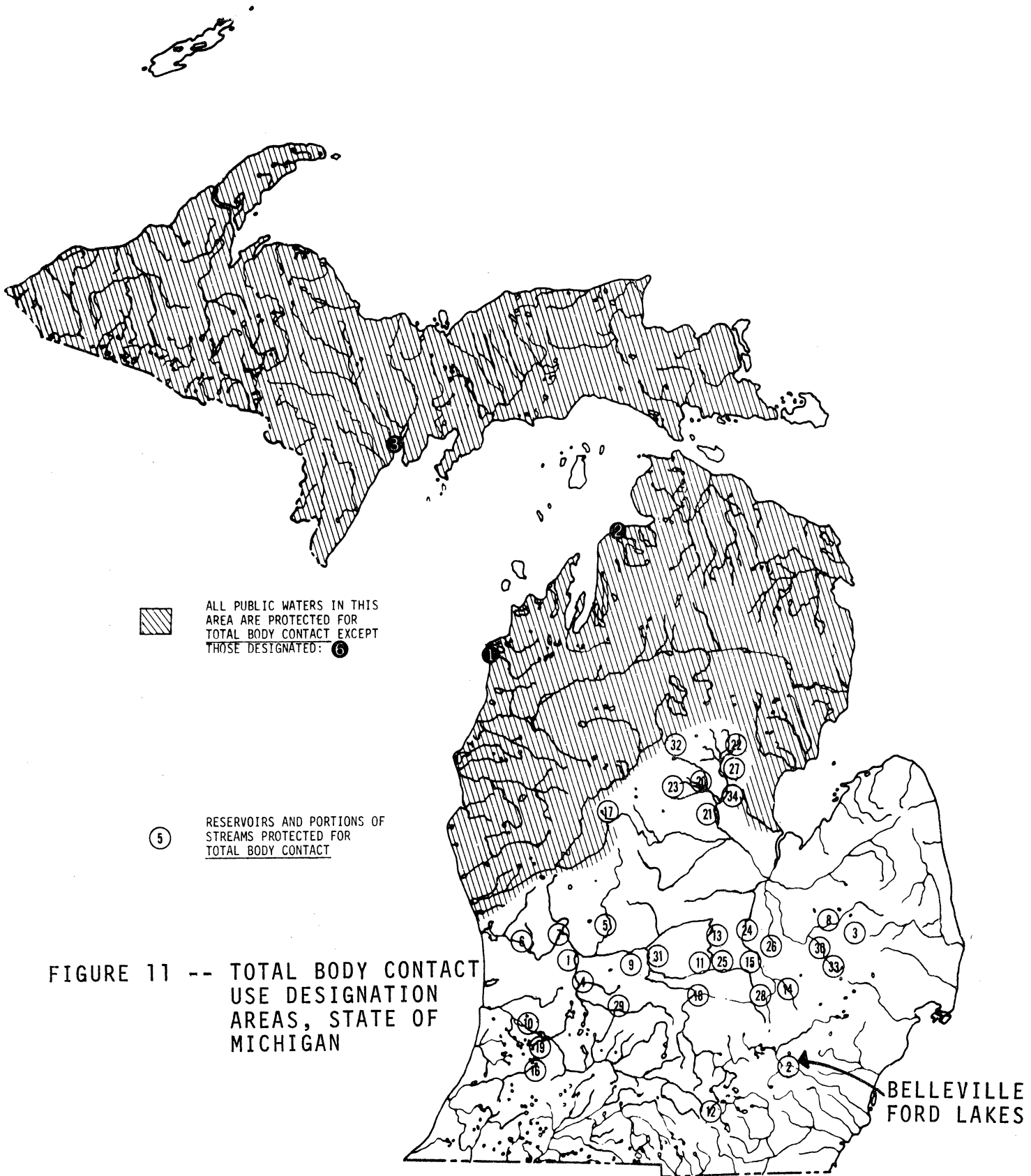


FIGURE 11 -- TOTAL BODY CONTACT
USE DESIGNATION
AREAS, STATE OF
MICHIGAN

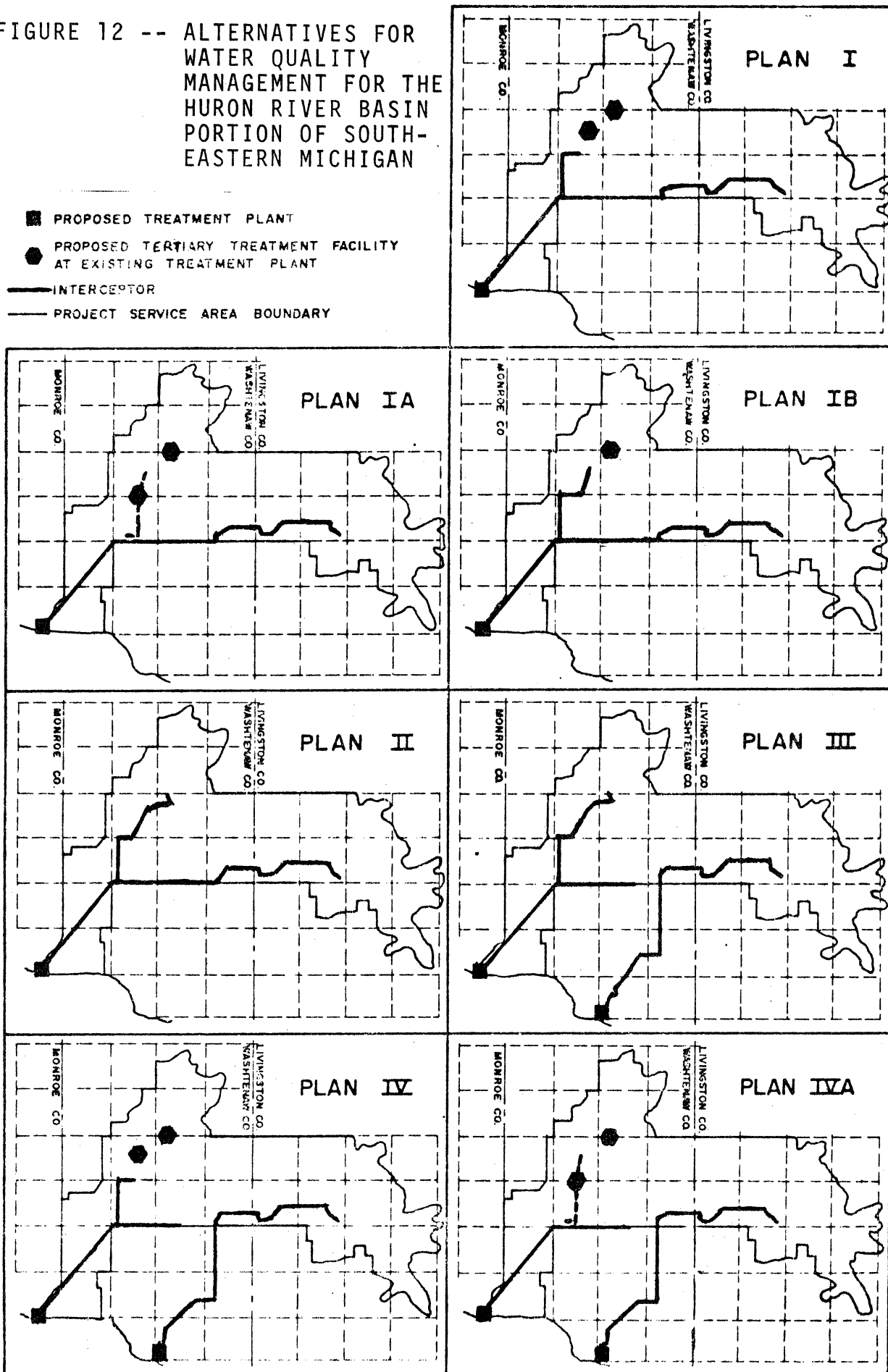
wastewater functions while Detroit would provide water to the extended service area.

The controversy over alternate treatment methods continued. In the Summer of 1971, the WRC, with funds from the Environmental Protection Agency, commissioned two consulting engineering firms, McNamee, Porter and Seeley (consultant to Ann Arbor) and Hubbell, Roth and Clark, Inc. (consultant to Wayne County and Detroit), to undertake a Special Study evaluating alternative plans for managing wastewater in Southeastern Michigan. The Consultants' Report, published in September of 1971, considered seven alternatives, all of which were based upon the interceptor-centralized plant concept (see Figure 12).³⁴ Essentially, all seven plans were variations on the same theme. The Report cited the NSF studies' recommendation of a large system of interceptors with massive treatment facilities. It also noted that the plan was adopted in principle in the FWPCA's Lake Erie Report. Thus, again the NSF findings were used as historical precedent in spite of the contradictions which existed between them and those at the Public Health Service's Report.

The Consultants stated their objectives as presenting the costs and benefits of alternative plans to the WRC for evaluation with respect to compatibility with a long range plan of regionalized treatment.²⁵ In light of the WRC's predisposition to regional plans which are composed of interceptors tying the region together (see Chapter Five), it is entirely possible that the Consulting Engineers were

FIGURE 12 -- ALTERNATIVES FOR WATER QUALITY MANAGEMENT FOR THE HURON RIVER BASIN PORTION OF SOUTH-EASTERN MICHIGAN

- PROPOSED TREATMENT PLANT
- PROPOSED TERTIARY TREATMENT FACILITY AT EXISTING TREATMENT PLANT
- INTERCEPTOR
- PROJECT SERVICE AREA BOUNDARY



instructed to consider only plans regional in the sense that the area was laced with interceptor lines. If this was the case, as it was in the Traverse Bay Case (see Chapter Eight-B), then the lack of consideration of non-interceptor alternatives can be explained by the inherent bias in goal direction. The 1971 Report concluded that "based upon...per capita costs the least costly overall project is Plan II," and that "Plan II is in conformance with the 1964 (NSF) Study".³⁶ Plan II is essentially the same system as that proposed in the NSF Report and cited in the FWPCA Report as the regional plan for Southeastern Michigan (see Figure 10).

The engineering study was forwarded to the WRC in September of 1971, some 24 to 48 hours before the September Commission meeting. At the meeting, Plan II was adopted by the Commission. The following is an account of the session provided in the minutes of the meeting:

"Friday afternoon - September 24, 1971: Following considerable discussion, Mr. Balden (Industry) made a motion, supported by Mr. Pierce (DPH), that the Commission adopt Plan II. Mr. Woodford (Highway Department) then made a motion, supported by Mr. Slaughter (DNR), that the Commission table action on the motion to allow more time to review the various options. The motion failed by a vote of two in favor and three against. Chairman Kitchel (MUCC) did not vote. Following further discussion, Chairman Kitchel called for a vote on the first motion with the result showing five in favor, with Commissioner Woodford dissenting. Plan II calls for the construction of a secondary treatment plant on Lake Erie at the mouth of the Huron River with an intercepting sewer conveying to it the sanitary sewage from all of the service area in Wayne County, Oakland County and Washtenaw County. The plan, if concurred in by the Federal agency, will prevent individual communities within the service areas seeking to construct new or

upgraded treatment plants from receiving state or Federal construction assistance funds. Monies instead would be approved only for the intercepting sewers and metro treatment facilities".³⁷

In retrospect, it is unclear why the Plan was rushed through a final decision with such a short time for consideration. This is in contrast to the WRC's routine tabling of enforcement actions. It is very interesting to note that Mr. Balden and Mr. Pierce, proponents of the plan, were both on the Technical Advisory Committee to the 1964 NSF Study!³⁸ At the time, Mr. Balden was not yet a member of the Commission, while Mr. Pierce was Chief of the Wastewater Section, Department of Public Health. Since both were most likely intimately aware of the NSF findings, an objective analysis as Commission members would seem difficult.

As was pointed out in the segment of the minutes printed above, the adoption of Plan II would cause individual communities to be denied grant requests for expansion of individual treatment plants which would be replaced by the interceptor system. Ann Arbor, the community at the end of the Huron River Interceptor, was placed in this position. It preferred a plan which would allow the expansion of the existing Ann Arbor Treatment Plant to include tertiary treatment. Accordingly, following the September WRC meeting, Ann Arbor petitioned for a reversal of the Commission's concurrence on Plan II.

A conference was held in November, 1971 between representatives of the City of Ann Arbor and the WRC. At this

meeting, lengthy arguments were made by Ann Arbor in opposition to Plan II. In the closing remarks of Ralph Purdy, Executive Secretary of the WRC, the need for and requirement of the preparation of an environmental impact statement was identified. Accordingly, in December of 1971, an environmental assessment of the proposed plans was commenced. This raises the question, why wasn't such an assessment prepared prior to the Commission's September endorsement of Plan II? Effective decision-making is conditioned upon accurate and adequate information. If the Commission felt that such an assessment was not necessary to make a proper decision, then why was the assessment prepared at all? If the answer to this question is because it is required, then it would appear in this case that the compliance with environmental mandates by the State was effected solely for procedural reasons rather than for substantive ones.

The intent of environmental impact requirements is to guarantee the addition of environmental information into a planning process previously dominated by economic criteria. If the WRC is preparing such information solely to "meet the requirement", then a violation of the intent of such requirements is apparent. If one presumes that similar environmental requirements were written into law as a result of a majority public interest then the subversion of such requirements violated the interests of the majority public, constituting an administrative corruption of the powers

of public resource stewardship.

Even if the motives underlying environmental assessment preparation are overlooked, the time of the assessment raises further questions of validity in light of the concept of bureaucratic legitimacy articulated in Chapter Four. The Commission had endorsed Plan II. The Commission has been shown to be highly dependent upon the Bureau of Water Management for technical advice. This fact, and statements by the Executive Secretary, indicated upper-level staff support for Plan II. Lower-level staff were asked to prepare an environmental assessment of the plans. Since rules and rewards flow from the top, obedience usually flows from the bottom. It is unlikely then that the staff would willingly contradict the Commission, as this would jeopardize the validity of past and future Commission decisions.

The Environmental Assessment was finished in February, 1972. Not unpredictably, it concluded its findings in favor of Plan II:

"In summary, many factors of the alternative plans came out equal but considerable weight was attached to the higher levels of protection and lower risks afforded by the interceptor system and treatment at Lake Erie".³⁹

Assuming the risk question to be a significant enough criterion upon which to make a decision between two types of plans, Ib and IV would be ruled out. The Assessment also asserts Plan II preference over Plan III. The prime reason given was that of the lower per capita costs of Plan II. To start with, it is not clear that the valid role of an environmental assessment is to select one plan over another, making

it in effect a decision document. Beyond this, selection of one plan over another on the basis of cost criteria would certainly appear an unlikely function of an environmental assessment.

If the risk question is looked at closely, the validity of its use as a decision criterion is questionable. The Assessment states that both Ib-type plans and II-version plans would improve the quality of the Lower Huron River.⁴⁰ The difference is that in case of treatment plant malfunction, under Plan Ib, wastes would be discharged into the Huron River, while under Plan II, wastes would be discharged into Lake Erie. The Assessment suggests that the waste discharges into the Huron would be a threat to recreation, but not to public water supply.⁴¹ It also suggests that Plan II raw waste discharges into Lake Erie would adversely impair recreation along the Michigan shoreline.⁴² It would seem then that plant failure at either location would adversely affect recreational uses. The Assessment states that no tertiary plant of the size proposed for Ann Arbor had been built yet in the State and implies that the risk of failure at such a plant would be greater than at a conventional facility. The report fails to mention, however, that no secondary plant of the size proposed for the Lake Erie facility had previously been constructed in the State either.

The point of this discussion is that the Environmental Assessment made conclusions that were at best questionable. It is not the intent of this report to provide a lengthy

comparison of Plan II with other alternatives. The intent, however, is simply to point out that administrative structure which had been built into the planning process to guarantee an efficient and comprehensive consideration of all potential alternatives and impacts had been eroded and remolded into use as a decision weapon in the political arsenal. The search for alternatives had been essentially frozen as of the Black & Veatch and NSF Reports--documents using 1960 technology, values, legislative guidelines, rules, and regulations. The development of the federal water quality program in the 1960's was evidence of shifts in technology and values. Yet Plan II was born and came of age in the early 1960's. By 1973, it should have been allowed to die a natural death. Instead, its family fed it political drugs to ensure their own survival. This report does not condemn the practice of artificial rejuvenation practiced by the Plan II proponents, in view of the value systems under which they operate. The report does suggest that the coercion of the process has led to ineffective and noninnovative planning output. Innovative ideas and processes are born into a hostile world. The vested interests in the past have proven to be formidable opponents to positive change.

The effect of the Environmental Assessment was predictable. At the February meeting of the WRC, representatives of Ann Arbor presented further arguments in opposition to Plan II. Prefacing the vote for final approval, the WRC

staff reminded the Commissioners that no water or sewer construction grants were available for the entire region until the Basin Plan was approved by the U.S. Environmental Protection Agency (EPA). EPA approval, of course, was conditioned upon State approval. The threat of a delay in receipt of federal monies was certainly a significant factor in the consideration of a final decision. If Plan II was not approved, the State would have to go back to the drawing boards to come up with an acceptable plan. Meanwhile, federal funds would be placed out of the reach of the State treasury. In addition, a vote against approval would suggest a lack of consideration prior to the September 1971 vote. Also, if the Commission declined approval, it would be in contradiction with its own staff's opinion. Accordingly, the WRC voted (6 in favor, 1 abstention (Municipal Groups Representative)) to continue its approval of Plan II.⁴³

To comply with the provision of the National Environmental Policy Act (NEPA),⁴⁴ an environmental impact statement (EIS) must be prepared on every major federal action significantly affecting the quality of the human environment. Since the Interceptor plan would require the expenditure of many millions of federal construction grant dollars, an impact statement was required. The intent of NEPA was to guarantee the injection of specific environmental information into the decision process, including the consideration of impacts of and alternatives to the proposed action. The Draft EIS that was issued by EPA in February 1973 was

essentially a rubber stamp of the WRC Environmental Assessment. Indeed, the Acknowledgement section of the EIS states that "portions of this Environmental Impact Statement were taken directly from the 'Environmental Assessment - Phase I Plans for Water Quality Management, Southeastern Michigan Area,' prepared by the Michigan Water Resources Commission".⁴⁵ The statement concluded that the EPA should approve Plan II.

Public hearings were held in April of 1973 on the Draft EIS. 38 speakers spoke in opposition to the Plan. The only four speakers who supported the findings of the EIS were representatives from the Detroit Metropolitan Water Department, the Wayne County Road Commission, the State, and SEMCOG. A Final EIS is expected in the near future.⁴⁶

From the above chronology, it appears clear that wastewater management planning in Southeastern Michigan was essentially set by the Black & Veatch and NSF Reports of the early 1960's. Assumptions made in the NSF studies have been proven to be questionable. The Plan is noninnovative and inefficient because of a failure to adequately address present and future problem states and trends. For example, stormwater runoff was not addressed by any of the plans. Yet studies by researchers at the University of Michigan⁴⁷ have demonstrated the significance of pollutant inputs due to runoff. Indeed, Plan II's primary assumption that water quality will be significantly improved in the lower-Huron may be false, considering Canale's conclusions that water quality was already poor above Ann Arbor due to stormwater

runoff and municipal users upstream.

The induced effects of growth and the resultant increased needs for water supply and wastewater treatment were also not addressed. Indeed, the EIS stated that "implementation of the proposed interceptor system will probably not affect planned land use."⁴⁸ Studies have shown, however, that service corridors do indeed spawn urban sprawl along the corridor.⁴⁹

Proponents of the Plan claimed that it would not significantly degrade the waters of Lake Erie. It is hard to determine what is "significant", but considering the findings of studies cited above, Lake Erie appears to be in a perilous life-death balance. It seems difficult to believe that a discharge of 121 million gallons per day of secondary-treated sewage effluent will not weight the Lake Erie scales in an adverse manner. It would seem especially dangerous to add effluent treated to remove only 90 percent of phosphorus when the biggest problem appears to be increased eutrophication due to massive nutrient inputs. It is particularly difficult to understand the non-degradation conclusion considering the 1968 FWPCA Report's recommendation that by 1990 tertiary treatment should be a general basin-wide requirement. Plan II was designed to be at capacity in 1990. This raises the additional question of planning horizon: Why was a planning horizon of 1990 used when the system wouldn't become operational until 1981?

The environmental assessment procedure was supposed to

identify plan shortcomings and viable alternatives. This didn't happen. The WRC's Environmental Assessment was largely a justification of Plan II. The EPA's Impact Statement was largely a reprint of the WRC document. The lack of an original analysis would appear to violate the intent of NEPA. It is unlikely that the EIS was intended to make conclusions and become a decision document. If conclusions are warranted, it is even more unlikely that nonenvironmental cost data was intended to be used as the basis of such "environmental impact" conclusions.

Many of the opinions expressed in the EIS are farcical. For example, in delineating areas of irreversible and irretrievable commitments of resources, the document states: "except for materials of construction, there will be no irreversible and irretrievable commitment of resources. It is possible to remove interceptor sewers and treatment plants and revert the land areas back to their natural state".⁵⁰ Lest it be forgotten, the Huron River Interceptor Plan proposed a concrete pipe ranging from 5 to 13 feet in diameter at a depth of 0 to 100 feet below ground surface, travelling a distance of more than thirty miles.⁵¹ Indeed, perhaps the EPA should be commended for noting (in a paragraph identical to that printed in the WRC document) the positive environmental enhancement value of planting trees at the treatment plant site.⁵²

The point of the discussion is that the proposed Plan and the EPA and WRC environmental analyses fit the pattern

of incremental, programmed, noninnovative decision-making. Advanced treatment was never considered for the Lake Erie plant. Smaller, regional, satellite plants which would provide high orders of treatment were never considered. The only non-interceptor alternative vaguely suggested in the Impact Statement, that of land disposal, was dismissed due to a cost criterion (not on environmental grounds). Certainly, at least valid questions were raised prior to WRC approval, preparation of the Environmental Assessment, and EPA EIS consideration, Yet these questions were never adequately addressed in any of the documents. It appears clear, then, that the decision was made largely on political grounds, in the sense of maximizing concurrence support. The EPA seemed to make their priorities clear in the conclusion of the EIS:

"The proposed Plan II has been endorsed by the Southeast Michigan Council of Governments and the Michigan Water Resources Commission, and the EPA has concluded that the proposed Plan II is the most environmentally compatible solution to the wastewater management problems of the Huron River Basin area".⁵³

This order of considerations, political then environmental, was reflected throughout decision-making, refracting the efficiency of the process. Unfortunately, the most powerful political interests have a vested interest in maintenance of the status quo (see Chapter Four). To make this more lucid in the context of the Huron River Interceptor case, a concise look at representative policy actors and the stakes which each had in the outcome of the issue follows.

Detroit Metropolitan Water Department: The DMWD was strongly in favor of Plan II. As seen earlier in the discussion, the DMWD has been continually spreading its influence by selling water to more and more of Southeastern Michigan. It now supplies water to more than half of Michigan's population. Ann Arbor and Ypsilanti currently use Huron River water for domestic purposes. If they were to pipe their wastes through an interceptor system, the Huron will be reduced to about a third of its flow below the water intakes. It is likely, therefore, that an alternate source of water supply would have to be found. Needless to say, the DMWD would be happy to comply.

Wayne County Road Commission: The WCRC was also strongly in favor of Plan II. The WCRC is in the business of sewer and road construction and maintenance, and also operates the Detroit Metropolitan Airport. It controls four wastewater treatment plants, and approximately 253 miles of interceptor sewers, and treats the wastes from approximately 3,370 miles of connector sewers.⁵⁴ Nowhere in the approved WRC Plan did it say who would build and operate the wastewater treatment system, but Wayne County was openly available for the task.

City of Ann Arbor: Ann Arbor was strongly opposed to Plan II. As the community at the end of the Huron River Interceptor, it would have preferred to remain independent of the system. Plan II would be more costly to the City than expanding the existing Ann Arbor Treatment Plant to

provide tertiary treatment. In addition, while costs would be higher, wastes would be given less treatment. Inclusion into the interceptor system would more than likely necessitate a search for alternate sources of drinking water. Thus, the City would lose control over its wastewater and water supply facilities. Ann Arbor applied for a grant to upgrade its treatment plant to tertiary treatment, but the WRC refused (preferring the interceptor scheme).

Oakland County: Oakland County was pro-Plan II. It is currently largely undeveloped. An interceptor system would facilitate future development. However, at the existing time, the County couldn't afford to pay its own share of an interceptor arm. Thus, Ann Arbor would essentially be paying for part of Oakland County's share.

Southeast Michigan Council of Government: SEMCOG is the A-95 regional planning agency. It supported Plan II. Interestingly, the Council's Technical Staff came out against the Plan. Why was the Council for it? The answer might lie in the fact that if SEMCOG didn't support Plan II, two plans would exist. Because federal grant approval is contingent upon the existence of one regionally-approved plan, disapproval of Plan II would further delay the receipt of federal monies. Thus, afraid of losing the federal dollars, SEMCOG gave its golden "regional plan" stamp to the project.

U.S. Environmental Protection Agency: EPA came out in favor of the Plan in its Draft EIS. Since the regional

agency (SEMCOG) and the State (WRC) had approved the Plan, disapproval of the Plan would appear contrary to "local interests". The federal government, especially in the Nixon administration, wanted to reward and support local initiative. From the facts of this case, it appears both EPA and WRC locked onto the concept of regionalism as one physically tied together by interceptor lines. The Environmental Impact Statement was not intended to be a decision document; rather, it was intended to facilitate the decision-making process by providing additional information. However, EPA also controls 75 percent federal grant monies. Since a favorable EIS is a prerequisite to receipt of grant monies, the Impact Statement became in effect the decision document.

Michigan Water Resources Commission: The WRC supported Plan II. Although it has the overall responsibility for water quality in the State, in this case, it was responsive largely to the interests in Detroit and Wayne County. It is thought that the WRC believed it could minimize the planning hassle by supporting Plan II. In addition, a single plant would be easier to monitor and control than would be a network of plants using advanced and possibly unfamiliar technology. An additional State motive for support of Plan II was to ensure the timely capture of available federal funds. Thus it appears that the WRC got locked into an outdated position and either wouldn't or couldn't let go.

The Case of the Huron River Interceptor, then, illustrates a situation whereby planning was effectively

frozen as of the early 1960's. The institutions and processes which had arisen to guarantee comprehensive and effective planning had failed or had been coerced into use as political weaponry. As is reiterated in the next case, the State water agencies, the WRC and the DPH, were antagonistic to change. In the Muskegon case, however, rather than supporting an outdated plan, they opposed a novel and innovative plan.

CHAPTER SEVEN -- THE MUSKEGON COUNTY CASE

"No vested interest is so powerful as the vested interest in an idea"

-Burke

The wastewater management system which was adopted for Muskegon County evolved out of a series of regional waste treatment schemes prompted by a continually declining ecologic and economic regional environment. The system which developed is exceptional in that in the space of 36 months, from August 1968 to July 1971, an innovative wastewater management policy was formulated, legislative approval of 14 local governments (including the County Board of Commissioners) was obtained, administrative approval of two state agencies was secured and approval of various federal agencies given, the engineering plans were prepared, and the bonds for financing offered for sale. How was this possible? What factors prevalent in the Muskegon experience account for the political success of such an innovative system? The material in this chapter attempts to shed some light upon these questions through a detailed chronology¹ and analysis of the Muskegon case.

Muskegon County encompasses an area of 510 square miles in western lower Michigan bordering on Lake Michigan. Its economic development generally paralleled that of the rest of the State as was articulated in Chapter Three. By 1840, the area had become a prosperous center of urban activity. In the nineteenth century, its economy was based largely on the exploitation of the pine forests which blanketed the

area. However, by 1900, the timber resources were largely depleted due to clearcut logging practices. This caused a slowdown and an eventual transformation of the economy into one dominated by heavy industry.

Industrialization began with the expansion of the foundries which had supplied heavy machinery to the lumber mills. An abundance of high quality sand was prevalent in the area and was used in the making of molds used in the foundries. The initial market for foundry products was the railroad industry. Later, as the automobile gained in the economic hierarchy of the State, Muskegon industry shifted into automobile manufacturing supply. The two World Wars maintained a continued source of demand for area production. In 1927, oil was discovered in the region. However, by 1940, the fields were largely depleted or wasted due to exploitation, ineffective regulation, and inefficient extraction.

The third major resource, the land, had been left barren behind the lumberjacks with neither the topsoil nor the drainage to support a viable agricultural segment of the economy. Urban growth and the proliferation of heavy industry had had a disastrous impact on the regional environment. The shoreline and dunes areas, perhaps the region's most striking natural features, had been left degraded and destroyed. Pollution and urban sprawl had run rampant.

By the 1950's, the effects of continued environmental degradation and a lack of a diversified economy was felt. Area industries couldn't compete with more modern plants

elsewhere; the widespread environmental degradation inhibited their expansion. In addition, pollution and a largely unskilled work force discouraged new firms from locating in the area:

"By 1968, the unemployment rate was twice the national average; the young and more educated residents were emigrating; deteriorated residential and commercial property was widespread; and agriculture and tourism was almost non-existent".²

Indeed, the County population highlights the effects of local deterioration as it declined from 166,854 persons in 1968 to 157,426 in 1970.³

It became evident then that piecemeal solutions to the County's problems would not be sufficient to reverse the downward economic spiral. A total rehabilitation of the environment was needed. The creation of the Muskegon County Metropolitan Planning Commission laid the foundation for the evolution of an aggressive metropolitan planning program. Wastewater became a central planning feature as a result of the Lake Michigan Pollution Conference ruling that all municipal and industrial wastes must be given the equivalent of secondary treatment with eighty percent phosphate removal by the end of 1972.⁴

"In reviewing Muskegon's planning efforts, three elements stand out. One, a rare willingness was exhibited to move toward regional development objectives not constrained by the conventional approaches. Two, respect was given to the natural ecological cycle as a closed system in developing a program for regional development. Three, water was seen as the key to total regional development".⁵

Not only did wastewater management become a planning focus, but it was seen as the key to revitalization of the regional

economy. This is thought to be significantly innovative considering the engineering norm of plan minimization of development and growth pressures resulting from increased wastewater treatment capacity.

In the Spring of 1968, Roderick Dittmer, Muskegon County Planning Director, went to John R. Sheaffer at the Center for Urban Studies of the University of Chicago for help in devising a wastewater management policy in accordance with the Lake Michigan Conference pact. Sheaffer and associates studied the region and recommended a system which was based on several widely-used processes which had not been previously integrated into a single system.⁶ Figure 13 contains a schematic representation of the system.

Basically, wastewater is piped from urbanized shoreline areas to suitable locations inland where it is given the equivalent of secondary treatment (in aerated lagoons). After storage and disinfection, the effluent is spray irrigated onto crops. Possible income-producing crops include corn, beans, onions, winter wheat, and legumes.⁷ Passage through the "living filter" of the soil further purifies the water. Finally, the treated water is collected in an underdrainage system, monitored to assure that it meets drinking water standards, and discharged to the surface waters to augment low flows. Thus the system aims at a total management approach, using the water resource as a waste transport and treatment medium and as an input to crop production, finally returning it to its source in a near-original condition.

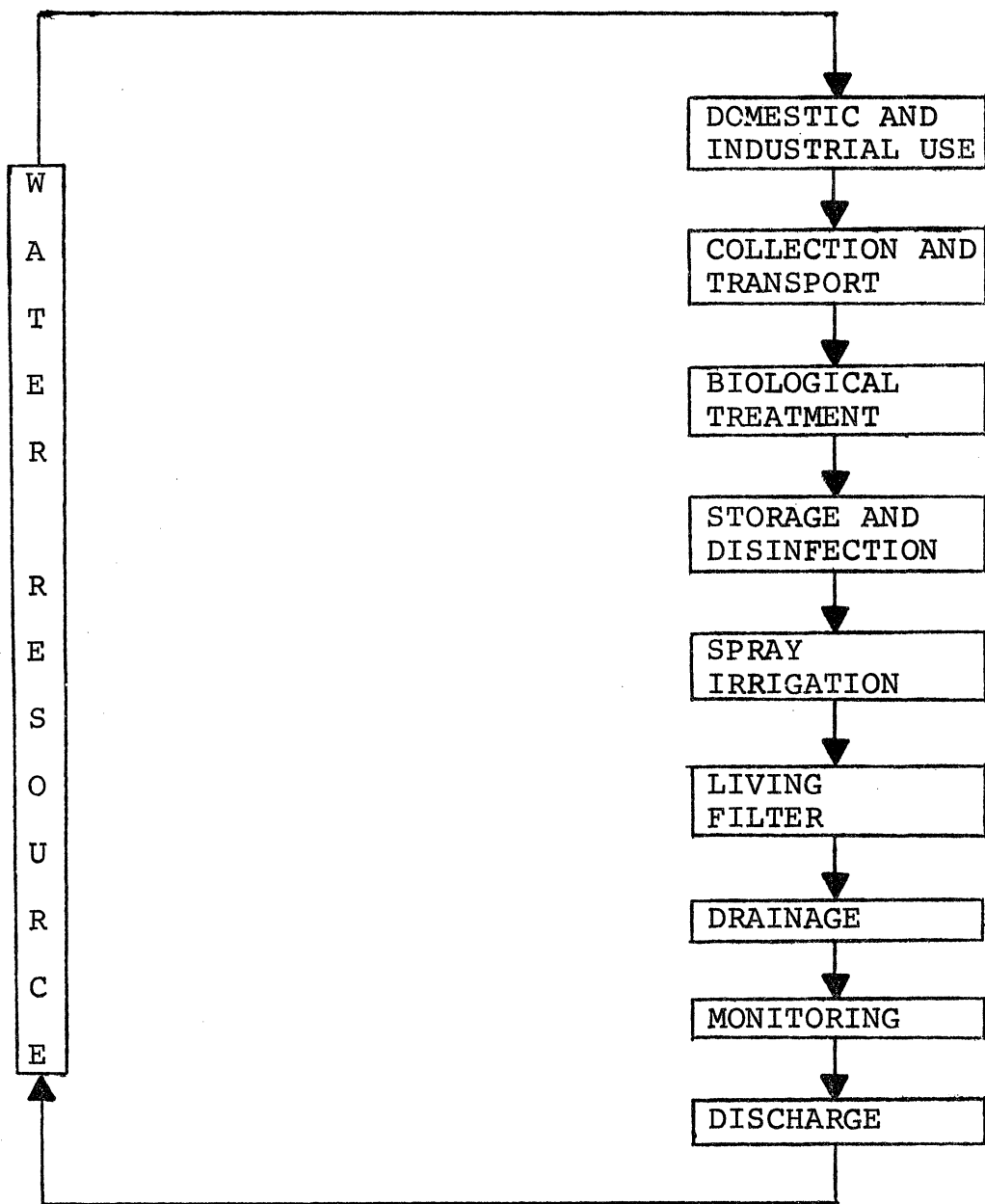


FIGURE 13 -- SCHEMATIC REPRESENTATION OF THE MUSKEGON COUNTY WASTEWATER MANAGEMENT SYSTEM

The system was seen by its promoters as creating a viable agricultural sector for the County, permitting development of water-oriented tourism, encouraging industrial growth, further developing the County's natural and human resources through a better living environment and more job opportunities, and encouraging the development of more extensive housing, transit, and education facilities. The image which was promoted was one of total County revitalization as is represented in Figure 14.⁸ Figures 15 and 16 contain maps of the system.⁹

In order to implement the system, Sheaffer developed a policy which could be effected only by banning waste discharges into the rivers and lakes. Dittmer endorsed the policy and the Muskegon County Planning Commission followed suit on January 30, 1969. However the State opposed the system. Sheaffer stated that:

"The Michigan State Water Resources Commission did not like our point of view. What we proposed would meet any situation anyone could think of up to the year 2000. Why go to all that expense? It was costly enough to try to think in terms of 1980".¹⁰

The State thought that the expense of carrying out the policy was too costly in light of the expenses necessary in the first decade of plant construction and operation. Project construction costs alone (not including engineering, legal services, administration, fiscal, and land) would run more than 33 million dollars.¹¹ Operating costs, however, would be low, with estimated costs at approximately 90 dollars per million gallons treated. Operation of an advanced conventional

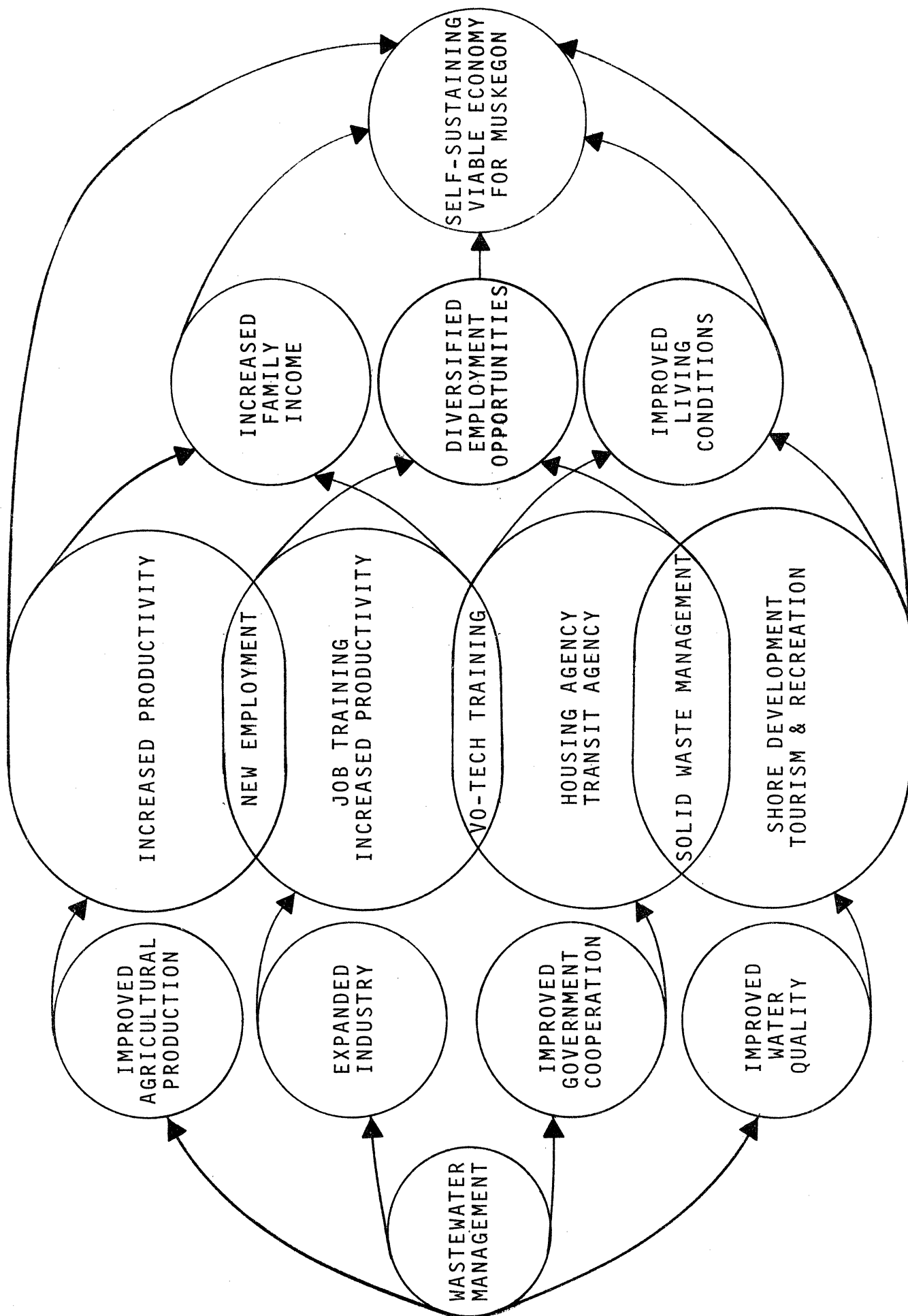


FIGURE 14 -- MUSKEGON COUNTY WASTEWATER MANAGEMENT SYSTEM: A MEANS FOR COUNTY REVITALIZATION

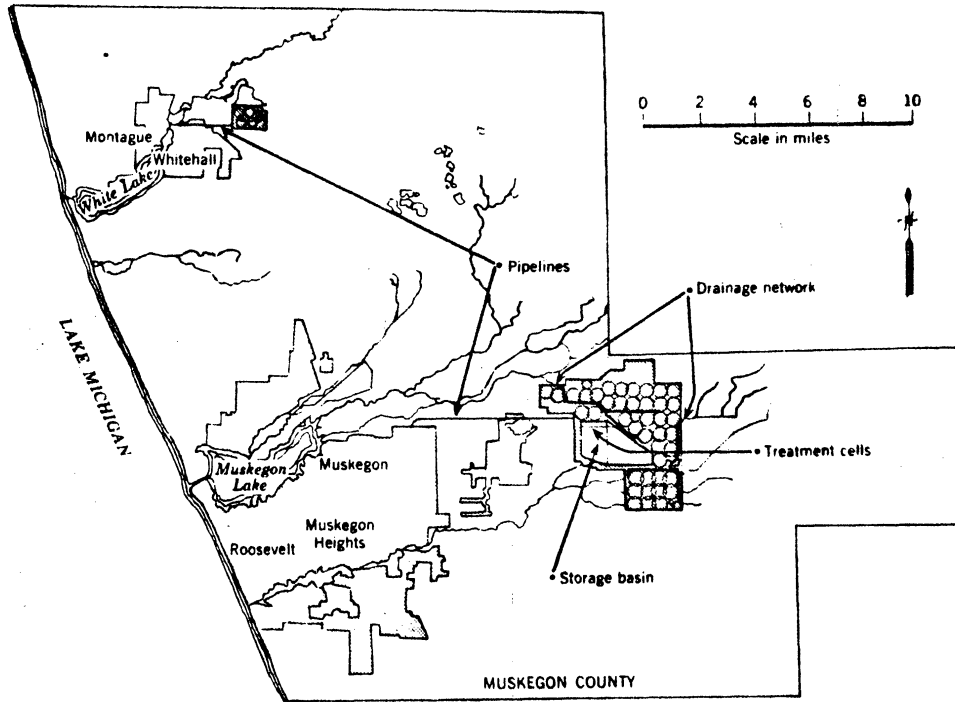


FIGURE 15 -- MAP OF MUSKEGON COUNTY OUTLINING THE LOCATION OF THE WASTEWATER MANAGEMENT SYSTEM

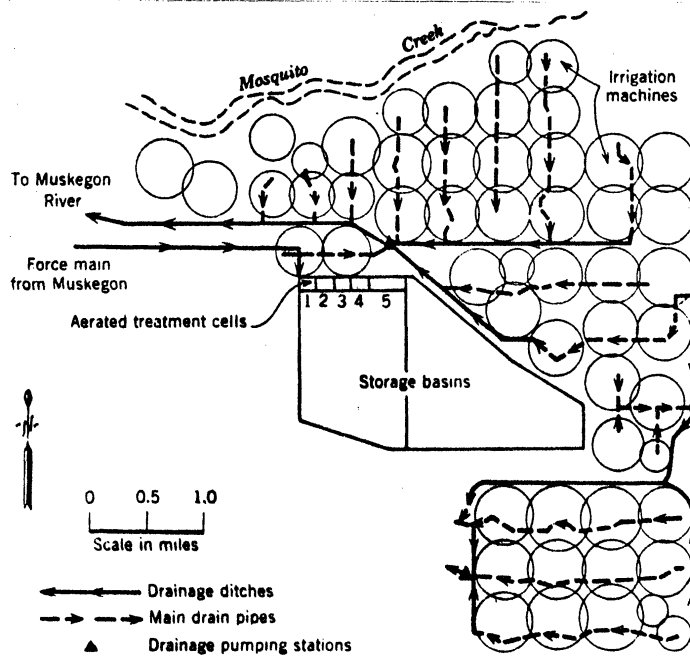


FIGURE 16 -- MAP OF MUSKEGON COUNTY TREATMENT FACILITY

plant would cost about double that amount.¹² Over a twenty-year financing period, the average annual cost of the plan was projected to be actually \$3.30 less per capita than the cost of meeting less demanding federal water quality standards through conventional waste treatment.¹³

Following the United States Supreme Court's "one man, one vote" decision, the Muskegon County Board of Commissioners was reapportioned and streamlined down to 15 members (9 Democrats, 6 Republicans). In February 1969, disregarding partisan considerations and the State's expressed displeasure, the reapportioned Board voted to support the Planning Commission.¹⁴

The decision by the State to impose strict nutrient standards on wastewater effluents to water bodies (which became effective in 1972) increased pressure on the County to develop a management system. To meet the requirement, a project would have had to have been funded during Fiscal Year 1970. The deadline for grant applications was May 15, 1969. Riding on the inertia created by the policy-adoption action of early 1969, a detailed proposal was drawn up by Bauer Engineering, Inc., approved by the County, and forwarded to the WRC on May 14.

The WRC's opposition to the plan encouraged local opposition. The Cities of Muskegon and Muskegon Heights drafted plans for conventional treatment which would dump effluent into the river system. From a short range perspective, the local systems looked more economical than the Bauer plan. Local sanitation consultants, still working with

conventional technologies, advised local politicians to use conventional treatment. Accordingly, the City of Muskegon also submitted a proposal to the State for grant funding.

"The Water Resources Commission's policy in cases of local conflict was to leave the resolution of conflicting proposals up to the local governmental units".¹⁵ If local differences were not resolved within 60 days, the WRC had the authority to make a decision as to the best method of local treatment.

A concurrent problem faced by proponents of the management scheme was that of obtaining the approval of the State Department of Public Health. The Department had expressed a number of scientific reservations about the plan which would take some six months to resolve. In light of this situation, a three-part program was embarked upon. Efforts were made to: 1) develop local acceptance of the County program, both by generating local support for the plan and by resolving the differences between the City of Muskegon and Muskegon County; 2) postpone any decision by the State until the County had built an unassailable case; and 3) obtain a federal demonstration grant to illustrate the feasibility of the system.¹⁶

Several factors convinced the City of Muskegon to withdraw its grant proposal: 1) feasibility studies indicated the potential of the County system; 2) education programs conducted by the County had generated significant intra-City opposition to the local plan; 3) administrative shifts

in the City government replaced the former anti-County plan City Manager; and 4) position shifts by the S.D. Warren Paper Company lent considerable support to the County system. Warren Paper Company would have to pay more than half of the local costs since its wastewater flows would account for some 55 percent of treated wastewater. It realized that the County system, if it performs according to design specifications, would solve the problem once and for all, and would have lower treatment costs than conventional systems.¹⁷ Other Muskegon industries followed suit, and the local opposition began to crumble. However, the State water agencies still did not give their approval.

Sheaffer and Dittmer cultivated the interest of Michigan Congressman Guy VanderJagt in the project. VanderJagt remarked the "It appears that our present efforts (in handling sewage disposal) are headed in the wrong direction...I will predict that the Muskegon County facility will be the focal point for the Nation's battle to solve water pollution problems".¹⁸ Accordingly, VanderJagt went to David Dominick, Head of the Federal Water Quality Administration, Russell Train, Chairman of the President's Council on Environmental Quality, and John Ehrlichman, President Nixon's Assistant for Domestic Affairs. A letter from the President to John Sheaffer in April 1970 praised the system as "a new and promising approach to sewage disposal".¹⁹ A newspaper article suggested that "the reason for such high-level interest is that officials think Muskegon's plan may turn out to be a model

system for communities everywhere that are struggling with the problem of what to do with their sewage and, at the same time, clean up their environment".²⁰

In accordance with this White House interest, Train voiced his enthusiasm to Dominick, who wrote a favorable letter to VanderJagt. VanderJagt carried this letter to Michigan Governor William Milliken. The Governor announced his plans for an environmental tour of the State shortly thereafter, with Muskegon as one of the stops. After his return to Lansing following the tour, approval of the project came from the WRC (June 1970). In September of 1970, Secretary of the Interior Walter Hickel announced that the Federal Water Quality Administration had awarded the County a demonstration grant of over 2 million dollars.

Approval still had to be obtained from the State Department of Public Health, and financing had to be arranged. Difficulties with the Health Department (who license plants) continued, ostensibly over the reliability and safety of the proposed project:

"Although the feasibility studies were completed in July of 1970, the Department of Public Health continued to have reservations about the proposal. The proponents felt that the Department of Public Health was being reticent in its approval for non-technical reasons that went beyond mere bureaucratic resistance to innovative ideas and approaches that required new expertise. They felt that the Michigan consulting engineers were lobbying with certain decision makers in the Department of Public Health in order to delay the Muskegon Project since Bauer Engineering was an out-of-state firm".²¹

To obtain SDPH approval, political pressures were again placed upon the Governor through Representative VanderJagt.

Finally, approval came in April of 1971.

The final task was that of obtaining the financing to sell 16 million dollars in revenue bonds to make up the County's share. A difficulty arose with the financing arrangements when a group of citizens formed an organization to oppose the project and indicated their intent to file suit at a late moment. The County thought that an early adjudication was essential to prevent interference with the sale of the bonds and with the receipt of State and federal construction grant monies. Accordingly, it brought suit for a Declaratory Judgement against the citizens group. The group filed a counterclaim under a Michigan statute whereby individual citizens may bring a relief action where an alleged pollution is likely to occur. The case was advanced for an early trial in May of 1971. At the culmination of the litigation the entire Court went to Pennsylvania State University to view a demonstration of a pilot system similar to the proposed county system. After its return to Michigan, the Court held unanimously in favor of the County, that the system wouldn't constitute a nuisance or a hazard. It also held against the counterclaim stating that the proposed system wouldn't pollute the air, water, or other natural resources. The opinion also concluded that there was no feasible and prudent alternative to the system. The decision thus opened the way for the sale of the bonds, which was undertaken in July of 1971.

Thus, in addition to the normal difficulties of program

formulation and local acceptance, time constraints, problems of financing, and bureaucratic entanglements with the State government contributed to the overall difficulty of project implementation. In light of these problems, why was Muskegon successful? If one looks at the twelve generalizations expounded by DeSantis in explaining the Bond Issue communication campaign (see Chapter Two, Part A), it became clear that the factors which accounted for the Bond Issue's success were also accountable for the Muskegon project success. Both the Bond Issue and the Muskegon project were essentially sold to the people.

Several factors were especially significant in the Muskegon case: 1) a favorable climate for implementation prevailed. The period in which the project was in controversy was one of increasing national interest in the environment. The date that the project was given final WRC approval was close to that of the first Earth Day in Spring of 1970. In addition, the Muskegon County government had been modified by adopting a streamlined County Board, reducing the membership from 45 to 15 persons. The Board was controlled by Democrats who had won in an upset and had an aggressive platform stressing decisive action by the County. This was evidence of a period of renewed interest in County government as a medium for dealing with problems of governing large metropolitan areas. The delineation of a 1972 State deadline for communities and private interests to meet water quality standards also helped to create an environment geared to action.

2) The project received energetic professional leadership which guided the implementation from the beginning to the end, providing continuity and purpose to the entire set of actions. In particular, John Sheaffer had a vested interest in the project, and expended considerable energy in pursuing its adoption.²² Bauer Engineering, Inc. of Chicago had a similar interest in the treatment system and accordingly was willing to design a system unlike conventional systems. John Lear, Vice President of the firm, stated that:

"(Bauer Engineering) is not bound by the traditions which have mitigated against innovation in the field of public works, Secondly, it feels that programs must be responsive to regional goals and aspirations ...Finally, Bauer Engineering, working within the framework of ecologically sound principles, seeks always to raise the efficacy of the local area by providing them with a vision that can be accomplished. This is in stark contrast to the typical approach which attempts to scare people into action".²³

In addition to the above two groups and to committed local planning officials, the involvement of Congressman Guy VanderJagt was critical to the adoption of the system.

3) The proposal was basically a "good idea". The spray irrigation system resolved the problem of the necessary provision of high levels of treatment in order to release effluents into water bodies by simply not directly releasing any. Although all of the project subsystems had been proven successful elsewhere, they had never been put together in a comparable system. Thus, the novelty of the plan generated enthusiasm in its potential (e.g. see President Nixon's comments above). In addition, the project was representative

of local goals and aspirations and therefore could generate significant self-serving support.

4) Planning must be regarded as a process which considers project implementation as well as plan formulation. This approach was taken by Sheaffer and Dittmer. A study of community goals and problems was undertaken prior to plan construction. The system was then designed to meet these goals (i.e., County revitalization) in contrast to the conventional "meet the State's order" approach. The problems of implementation were explicitly considered early in the planning process. For example, the Declaratory Judgement sought by the County ensured the sale of revenue bonds needed to finance the system.

5) The role assumed by the County government was unique in its dominance as a viable regional governing institution. This advocacy role tended to disrupt normal political activity.

6) Planners built a broad base of support by cultivating diverse interests in the County, as well as by mitigating conflicting interests (e.g., by persuading the City of Muskegon to drop its separate grant application). Support was built on local, regional, State, and federal levels. For example, the Democratic Muskegon Board used the Republican politicians from neighboring Ottawa County as an avenue into the Republican State administration in Lansing.

7) Finally, considerable amounts of resources were expended by the County to produce skillful management of the controversy. Careful advance preparation was made in an

attempt to identify the key influential decision-makers. In addition, a large amount of information was dispersed through the media and through an extensive speech program.

It becomes clear from the chronology and analysis that the level of involvement and energy expended in the Muskegon case were considerable and are the exception rather than the rule in the development of local wastewater treatment systems. The system which developed is thought to be innovative more in the sense of external factors rather than due to properties of its physical operation, i.e., the system was seen as a seed to generate County unification and revitalization. The plan succeeded in spite of, rather than due to, State water agency involvement. Thus, the political system was forced into yielding a nonprogrammed decision only through the input of an extensive amount of resources and energy, factors not prevalent in the planning processes of most local areas. This poses the question, from what source should innovation be generated? Is the WRC's role one of creative goal pursuit or simply one of conventional legislative implementation? Research has shown that a small group of states consistently serve as models for the rest of the country in the adoption of new programs.²⁴ It would seem inconsistent for a state which praises its own water quality achievements in comparison with those of other states,²⁵ to overlook the model function of innovation evaluation and generation. Questions and comments such as these are more extensively articulated in the final chapters of this study.

CHAPTER EIGHT -- OTHER CASES

"Decision makers, in spite of many supposed lapses, do ultimately succumb to logic and to impressive argument. The search for utopia, however, is likely to be endless"

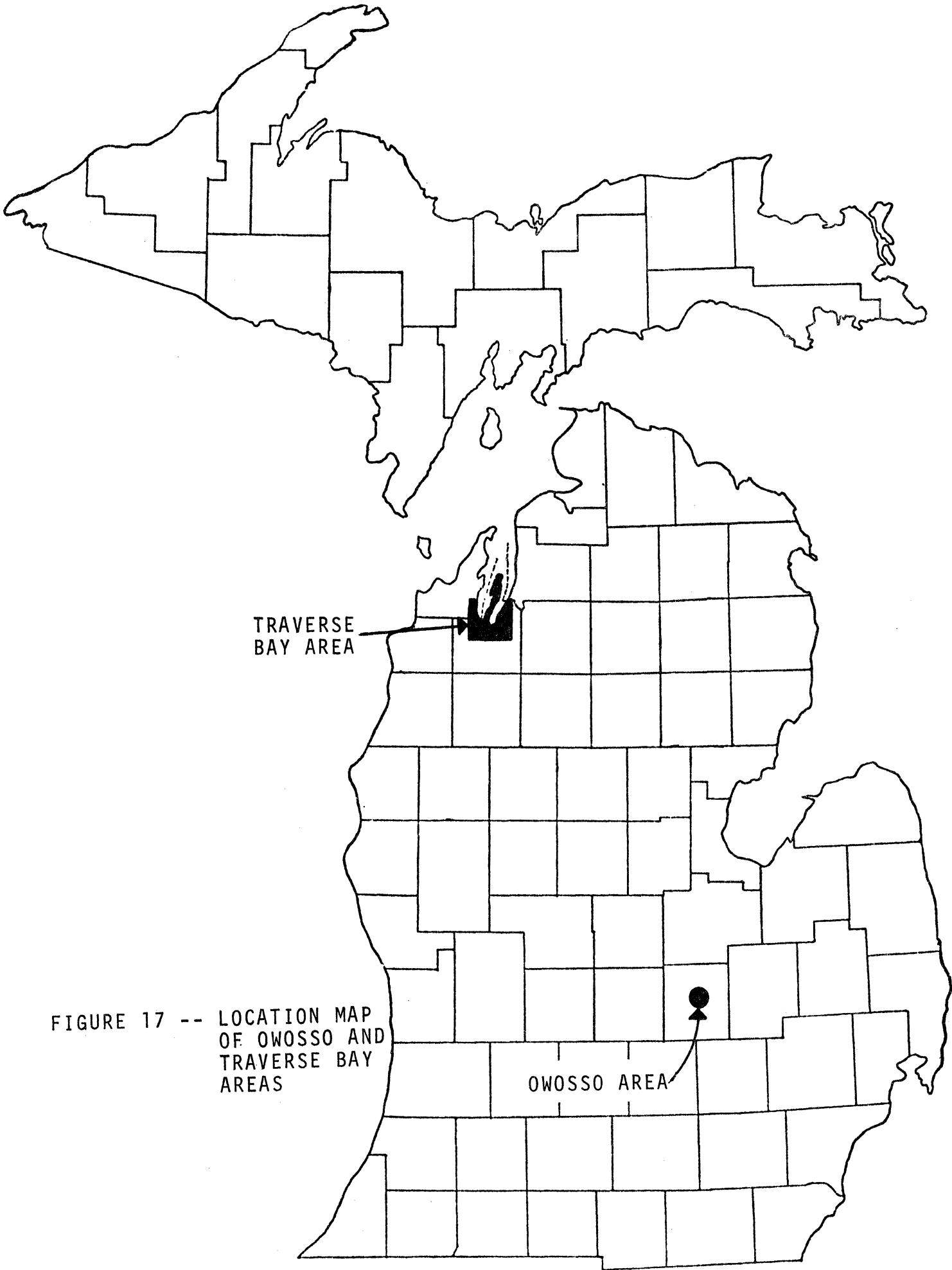
-Abel Wolman

Two additional cases are described in this chapter:

1) The Owosso Case; and 2) the Traverse Bay Case. In contrast with the cases presented in the preceding chapters, only a short summary chronology and discussion will be presented for each of the two cases in this chapter. Both of the cases are undergoing continued activity, making a documented analysis difficult. Since many of the actors involved in the cases were hesitant to be quoted in this report, it was decided that short summaries could present the lessons gained from the experiences without jeopardizing or influencing any of the parties in the cases. Many helpful insights can be gained from these two examples: Owosso illustrates a case where the use of an innovative physical-chemical treatment facility was resisted for a variety of reasons, while Traverse Bay illustrates a case where planning was essentially locked into the interceptor-activated sludge centralized plant model in the late 1960's.

A. The Owosso Case

The City of Owosso is a community of some 18,000 persons located on the Shiawassee River in central lower Michigan (see Figure 17). The wastewater treatment controversy which evolved in the area was initiated by a 1966 preliminary wastewater study by the Ann Arbor firm of Ayres, Lewis, Norris,



and May. The 1966 study recommended that a regional secondary treatment facility be constructed to service the Cities of Owosso and Corunna and the Townships of Owosso and Caledonia.

In 1967, grant applications were submitted for funds to help finance an area secondary treatment facility. However, grant monies were not available for the project because of limited funds. The 1968 Bond Issue monies hastened the controversy. Accordingly, applications for grant monies were resubmitted each year.

Three incremental shifts in stream standards forced a reconsideration of potential treatment methods. The first set of standards required treatment in the range provided by an activated sludge facility. The second set made stream requirements much more stringent, attainable only through the use of a tertiary treatment process. Accordingly, Owosso submitted an application for funds to design a biological tertiary treatment facility. However, the engineering firm, Environmental Control Technology Corporation, recommended that the facility bypass biological treatment through the use of a physical-chemical treatment plant. The City of Owosso agreed to proceed with the physical-chemical facility for several reasons: First, the City's existing, 40-year old, primary treatment plant used a chemical precipitation process which provided approximately 60 percent removal of solids. As a result of their familiarity with the chemical processes, City officials were interested in the physical-chemical process.

Second, the second set of stream standards established by the State government could only be met by an advanced treatment scheme. The physical-chemical process was one such system. In addition, it would provide the capability for removing greater percentages of waste constituents in the future if standards were raised again.

A pilot plant was financed through the U.S. Environmental Protection Agency's Demonstration Grant Program to determine the feasibility of the treatment process. After initiation of the pilot project, the State government added an ammonia standard which hadn't been set in the second group of standards. The shift in standards necessitated further changes in plant design.

Technical approval took more than a year. Design engineers were asked numerous questions about the proposed process by the State Department of Public Health (DPH). Lack of experience with the physical-chemical process on the part of the DPH was the basic cause of lack of project approval. Finally, EPA representatives convinced the DPH decision-makers of the technical viability of the process.

After technical approval was achieved, another major administrative problem surfaced. The City of Owosso was to build a 6 MGD treatment facility to provide 3 MGD capacity for itself, and 3 MGD capacity for the two townships and the City of Corunna. However, the townships felt that they couldn't commit themselves firmly to the project without a guarantee that they would receive financial assistance to

build the necessary interceptor and collecting sewers. The problem was that the treatment facility and the sewer lines were to be financed under different grant programs.

To get around the problem, the four governmental units signed a contract which said that the City of Owosso would assume the entire cost for the facility until the time when the township connected into the plant. At that time, the townships agreed to pay their share of project, interest, and operating costs. However, to the regional office of the EPA, the arrangement was not satisfactory. The City of Owosso had to justify the financing of the 6 MGD plant. EPA-Chicago said that there was no guarantee that the townships would ever connect into the system, and therefore the extra capacity was not justified. The controversy is stalemated on this issue. The City is afraid that it will lose its grant, and have to resubmit its application under a new priority point scheme.

The Owosso chronology indicates again that innovation has to pass through a gauntlet of problems and resistances. Continued effort by officials of the City and the engineering firm helped to overcome many of the resistances. Resource limitations were overcome through federal Demonstration Grant monies. Although economies of scale would be achieved by the area system, problems of uniting the four units of government into a regionalized scheme greatly hindered the adoption of the project. Indeed, the fragile coalition between the governments fell apart several times. In 1970,

for example, a project contract was all set to be signed, but was thwarted by a change in government in the townships.

One of the greatest problems was that of securing technical approval from the DPH. Most sources felt that approval was greatly delayed by a lack of technical understanding in the DPH. Essentially, approval was obtained by deferring the technical decision to staff members of the EPA. It was also felt that the incremental shifts in the standards were rather arbitrary, and served to resist the adoption of the physical-chemical process.

The consulting engineering firm appears to be one of the few firms in the State with expertise in the physical-chemical process. Accordingly, it had somewhat of a vested interest in the process. Thus, considerable energy was spent by the firm in trying to get the process approved. Experiences like the one at Owosso may serve to restrict the proposal of future innovation.

Owosso, then, points out that realized innovation is a rarity which must overcome many obstacles, both real and artificial. It is of course desirable that a series of checks operate to evaluate potential innovation. However, at some point in time, these necessary resistances become dysfunctional and serve only to maintain status quo. The line between desirable checks and resisting hindrances is a fine one, which can only be evaluated in light of current and future values and goals. If innovation is indeed essential to the attainment of current water quality goals

as this report suggests, then the checks/hindrances line should be redrawn in a position different from that used in the Owosso experience.

The Traverse Bay Case, while reiterating the significance of the federal and State policy of induced regionalization, differs markedly from the Owosso experience. An innovative plant was resisted at Owosso ostensibly on the grounds that no one could guarantee that the plant's capacity would be fully utilized. Yet at Traverse Bay, commitments were made to expand a centralized activated sludge plant to provide capacity for outlying township areas well in advance of any consideration of methods of waste collection.

B. The Traverse Bay Case¹

Grand Traverse Bay is located on Lake Michigan on the northwestern side of the lower peninsula of Michigan (see Figure 17). Figure 18 contains a map of the region, illustrating the location of Traverse City, and Elmwood, Garfield, East Bay, Acme, and Peninsula Townships. The existing area population is distributed densely in Traverse City, and sparsely throughout the outlying townships.

The wastewater management controversy in the Traverse Bay region was initiated by a State WRC Stipulation issued to Traverse City in January of 1967. The Stipulation called upon Traverse City to upgrade and expand its waste treatment facility from primary to secondary treatment. In 1967 and 1968, Traverse City and Garfield and East Bay Townships submitted separate applications for federal construction grants

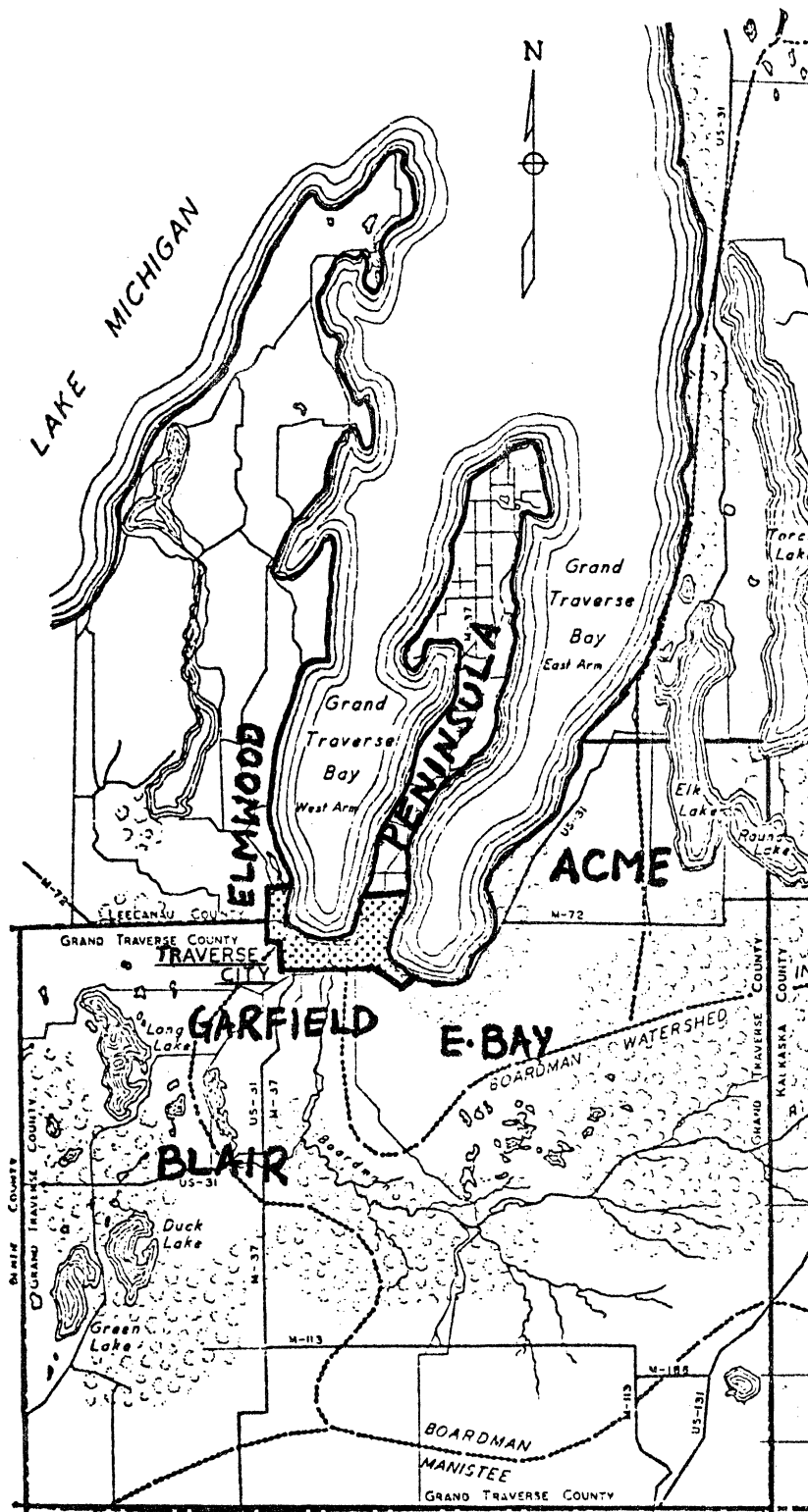


FIGURE 18 -- MAP OF TRAVERSE BAY REGION ILLUSTRATING TOWNSHIP LOCATIONS

to develop individual treatment systems. However, in 1968, the localities were advised by federal and State agencies that no grants would be provided unless a regional treatment approach was taken. This requirement reflected a federal grant incentive encouraging regionalized systems.

In the latter part of 1968, Grand Traverse County, Traverse City and the Townships studied ways of meeting the regional treatment approach requirement. Traverse City commissioned the Ann Arbor consulting engineering firm of McNamee, Porter and Seeley to develop plans to upgrade the Traverse City primary treatment facility. The plan was to meet government effluent criteria as well as the regional approach requirement.

McNamee, Porter and Seeley concluded its study in 1969. Its report developed the treatment model of a centralized Traverse City plant using interceptors to pump wastes from outlying township areas. The report suggested that Traverse City annex much of the township lands which fell into the proposed service district, and provide treatment service to nonannexed land only with the payment of a surcharge. Needless to say, the proposed annexation policy raised considerable animosity between the City and the five surrounding townships. The Townships preferred individual systems using aerated lagoons and spray irrigation as proposed by the engineering firm of Norton, Gourdie, Miller and Batzer, Inc. The hostility existing between the localities was particularly evident when both Townships and City refused to accept the others' engineering studies.

In March of 1969, the Traverse Bay Regional Planning Commission was formed to provide a regional planning approach for the area. A Special Water and Sewage Study Committee was created to formulate a regional sewage treatment plan. The Committee was composed of the Mayor and City Manager of Traverse City, and the Superintendent of the five surrounding townships. The Committee commissioned the engineering firm of Ayres, Lewis, Norris, and May to examine alternative regional wastewater management plans.

Ayres, Lewis, Norris, and May studied four alternate systems: 1) aerated lagoons with irrigation for individual townships; 2) aerated lagoons with irrigation for collective townships; 3) activated sludge with irrigation for individual townships; and 4) regional treatment, activated sludge with irrigation as proposed by McNamee, Porter and Seeley.² The preliminary study was finished in March of 1970. It concluded that the first alternative, individual aerated lagoons, was the least costly system. However, the preliminary report went on to state that "the State Water Resources Commission has indicated that under present policies, no participating funds would be available under alternatives 1, 2, or 3 from either State or Federal agencies".³ Thus, the consulting engineering firm, acting upon information received from the State government, effectively froze the comparison of alternatives since the network of lagoons was not to be considered a regional system.

On the basis of the Preliminary Report's recommendation,

the Special Water and Sewage Study Committee decided to adopt the single plant concept. The Committee agreed that each locality would own a portion of the plant equivalent to the percentage of use each made of the facility. Prior to July 1970, Traverse City applied to the WRC for grant monies to pay a portion of the plant expansion costs.

The Final Engineering Report was released by Ayres, Lewis, Norris and May in August of 1970. It detailed the collection systems and costs to each township for the regional system. Thus, in the Traverse Bay project, commitments were made to expand a centralized treatment facility prior to the consideration of the interceptor collection systems. Indeed, as of mid-1973, plant expansion had been completed, but construction had not been started on the interceptor sewer lines. This contrasts sharply with the administrative policy which influenced the Owosso controversy, in that the administrative agencies would not make grant commitments without a firm delineation of the interceptor collection system. The major difference between the two systems was that the Owosso plant was to use an innovative treatment process, while the Traverse City plant used conventional activated sludge treatment techniques. Indeed, it is not clear how an adequate benefit/cost analysis could have been done for the project prior to the design of the collection system.

The Final Report made the difference between the collective and individual systems perfectly clear:

"The advantage of the collective solution over the individual solution lies in the grant funds available for collective facilities of up to 55 percent of the total project cost, and no grant monies offered for the go-it-alone solution".⁴

At no point in the planning process was "regional system" taken to mean anything but an interceptor-centralized plant system. It is certainly conceivable that a network of aerated lagoons could constitute a regional system. However, alternative technical solutions to the wastewater problems were never really considered.

Alternative managerial arrangements were not investigated, or at least were never documented. For example, the region could have been united in a sewage and water management authority or district, in which a joint body could have implemented a regional treatment scheme. Development questions were not adequately discussed. Traverse Bay is a superlative scenic and recreational resource. What will happen if urban sprawl becomes the dominant development pattern and overtaxes the ecologic and service environments? Planning alternatives were also not given adequate consideration. For example, several sources suggested a more desirable pattern of growth would allow intensive development in Garfield and East Bay Townships and restrict growth along the Bayshore in Elmwood, Peninsula, and Acme Townships.

Technical, managerial, and planning alternatives were not adequately considered because there was no incentive to do so. The State's regional approach policy locked the community into the interceptor-centralized plant treatment

model. Planning alternatives were not adequately considered because of substantial vested interests held by local officials in development. Not the least of these interests was land to be opened up for development by the interceptor lines.

The 1968 Bond Issue indirectly allocated funds from one area of social welfare to another. Thus, funds used in water pollution control could have been used to promote better housing, better education, etc. Acting under the perceived priorities of the State and the Nation, citizens and legislators allocated the funds to water pollution control. The State agencies in charge of fund disbursement should be certain that funds are being spent in an optimal manner to achieve stated goals. By not requiring adequate technical, managerial, and land use planning, State agencies are sub-optimizing systemic goals. The Bond Issue funds did indeed represent an incentive to localities. However, the incentive became one of capturing scarce resources rather than solving the pollution problem in the most effective manner. If the State is going to promote incentive programs to achieve social goals, it should be responsible for setting elaborate guidelines for insuring that scarce resources are dispersed in the most optimal manner. This responsibility should take the form of requirements as well as education, i.e., providing localities with updated information as to the technical, managerial, and planning alternatives available.

The image which emerges from the Traverse Bay, Owosso, Muskegon, and Huron River Interceptor Cases reveals an

inherent resistance to innovation, a suboptimization of systemic pollution control goals, a reliance upon the interceptor-centralized plant model of regionalization, and basically a lack of incentives which promote planning and comprehensive analysis. The result of these patterns is to limit change, and thus limit the ability to adapt to a changing environment. As one looks at evolution, the impact of a failure to adapt is clear. The concluding chapter of this report outlines factors which promote and resist innovation in an attempt to define a normative water quality management model which seeks to promote means of better coping with a changing environment.

PART IV -- TOWARDS FUTURE INNOVATION

The objective of an investigative study is to transform data into information, history into insights. The logical endpoint of such a study is in suggestions towards systemic changes in light of the information gleaned from the analysis. Accordingly, Chapter Nine summarizes the preceding material, highlighting significant factors which have resisted the use of innovative wastewater treatment techniques in the implementation of the Bond Issue, and presenting an enumeration of factors prevalent in the literature and in the case studies which serve to promote the use of innovation. It then outlines structural and process changes which will enable the management system to better cope with and utilize change.

This section, then, defines pathways towards future innovation. The necessity of doing so becomes particularly clear in light of the additional funds which will be provided to the State due to current federal legislation and recent court activity. The manner in which allocation of these funds takes place will decide the final success of the program in meeting its water quality goals.

CHAPTER NINE -- SUMMARY AND CONCLUSIONS

"The piano tuner has been in the house for a long time now, and the hour has come for a sonata to be played or even a concerto"

-Toynbee

After more than four years and greater than \$250 million of Bond Issue implementation, it appears that the State of Michigan has not progressed much closer to its goal of controlling water pollution by 1980. The net effect of the Clean Water Bond program has been to maintain a 1968 status quo situation. An underlying assumption of this report has been that innovative and advanced waste treatment methods were essential to the attainment of the State's goals. The validity of this assumption has been strengthened by the fact that conventional treatment schemes have done little to resolve the 1968 problem state. Few cases of innovation occurred as a result of the Clean Water program. The central question which this study poses is: why? The answer is composed of diverse factors which influence the environment and substance of the water quality management system. These factors can be classified into seven categories: 1) Problem Perception; 2) Psychosociologic Factors; 3) Organizational Behavior; 4) Financial Resources; 5) Expertise; 6) Institutional Factors; and 7) Program Factors.

A. Factors Resisting Innovation

Problem Perception--The dominant force underlying change and innovation is stress, conflict or discrepancy. Usually this is translated into need and is expressed in terms of

economic or political pressure. Because of this key need-innovation relationship, a significant question to examine in the Bond Issue implementation is how was the need for the water pollution control program perceived. Historically, the states had shown a continued reluctance to develop regulatory or incentive programs in the water quality maintenance field. Instead, responsibility was left to the local units of government. It was only after this management model proved itself ineffective over time that a dominant federal role was initiated.

The Michigan Clean Water program was proposed in 1968 not only in response to a water quality problem, but also to capture federal grant incentives. Indeed, it is possible that without the federal grant program no State program would have developed. Thus, the perception of need was perhaps based as much on capturing the full Michigan share of federal monies as it was to resolve a pollution problem.

The two sets of need estimates (undertaken separately by the Joint Legislative Committee on Water Resources Planning and the Water Resources Commission) had no true precedent. Comprehensive and systematic water pollution programs had essentially not been implemented previously. It appears that the assessments failed to adequately define both financial and technical needs as well as the proper strategy to press towards goal attainment. The assumption that provision of secondary treatment at point source waste discharges would be adequate to resolve the problem, the

lack of recognition of the nutrient and runoff problems, and the lack of knowledge of economic conditions (e.g. the inflation rate), all served to inaccurately define water quality needs and problems.

An adequate optimization analysis to determine the most efficient allocation of Bond Issue funds was not undertaken. One source suggested that the mood at the initiation of Bond Issue implementation was hostile to research, i.e., that enough research and studies had been performed and it was time to go out and solve water pollution problems. Indeed, a Committee on Research and Development of Waste Treatment was formed in 1969 to guide State agencies in the development and implementation of the State's pollution control program. However, lack of political support and other problems contributed to the non-functioning of the Committee after less than a year of operation. The inexperience of policy- and decision-makers with a problem of the nature and magnitude of the water quality problem was perhaps the key factor in inadequate and inaccurate need perception.

Psychosociologic Factors--The definition of the problem and the administration of the program were subject to the nature of the human and social management vectors. In order to cope with a complex environment filled with diverse stimuli, individuals and groups develop habits, attitudes, roles and norms. These elements of social behavior offer predictability and control over a demanding environment. The organism develops an equilibrium with its environment

which allows it to process repeated stimuli with a minimum of resource expenditure. This equilibrium becomes more set as time passes and is reinforced by socialization processes. An innovation implies risk and uncertainty. It shatters the personality equilibrium of the organism, reducing predictability, generating new demands and new decisions, increasing the complexity of existence. The general tendency of all social organisms is to avoid the uncertainty of innovation, to make sure the light is on before one enters the darkened room.

Organizational Behavior--These same factors of social behavior are reflected and compounded in the behavior of bureaucratic organizations. Hierarchical role relationships and narrow role definition serve to minimize conflict that generates new ideas. The desire for control, predictability, and conservation of resources leads to a programming of behavior and responses that results in an inability to effectively deal with change. The goals of the bureaucracy often become increasingly oriented towards the agency and away from society. A key goal becomes agency survival. To train individuals in maintenance of organizational norms and goals, a hierarchical advancement scheme is used. Thus, individuals enter at the bottom of the organization where little impact can be made, climbing the ladders of responsibility over time. As time progresses, an individual's expertise often becomes outdated. Thus, ideas stagnate, with agency attitude changes often lagging behind the interests

of society. The bureaucratic reward system is usually composed of extrinsic factors such as money, status, and power. The attainment of a mandated goal, such as water pollution control, slips lower in the individual's priority scheme. The impact of this form of organizational behavior is even more significant since agencies bind with powerful interest groups for mutually-rewarding reasons. Since the most powerful groups usually have a vested interest in the conditions of status quo, agency-interest group relationships serve to reduce an organization's receptivity to change. Indeed, while conflict is perhaps the driving force underlying innovation, it is perhaps the antithesis of bureaucracy.

Financial Resources--The diffusion of innovation is also heavily dependent upon available resources for support. There are three dominant sources of financial support for water pollution control facilities: the State, the federal government, and local units of government.

While the incentive to clean up is relatively salient on the municipal level, limited resource capabilities inhibit effective action. Local units of government are dependent upon bond markets to obtain resources. If a proposed project is considered risky, it is possible that the municipal bonds would not be bought. In addition, innovative systems require lengthier periods of examination prior to regulatory agency approval. The longer period of time that approval requires, the more costly a system becomes as administrative and construction costs rise.

The State program is the second source of financial resources. However, as a result of the inadequate initial assessment of needs and the subsequent problem caused by a high inflation rate, the State program was behind from the start. The policy of advancing funds towards the federal share, and the lack of federal appropriations, caused State funds to diminish much more rapidly than was anticipated. No funds were specifically marked for innovative application. As a result of the inadequate amounts of State funds, the State strategy could have focused on and promoted innovation as the key to goal-attainment in spite of the limited funds. However, this doesn't appear to have been the case. The continued promise of greater amounts of federal grant support took much of the pressure off of State administrators.

The third source of financial resources is the federal government. The incentive value of federal construction grants was certainly one of the most powerful stimuli generating state pollution control programs. However, little in the way of spending guidelines were given with the funds. The federal government did not want to dictate policy to the states. Thus, funds were given without specific restrictions encouraging consideration of a range of alternative technologies, or management or planning arrangements when financing treatment projects.

The inadequate funds which were appropriated represented a further area of federal irresponsibility. The failure of the federal program to live up to its commitments destroyed

any hope of planning effective state and local programs. The only source of financial resources dedicated to the support of innovation comes from the U.S. Environmental Protection Agency's Demonstration Grant Program. However, funds are limited and appear to require considerable political or technical project support to secure grant funds.

Expertise--Innovation is also dependent upon the resource of technical expertise. Two sources of expertise in wastewater management were significant in the implementation of the Bond Issue: the State Department of Public Health (DPH) and the consulting engineering firms. The DPH wastewater unit appears to have become outdated in its expertise and strongly resistant to unfamiliar and innovative technology. It appears also that few consulting engineering firms have expertise at present in innovative treatment techniques. Since these are the principal sources from which alternative local treatment schemes are generated, their impact on the use of innovative plans has been very great.

Institutional Factors--In 1968, Governor Romney and other State officials expressed the firm desire that the implementation of the Bond Issue be kept out of politics. From the preceding chapters of this report, it appears that they failed to accomplish this. The idea that social institutions lag behind the needs of society is also corroborated by the report. The Water Resources Commission (WRC) is the primary water management agency in the State. The WRC is composed of seven members of single-use interest

constituencies which encourages the development of an insider perspective. The short periods of time allocated to Commission meetings places Commission representatives in the position of being responsible to non-Commission interests a majority of the working days of the month. This mitigates against decision-making free of these extra-Commission ties. In addition, it forces the Commissioners to place considerable reliance on its staff, the Bureau of Water Management (BWM). The BWM, however, serves as the water quality management agency as well. The dual role as staff and management agency serves to present an over-representation of its interests into WRC deliberations. The effect of these structural factors has been to promote a forum for mixing existing agency viewpoints, reducing competitive pressures, and decreasing the impetus for goal-directed change.

The Department of Public Health (DPH) is the second component of the water management system. It had a major role in influencing the form of technology used in the Clean Water program. The DPH has been shown to have been outdated in its expertise and highly resistant to technological change.

Consulting engineering firms operate as profit-maximizers and thus desire to minimize resource expenditure. Innovative techniques often require the commitment of more resources than conventional systems because of lengthier design and political approval procedures.

Municipalities have little incentive to press for

innovative techniques due to limited financial and expertise resources as well as limited geographic viewpoints. They react to State orders and compete for limited grant funds. Thus, their goals become increasingly defined as meeting the orders or capturing the grant funds. The dominant actors in the political management process, then, provide little support for innovation. Indeed, since one goal of institutions is to maintain order, a latent resistance to change is prevalent.

Program Factors--Finally, deficiencies in the control program which has developed also served to restrict the consideration of innovative treatment alternatives. The increased rate of technologic change should foster shorter-term treatment schemes which allow advantages of future innovation to be captured. Yet the State program encourages the construction of massive interceptor-centralized plant facilities, resulting in the commitment of large amounts of resources. The definition of regionalization as one in which interceptors tie into centralized plants has served to reduce the search for alternatives. The technical, political, administrative, and financial problems of physically joining numerous units of government have been enormous. An innovative treatment scheme at the centralized location compounds these problems. In addition, this model of regionalization encourages growth without determining whether growth is desirable.

The utilization of the acceptable use and stream standards method of program implementation encourages the

development of a non-responsive system unless adequate evaluation and review is undertaken prior to and periodically after establishment of the use designation areas and associated standards. However, evidence has been presented that suggests that these tools were sometimes used as political weaponry and at times were set somewhat arbitrarily.

An enforcement system based on negotiation rather than litigation runs the risk of suboptimizing system output. A management system which guarantees that point-source discharges meet a set of criteria is crisis-oriented in that little action occurs prior to the development of a problem state. The lack of measures to assess progress towards goal-attainment hinders goal and program re-evaluation and alteration. Lack of concentrated sources of information relating to potential alternative technical, managerial, and planning solutions to a wastewater management problem has effectively reduced the consideration of such alternatives.

Perhaps the best way to characterize the management system is as one plagued by administrative fragmentation. Thus, significant interrelationships between planning, enforcement, financial, and expertise components of the system were overlooked and served to hinder progress towards goal attainment. Indeed, in retrospect, it is not clear that the adoption of a State grant program helped to significantly resolve the problem in lieu of an alternate scheme of financial or administrative aid.

The Clean Water program exhibited all of the above elements to some degree. Yet factors are prevalent in the case studies and in the literature¹ which act to promote innovation. Several of these factors are enumerated below.

B. Factors Promoting Innovation

- 1) An early and clear perception of need
- 2) Clear definition of systemic goals
- 3) Social demand
- 4) Non goal-related research
- 5) Leadership, technical entrepreneurship
- 6) Vested interests in specific technological innovation
- 7) Excess resources (slack), subsidy
- 8) Free and diverse information flows
- 9) Enhanced professional and nonprofessional interaction in both horizontal and vertical directions
- 10) Conflict and competition
- 11) Overlapping jurisdictions and responsibilities, broadened role and norm definition
- 12) Dispersal of power
- 13) Extensive interaction between administrators and innovators -- especially significant since most innovation comes from extra-agency sources
- 14) Cultivation of updated technical talent at upper levels of administrative agencies
- 15) Reward systems which provide for stimulation without forcing the individual into areas of non-competence

Evidence is prevalent in the literature and in the case studies that these factors serve to promote the inclusion of innovation and new ideas into the policy-making process. Accordingly, the concluding segment of this chapter outlines potential system changes that incorporate the above factors

into the water quality management system.

C. Suggestions Towards Structural and Process Changes

The material in Chapter Five highlighted the problems associated with the structure of the WRC. Accordingly, one potential alteration would change the membership on the Commission to provide for a body composed solely of members of the general public:

"The few states that have panels composed of engineers, professors, pharmacists, housewives, and other disinterested citizens, and that obtain expertise from outside sources give every evidence of getting along just as well as boards with members of the pollution sector".²

Indeed, it seems likely that a commission composed of members of the public would have less of an "insider perspective" than one dominated by existing agency personnel.

In addition, longer periods of time allocated to the activities of the Commission would allow the policy-makers to be less dependent on staff opinions and would promote a more complete consideration of alternative courses of action. Also, a Commission staff separate from that of the BWM would cause the BWM to have a reduced impact of input into Commission decisions, promoting a more balanced and comprehensive procedure for policy-making.

The Bureau of Water Management could be taken out of the Department of Natural Resources and established in a separate State Environmental Protection Agency (presumably including air pollution control, solid waste disposal, etc). This change might promote a broader outlook as well as a clearer goal to be pursued in a new and young agency.

Several changes in the primary water management agency, i.e., the Bureau of Water Management, might facilitate a broader and more comprehensive management approach. Foremost among these are changes aimed at reducing the administrative fragmentation seen in the past. It is believed that progress has been made recently in this category by the Executive Reorganization in early 1973. The Wastewater Division of the Department of Public Health was transferred into the BWM. Additional procedures should be developed to insure that extensive future interaction takes place between the financial, enforcement, planning, and wastewater expertise agency units.

A major factor affecting the use of advanced treatment systems has been the type of expertise maintained by the agency wastewater unit. Throughout the study, a major deterrent to the use of unconventional advanced wastewater treatment systems was the outdated expertise in the DPH Wastewater Division. Programs should be implemented to cultivate comprehensive knowledge of the current state of treatment technology. One way of accomplishing this is by developing reciprocal arrangements between the BWM and State universities, trading for several months at a time staff members for faculty and graduate students. The university representatives would gain the advantages of real world exposure to management systems, while the arrangement would allow the agency personnel to become acquainted with recent advances in treatment systems.

Extensive networks providing for public input and agency

output should be constructed. By closing the gap between the agency and the public, decision-makers can reduce the lag between agency and social values. Thus, information inputs should be encouraged rather than resisted. Indeed, a recent policy statement by the WRC supports "full public involvement in the programs and activities of government agencies".³ Although this statement differs radically from the position contained in the letter reprinted in Appendix V, it is hoped that the shift is one of policy, not rhetoric.

Programs of enhanced agency output ought to center around an information-provision and education role. For example, a booklet could be prepared describing potential technical, managerial, and planning alternatives which are available to localities. This would enable local units of government to be less dependent on consulting engineering firms whose motives may be aimed at construction rather than planning. Indeed, a public information and education role was outlined for the State government by the Joint Legislative Committee on Water Resources Planning in its 1966 Study of Needs.⁴

Beyond the role of provision of information outlining potential treatment alternatives, the State should develop a series of guidelines in conjunction with the construction grant program to insure that all viable alternative solutions have been considered. Such guidelines should also insure that potential ramifications of proposed systems are delineated well in advance of grant commitment and construction stages. Several planning tools have been developed for this purpose,

notably that of environmental impact assessment methodology.

The planning approach which should be encouraged is one which takes a broad view of the system. Along these lines, water resource planning should be integrated with land use and economic planning. The management program should attempt to move away from the crisis-oriented management model provided by the standards-enforcement arrangement, and move towards advance planning on a State-wide basis.

The State should also encourage research into areas where scientific knowledge is inadequate to make reasoned decisions. A committee similar to the one created in 1969 (described briefly above), could outline research needs and priorities.

The State should also promote the development of an extensive data management system to produce organized information to facilitate the planning process.

A change which would have a significant impact upon the management system would be the creation of a separate public corporation empowered to finance, construct, and operate wastewater treatment facilities. One possible model for such an agency would be the Maryland Environmental Service, created in 1970.⁵ This type of corporation would circumvent the problems of local financing prevalent throughout the implementation of the Bond Issue.

Regardless of the specific changes which take place in the structure of the water quality management system, its activities should aim towards a broad and comprehensive planning approach. Its policies and programs should provide

for managerial flexibility and continual reassessment of goals and programs, and should promote the utilization of the benefits of innovation and change. For a changing environment is an inevitability. The ability of social institutions to adapt, to cope with the change, will in the end determine the fitness of the system to survive.

APPENDIX I

Act No. 11
Public Acts of 1969
Approved by Governor
June 12, 1969

STATE OF MICHIGAN
75TH LEGISLATURE
REGULAR SESSION OF 1969

Introduced by Senators Schweigert, Bouwsma, Fitzgerald, Lodge, Rockwell and Brown

ENROLLED SENATE BILL No. 107

AN ACT to amend the title and sections 1, 2, 3, 6, 8 and 11 of Act No. 329 of the Public Acts of 1966, entitled "An act to provide state grants for sewage treatment facilities," as amended and added by Act No. 75 of the Public Acts of 1968, being sections 323.111, 323.112, 323.113, 323.116, 323.118 and 323.121 of the Compiled Laws of 1948; and to add sections 3a and 12 to 18.

The People of the State of Michigan enact:

Section 1. The title and sections 1, 2, 3, 6, 8 and 11 of Act No. 329 of the Public Acts of 1966, as amended and added by Act No. 75 of the Public Acts of 1968, being sections 323.111, 323.112, 323.113, 323.116, 323.118 and 323.121 of the Compiled Laws of 1948, are amended and sections 3a and 12 to 18 are added to read as follows:

TITLE

An act to prevent the discharge of untreated or inadequately treated sewage or other liquid wastes into any waters of the state; to provide financial assistance to local agencies for the construction of treatment works to prevent such discharge; and to abate and prevent pollution of the waters in and adjoining the state; and to implement Act No. 76 of the Public Acts of 1968.

Sec. 1. (1) A fund to be known as the state water pollution control fund is established to be used for assisting counties, cities, villages, townships or other public bodies created by or pursuant to state law and having jurisdiction over disposal of sewage or other liquid wastes, hereinafter referred to as local agencies, in financing their construction of treatment works.

(2) As used in this act:

(a) "Treatment works" means the various devices used in treatment of sewage or industrial wastes of a liquid nature, and extensions, improvements, remodeling, additions and alterations thereof, including necessary intercepting sewers, outfall sewers, pumping, power and other equipment and their appurtenances.

(b) "Intercepting sewer" means a sewer, including necessary pumping stations, designed or constructed for 1 or more of the following purposes:

(i) To receive the existing flow of untreated or inadequately treated sewage or other liquid waste from 1 or more sewers or outlets, other than from a building or dwelling, that discharge or formerly discharged the flow into any waters of the state; and convey the flow to a treatment works.

- (ii) To serve in lieu of an existing or proposed treatment works.
- (iii) To convey sewage from a sewage collection system directly to a treatment works.

(c) "Outfall sewer" means a sewer designed or constructed to convey the effluent from a treatment works to the point of final disposal.

(d) "Construction" means the engineering, architectural, legal, fiscal and economic investigations and studies, surveys, designs, plans, working drawings, specifications, procedures and other similar action necessary to the construction of treatment works; the erection, building, acquisition, extension, improvement, remodeling and additions to or alterations of treatment works; and the inspection and supervision of the construction of treatment works. "Construction" does not include acquisition of lands and rights of way.

Sec. 2. The proceeds of sale of \$285,000,000.00 of the bonds authorized by Act No. 76 of the Public Acts of 1968, being sections 323.371 to 323.382 of the Compiled Laws of 1948, or any series thereof, and any premiums and accrued interest received on the delivery thereof, shall be deposited with the state treasurer in the water pollution control fund. Disbursements from the fund shall be made only for specific eligible treatment works projects approved by the appropriation committees and by the legislature by concurrent resolution adopted by a roll call vote of a majority of the members elected to and serving in each house. A concurrent resolution shall include all or part of the projects on the list of eligible projects reported by the water resources commission as provided in section 16, but in case of a part only it shall be an entire part representing all projects on the list having priorities higher than those of projects not included in the resolution and projects out of the priority order shall not be included. The income from temporary investments of the proceeds shall be deposited in the general fund.

Sec. 3. (1) Grants shall be made under this act only for treatment works eligible for federal grants under United States Public Law 84-660, as amended, and on which construction commenced after June 30, 1967, and shall be made in an amount equal to 25% of that portion of the treatment works cost that is eligible for such federal grant. However, (a) treatment works which receive federal grants only under federal laws other than United States Public Law 84-660, as amended, and on which construction commenced after June 30, 1967, are eligible for state grants not to exceed 25% of the cost of treatment works, and; (b) the sum of state and federal grants on projects which receive federal grants only under federal law other than United States Public Law 84-660, as amended, shall not exceed 75% of the cost of the portions of such treatment works which would have been eligible for grants under United States Public Law 84-660, as amended.

(2) Commencing July 1, 1967 and ending June 30, 1971, a treatment works qualifying for a 25% state grant under this act and a federal grant under United States Public Law 84-660, as amended, is eligible to receive an additional payment from the state water pollution control fund as an advance against the prospective federal share of the eligible treatment works cost authorized by United States Public Law 84-660, as amended, so that the combined state grant, state advance of the federal share, and federal grant apportioned to the treatment works shall not be less than 55% of the eligible cost. After June 30, 1971, the combined state grant and state advance of the federal share shall not be less than 50% of the eligible treatment works cost.

(3) Financial assistance shall be given under this act to a local agency only if it has agreed, when filing its application for assistance under this act, to adjust the amount of its request for federal grants to the amount that is determined by the water resources commission to be available for apportionment. This agreement shall not affect the eligibility of the local agency for future reimbursement of costs of the treatment works, which were prefinanced by the local agency but which would have been eligible for federal grants if funds therefor had been available.

(4) Financial assistance shall be given under this act to a local agency only for treatment works on which eligibility for a federal grant has been established and construction contracts awarded or construction commenced after June 30, 1967.

(5) Notwithstanding the provisions of subsections (1) and (2) of this section, when a treatment works owned by a local agency is to be replaced in whole or in part by a system of another local agency under an official plan approved by the water resources commission after June 30, 1967, the project costs eligible for a state grant to the regional local agency may include 50% of the present value of the treatment works or part thereof that is to be replaced, less the land value and any state or federal grants used in the construction thereof. The present value shall be based on a straight line depreciated cost including any capital improvements thereto based on a maximum life of 40 years for structures and 20 years for equipment from the date the treatment works was placed in operation. The grant shall be made only if the regional local agency has entered into an agreement for acquisition of the treatment works or part thereof to be replaced and applies the grant toward such acquisition.

Sec. 3a. (1) Disbursements from the fund shall be made by the director of the department of administration and the state treasurer in accordance with the accounting laws of the state only for the following purposes for which the bonds have been authorized:

- (a) Expense of issuing the bonds.
- (b) Grants and advances to local agencies as provided in subsections (2) and (3) and subsection (5) of section 3.

(2) Before any disbursement from the fund, as provided in subsection (3), is made to a local agency to assist it in constructing treatment works, the water resources commission shall certify to the director of the department of administration and the state treasurer that such agency is eligible for financial assistance under this act. The certificate shall include or have attached thereto a certificate by the water resources commission, or by the state department of public health when so requested by the commission, of the necessity and sufficiency of the treatment works and all portions thereof.

(3) Disbursements from the fund to a local agency, as authorized by section 3, shall be made on certification to the director of the department of administration and the state treasurer by the water resources commission that such disbursements are due. A local agency is eligible for this certification at the same time and in the same proportions that federal grant payments are authorized. However, a disbursement shall be made from the fund to a local agency for 50% of the reasonable cost of preparing completed final construction plans and specifications for that part of the treatment works that is eligible for a federal grant, on (a) issuance of a construction permit by the department of public health for the treatment works for which the construction plans and specifications have been prepared, (b) receipt of evidence satisfactory to the commission of the local agency's ability to finance the local share of the project cost and (c) certification to the director of the department of administration and the state treasurer by the water resources commission of the necessity and sufficiency of the plans and specifications.

Sec. 6. Federal funds allocated to the state before July 1, 1971, in excess of 5% of the eligible costs of treatment works that have been certified for financial assistance under this act, shall be used under the reimbursement provisions of United States Public Law 84-660, as last amended by United States Public Law 89-753, to reimburse local agencies in full, for that portion of the federal share which they advanced, before such federal funds are used for reimbursement to the state of any portion of the federal share which the state has advanced. Federal funds received by the state, for reimbursement of the portion of the federal share which the state advanced, shall be deposited in the state water pollution control fund for state assistance in financing treatment works under this act.

Sec. 8. An official plan shall:

(a) Provide for timely construction of treatment works which will prevent the discharge of untreated or inadequately treated sewage or other wastes as defined by Act No. 245 of the Public Acts of 1929, as amended, being sections 323.1 to 323.12a of the Compiled Laws of 1948, into the waters of the state.

(b) Provide for adequate planning, zoning, population projections and engineering and economic studies to delineate with all practicable precision those portions of the

area which public sewerage systems may reasonably be expected to serve within 10 years and within 20 years, and any areas in which the provision of such services is not reasonably foreseeable.

(c) Be in compliance with the state pollution control plan required by United States Public Law 84-660, as amended.

(d) Set forth a time schedule and proposed method of financing, construction and operation of the pollution control system.

(e) Be reviewed by the official planning agencies having jurisdiction within the local agency, including the regional planning agency, if any, for consistency with programs of planning for the area, which reviews shall be transmitted to the water resources commission with the plan.

Sec. 11. (1) The water resources commission, with consent of the head of any other agency of this state, shall utilize such officers and employees of such agency as may be found necessary to assist in carrying out the purposes of this act.

(2) A recipient of assistance under this act shall keep such records as the commission shall prescribe, including records which fully disclose the amount and disposition by the recipient of the proceeds of such assistance, the total cost of the project or undertaking in connection with such assistance given or used, and the amount of that portion of the cost of the project or undertaking supplied by other sources, and such other records as will facilitate an effective audit. The commission, the auditor general and the state treasurer or any of their duly authorized representatives shall have access, for the purpose of audit and examination, to any books, documents, papers and records of the recipient that are pertinent to grants received under this act.

Sec. 12. Notwithstanding any other provision of this act or of any rule of the water resources commission, compliance with sections 12 to 16 is a prerequisite to the making of a grant or advance under this act. Sections 12 to 16 provide procedures for establishing the priority of eligible projects and for certifying projects for an allocation of grants and advances for treatment works construction. The point system is designed to give $\frac{1}{2}$ weight to financial needs and $\frac{1}{2}$ weight to water pollution control needs.

Sec. 13. (1) Points assigned to a treatment works project as a complete measure of financial needs shall not exceed 15.

(2) One-fifth of a point shall be assigned for each \$5.00 or major fraction thereof, based on estimated reasonable cost of the treatment works as entered on the application issued therefor by the administering federal agency, per capita of equivalent population established by the applicant's engineer as the basis of design of the treatment works.

(3) One-fifth of a point shall be assigned for each \$5.00 or major fraction thereof, based on applicant's outstanding financial obligations, exclusive of school debt, on the date the application is filed, per capita of population established by the latest federal census. In case of a project to be constructed by 1 local agency to serve any other local agency or portions thereof, or a project to be constructed by a new local agency formed by existing local agencies to be served, debt obligations per capita shall be based on the combined financial obligations and population of the areas served.

Sec. 14. (1) Points assigned to a treatment works project as a complete measure of pollution control needs shall not exceed 15.

(2) Two points shall be assigned for each of the following interests subject to pollution-caused injuries, which injuries will be corrected or substantially lessened by the proposed project:

- (a) Public health, safety or welfare but not including bathing.
- (b) Public water supply for domestic use.
- (c) Water supply for commercial or industrial use.
- (d) Irrigation or livestock water supply for agricultural use.
- (e) Organized public recreational use including bathing.
- (f) Aesthetic value or utility of riparian lands.
- (g) Water supply for wild animals, birds and fish, and adverse effects on aquatic life or plants.

(h) Usefulness of fish or game for human consumption.

(3) A treatment works required to be constructed in compliance with a judgment rendered by a court of competent jurisdiction, or with a stipulation or an order of the water resources commission, or an agreement with the department of public health, shall be assigned from 1 to 4 points in accordance with the following schedule, if the stipulation, order or agreement specifically recites the existence of unlawful pollution and was in effect not less than 30 days before the deadline for filing applications, and if the pollution abatement date is such that compliance therewith would make it necessary to start construction during the year ending:

- | | |
|---|----------|
| (a) June 30 of the fiscal year for which the application is filed | 4 points |
| (b) June 30 of the first succeeding fiscal year | 3 points |
| (c) June 30 of the second succeeding fiscal year | 2 points |
| (d) June 30 of the third succeeding fiscal year | 1 point |

(4) An applicant in default of a performance date specified by an order, stipulation or agreement may be assigned points under the preceding schedule only at the discretion of the water resources commission.

(5) A treatment works project, which qualifies for less than 4 points under subsection (3) and for which construction contracts are awarded before the deadline date for filing applications, shall be assigned from 1 to 4 points, so that the combined points assigned pursuant to subsections (3) to (5) shall equal 4.

Sec. 15. (1) Total priority points for a treatment works project shall be the sum of the points assigned for financial needs and for water pollution control needs.

(2) If 2 or more projects receive the same priority point totals the water resources commission shall assign priorities to the tied projects in the relative order of their points for water pollution control needs. If the projects have the same point totals for water pollution control needs the commission shall assign priorities after considering factors such as waters affected, extent of public interests involved, relative magnitude of pollution injury and other factors as the commission deems appropriate.

Sec. 16. (1) For the purposes of sections 12 to 16 the fiscal year is July 1 to June 30.

(2) An application for a treatment works construction grant for a specific fiscal year shall be filed with the water resources commission not later than September 15 preceding the fiscal year for which the application is filed. An application postmarked not later than midnight of September 15 will meet this requirement.

(3) A point total shall be assigned by the commission to each application that has been timely filed and conforms to the requirements of the administering federal agency no later than the following January 1.

(4) Projects entitled to construction grants shall be certified to the administering federal agency from the eligibility list as established by the water resources commission as approved by the legislature. Certification shall be made within 7 days after approval by the legislature and after receipt of federal authorization to certify projects.

(5) Priority certification of a project to the administering federal agency is subject to the condition that construction contracts for the project be awarded by the next October 1. Failure to comply with this condition of certification will be considered cause for the commission to request the administering federal agency to take action necessary to withdraw any grant offer that may have been obligated to the project. However, on a showing satisfactory to the water resources commission that the project will proceed within an extended period, the commission may allow 30 day extensions totaling not more than 90 days.

(6) An application for a treatment works construction grant filed with the commission is valid only for the year for which the application is filed.

(7) The commission shall report to the legislature by January 15 of each year the projects eligible for grants and the points and priorities assigned to them pursuant to this act and the projects which failed to comply with the condition of certification set forth in subsection (5). Within 10 days after the effective date of this act, the commission shall

submit to the legislature its June 27, 1968 list of projects and points and priorities assigned to them for projects which it appears can now be certified in accordance with the terms of this act and for which the applicants have provided assurance that they intend to award construction contracts before December 31, 1969. If legislative approval or rejection of eligible projects is not given each year within 45 days after receipt of the commission's list of eligible projects, the commission list will be considered approved.

Sec. 17. It is the intent of this act that the water resources commission encourage local agencies to use grants provided herein to assist in abatement of any unlawful pollution of waters of this state. When the commission is petitioned relative to such pollution and determines that untreated or inadequately treated sewage or other liquid wastes are being discharged into the waters of the state from any system of sewers, drains or existing treatment works, including but not limited to combined sewer overflows from regulating structures owned, operated or maintained by a local agency or a combination of local agencies, the commission shall take prompt and timely action under procedures prescribed by law to obtain the abatement of unlawful pollution caused by such discharges.

Sec. 18. Notwithstanding any other provision of law to the contrary a petition under chapters 20 or 21 of the drain code of 1956 may be filed by 1 public corporation when the purpose thereof is to alleviate pollution of the waters of the state.

Section 2. This act shall take effect June 15, 1969.

This act is ordered to take immediate effect.

.....
Secretary of the Senate.

.....
Clerk of the House of Representatives.

Approved.....

.....
Governor.



APPENDIX II

DATA/INFORMATION STORAGE AND
RETRIEVAL PROGRAM
(D/ISR)

by

Steven L. Yaffee
Research Assistant

Prepared under support
from OWRR Title I

Project No. A-054-MICH

November 1972

DATA/INFORMATION STORAGE AND RETRIEVAL PROGRAM -- D/ISRIntroduction

A computer program for the management of data and information relating to sewage treatment construction grants has been developed in the Water Resources Systems Laboratory, Department of Civil Engineering, The University of Michigan. The program (Data/Information Storage & Retrieval -- D/ISR) has the capability of storing both numerical data and character information, with the ability for selective retrieval and statistical manipulation. It is designed for use on two major levels: single-project information retrieval; and total system compilation, with statistical manipulation of grant data. The system was constructed for interactive use between user and computer via a remote-access terminal.

The impetus for construction of the D/ISR program came while undertaking a study investigating the implementation of the State of Michigan's sewage treatment grant funds. The research study specifically focuses on the identification of factors which affect (positively or negatively) the use of technologically-advanced wastewater treatment processes in the State. In 1968, the citizens of the State of Michigan approved two bills: one authorized the sale of \$285 million of bonds to provide the State's share of construction grant funds for sewage treatment facilities (Act 21, P.A. 1969, State of Michigan); the other authorized the sale of \$50 million of bonds designated for State financial assistance to localities to build collecting sewers in rural areas. These funds were to be allocated with a

maximum State participation of 25 per cent of eligible project cost, with total federal and State share not to exceed 75 per cent of cost.

As of September 1972, the State had granted over \$160 million of these funds with an additional \$91,324,940 set aside as advances on the federal share (Michigan Water Resources Commission, September 1972 Status Report, #9/72-15(a&b)). Thus, over \$250 million in State monies have been allocated over a period of four years. As of that date, 239 projects had been funded.

While studying the disbursement of funds, the need for an advanced method of organizing relevant data became evident. Due to the proliferation of projects and the resultant scattered State funds, little could be done to analyze spending patterns or trends of funded levels of treatment nor was it possible to adequately plan for future needs on a State-wide basis. Systematic planning to meet future needs on a State-wide basis to provide for the most efficient allocation of State bond monies requires careful data management. The inaccessibility of program data became evident to the researcher when a manual search of the Water Resources Commission's files had to be undertaken in order to establish the level of treatment that was funded by the bond money.

Several factors made this organizational need more poignant. First, with the increasing State population and consumption trends, the production of waste will rise at an ever increasing rate. The effect of this burden on the State's waterways may be devastating unless adequate waste treatment facilities can be

planned and constructed to meet these rising treatment needs.

Second, with the allocation of the entire \$335 million in bond funds, it appears likely that the State will submit another funding proposal to the voters. It appears equally likely that the voters will demand to examine the results of the first issue. Thus, data should be collected, organized, and presented in an understandable format to meet these demands. The ability of the D/ISR program to manage and manipulate large quantities of grant data makes it highly suitable to provide the basis for a cost-effectiveness evaluation. The trade-offs that took place between alternative uses for the funds should be identified to insure that proper direction is being given to the disbursement of the funds to competing projects.

Finally, there has been a rising commitment on the national level to provide for "purification of the nation's waters by 1985" (Lansing State Journal, 05 Oct 72, p A-12). This commitment was codified by the recent Congressional passage of the Federal Water Pollution Control Act Amendments of 1972. The Act will increase available federal funds for waste treatment grants into the billions of dollars annually, and will increase the allowable federal grant share of construction projects. Such a massive influx of federal monies into the State will require careful management and organization by the State's water agencies (primarily the Water Resources Commission).

These organizational, management, and analysis needs require the use of an advanced data management system. The D/ISR program is intended to be an example of such a system. Its construction was motivated by the belief that it would constitute a highly

useful tool in carrying out planning, policy-making, and implementation processes designed to restore and maintain the quality of the State's waterways.

Program Functions

The following material contains description and examples of the two major functions of the program, i.e., single project information retrieval and total projects data compilation and manipulation.

Single Project Information Retrieval

Numerous units of information can be stored, selectively retrieved, and altered by the D/ISR program. Initially, project information is read into a data file under a preset format. The program uses this data file to provide information for its data base. After the data base has been accessed and read into the program, it outputs "DATA BASE INITIALIZED." and "READY", prompting the user for a command. The commands are as follows:

1. Single Project Commands: (Provides information on a single project of interest)

<u>Command</u>	<u>Output</u>
TREATMENT	effective level of treatment that project provides
SEGMENT	segment or priority list data under which the project was funded
INFO	description of the project
POP	population serviced by project
FINISHED	whether or not the project is completed

GRANTDATA	data relating to the EPA grant, basic state grant, state advance on the federal share, total state grant, and state bond money paid to date
LIFE	date at which project will be at capacity
FLOW	treatment capacity (in M.G.D.) of project
LIST	all information stored on project (see below)

After the user inputs a single project command, the system then prompts him for the project number (PROJECT NUMBER =) or applicant (APPLICANT =). Single project information may be recalled by either label.

Example -- Single Project Information Retrieval

READY.

list

PROJECT NUMBER =

APPLICANT =

berrien co-stevensville

PROJECT NUMBER: 1118

APPLICANT: BERRIEN CO-STEVENSVILLE

FUNDED UNDER 329 PRIORITY LIST

THE PROJECT CONSISTS OF: INTERCEPTOR; WILL FLOW TO TWIN CI
*TIES STP (SECONDARY-ACT SLUDGE)

EPA GRANT:	331820
BASIC STATE GRANT:	497000
STATE ADVANCE:	497000
TOTAL STATE GRANT:	994000
STATE BOND MONEY PAID TO DATE:	149100

EFFECTIVE LEVEL OF TREATMENT: SECONDARY

SERVICED POPULATION: 500000

PROJECT IS NOT COMPLETED.

EXPECTED LIFE OF PROJECT: 1990

TREATED FLOW: 55.00 M.G.D.

READY.

The system indicated its readiness by printing "READY.". The command "LIST" was given, indicating that all the output on a given project was desired. The user chose not to retrieve via the project number, but used the applicant label instead. The system then printed out the desired information and indicated return of control to the user by printing "READY.".

2. Total Projects Information Compilation (Provides information on aggregation of project data)

Information can be compiled by the program from the single project data in the data base. Compilations can be obtained based on four parameters: segment under which project was funded (priority list); treatment which was obtained by building the project; serviced population; and expected date at which the project will be at capacity. Thus, grant data can be aggregated by, for example, those projects that were funded for secondary treatment, or those that were funded under the 1968 priority list, will provide lagoon treatment, will be at capacity by the year 2000, and will service a population of 500,000 or less, etc.

Total Projects Commands:

<u>Command</u>	<u>Output</u>
COMPILATION	compiles grant data by four parameters: 1) segment funded under, 2) treatment provided, 3) serviced population, 4) expected life of project

After the user inputs a total projects command, the system prompts him for the parameters by which project grant data will be compiled. The program outputs "SEGMENT=", "TREATMENT=", "POPULATION=", and "EXPECTED LIFE=". The user can compile via any combination of the four parameters.

A variety of alternative outputs is available. The system can compile and manipulate the data to yield 1) a listing of projects with the desired attributes (PWDAs), 2) the number of PWDAs, 3) the total funding of PWDAs, 4) the percentages of total funding that was allocated to PWDAs, 5) the averages (dollars per project) paid to PWDAs, 6) the standard deviations of funding to PWDAs.

These statistics can be outputted selectively by the user typing in a one-digit code indicating the desired output.

<u>CODE</u>	<u>OUTPUT</u>
1	list of PWDAs
2	number of PWDAs
3	number of PWDAs, totals to PWDAs
4	number of PWDAs, percentages to PWDAs
5	number of PWDAs, totals to PWDAs, percentages to PWDAs
6	number of PWDAs, totals, averages, percentages, standard deviations
7	list, number, totals, averages, percentages, standard deviations

Example -- Total Projects Information Retrieval

READY.
 compilation
 SEGMENT =
 0329
 TREATMENT =
 secondary
 POPULATION =

EXPECTED LIFE =

WHICH OUTPUT IS DESIRED?

7

PROJECT NUMBER	APPLICANT
1118	BERRIEN CO-STEVENSVILLE
1047	CLINTON CO-DEWITT TWP
1154	FLUSHING

NUMBER OF PROJECTS: 3

TOTALS-DOLLARS

EPA GRANT:	1015810.00
BASIC STATE GRANT:	988009.00
STATE ADVANCE:	684463.00
TOTAL STATE GRANT:	1672472.00
STATE BOND MONEY PAID TO DATE:	705733.00

AVERAGES--DOLLARS PER PROJECT

EPA GRANT:	338603.30
BASIC STATE GRANT:	329336.30
STATE ADVANCE:	228154.30
TOTAL STATE GRANT:	557490.60
STATE BOND MONEY PAID TO DATE:	235244.30

(Example continued on page D/ISR-9A)

PERCENTAGES OF TOTAL FUNDING

EPA GRANT:	0.19
BASIC STATE GRANT:	0.23
STATE ADVANCE:	0.27
TOTAL STATE GRANT:	0.25
STATE BOND MONEY PAID TO DATE:	0.18

STANDARD DEVIATION

EPA GRANT:	298612.60
BASIC STATE GRANT:	257449.10
STATE ADVANCE:	250986.10
TOTAL STATE GRANT:	486560.00
STATE BOND MONEY PAID TO DATE:	256496.40

READY.

The system indicated its readiness by printing "READY.". The command COMPILATION was given. The user chose to compile via segment and treatment, disregarding population and expected life. The output code chosen was "7", outputting all possible information. Return of control to the user was indicated by printing "READY.".

Other System Functions

The D/ISR program also has the capability of altering individual pieces of data. The comand "ALTER" is inputted along with the project number or applicant label. The system then prompts the user for specific parameters that are to be altered. These range from individual pieces of information to "ALL". The system then prompts the user for the alterations.

Example -- Alter

READY.
alter
PROJECT NUMBER =
1047
WHAT PARAMETERS ARE TO BE ALTERED?
pop
flow

NEW SERVICED POPULATION:
00750000
NEW TREATED FLOW:
035.00
IS UPDATE DESIRED? 'Y' OR 'N'
y
FUNDED UNDER 329 PRIORITY LIST

THE PROJECT CONSISTS OF: CONSTR OF SECONDARY-ACT SLUDGE PL
*ANT INCL PHOSPHATE REMOVAL, CHLOR, INTERCEPTOR

EPA GRANT:	640550
BASIC STATE GRANT:	458100
STATE ADVANCE:	187463
TOTAL STATE GRANT:	645563
STATE BOND MONEY PAID TO DATE:	523724

EFFECTIVE LEVEL OF TREATMENT: SECONDARY

SERVICED POPULATION: 750000

PROJECT IS NOT COMPLETED.

EXPECTED LIFE OF PROJECT: 1975

TREATED FLOW: 35.00 M.G.D.

READY.

After the alterations were inputted, the system asked the user if a new listing of project information was desired. The reply was "y" and an updated listing was printed out, reflecting the alterations.

Two other commands exist: CANCEL-- returns to D/ISR control when used at the appropriate time; and QUIT--terminating execution of the program and returns to master system control. The system also error-checks, informing the user of faulty terminal input.

Summary

The D/ISR program has been developed to store, retrieve, organize, and manage numerical and character information pertaining to sewage treatment grant data. It allows selective retrieval of single project information and statistical manipulation and compilation of information aggregated for all projects. It also provides for the alteration of specific pieces of data, and checks for faulty terminal input.

An additional function of the program that has emerged is to answer questions of the "what if" type. For example, if the goal is for funding projects with secondary treatment which will be at capacity by the year 1980, alterations can be made in the grant data and new compilations can be performed. In this manner, changes in proposed funding can be performed, allowing experimentation with the outcome. It is hoped that this type of experimentative capability will promote a more knowledgeable allocation of grant funds.

APPENDIX III

PERCENT OF TOTAL FUNDING BY PRIORITY LIST DATE

EPA GRANT
BASIC STATE GRANT

TREATMENT	ACT 3291	68	70	71-71	71-72	72	TOTAL
PRIMARY	0.82	11.10	0.14	0.00	0.00	0.00	12.05
	0.86	13.04	0.30	0.00	0.00	0.00	14.21
PRIMARY+PO4	0.00	0.00	0.02	0.00	0.00	0.00	.02
	0.00	0.00	0.04	0.00	0.00	0.00	0.04
INT>PRIMARY	3.65	0.25	0.10	0.00	0.00	0.00	4.00
	3.82	0.26	0.13	0.00	0.00	0.00	4.21
INT> A.S.	0.66	1.19	0.90	0.02	0.90	0.00	3.66
	0.76	1.38	1.81	0.04	0.57	0.00	4.56
INT> AS+PO4	0.00	0.00	13.65	0.11	0.22	0.00	13.98
	0.00	0.00	17.15	0.09	0.19	0.00	17.43
INT> T.F.	0.00	0.00	0.00	0.02	0.00	0.00	0.02
	0.00	0.00	0.00	0.01	0.00	0.00	0.01
INT> TF+PO4	0.29	0.00	0.00	0.00	0.00	0.00	0.29
	0.30	0.00	0.00	0.00	0.00	0.00	0.30
INT> LGN	0.00	0.00	0.04	0.00	0.00	0.00	0.04
	0.00	0.00	0.09	0.00	0.00	0.00	0.09
ACT. SLUDGE	0.28	0.73	0.58	0.65	22.04	0.00	24.38
	0.28	0.73	2.97	0.47	13.84	0.00	18.28
ACT. SL+PO4	0.27	1.20	3.08	17.27	4.94	0.00	26.77
	0.27	1.27	6.38	11.41	4.19	0.00	23.52
TR. FIL.	0.02	0.00	0.00	0.00	0.24	0.00	0.26
	0.02	0.00	0.00	0.00	0.15	0.00	0.17
TR. FIL+PO4	0.15	0.54	0.69	0.00	0.00	0.00	1.37
	0.06	0.71	1.54	0.00	0.00	0.00	2.31
LAGOON	0.47	0.51	0.78	0.62	1.21	0.00	3.59
	0.40	0.57	1.57	0.45	0.81	0.12	3.92
LAGOON +SI	0.02	0.12	2.43	0.00	2.57	0.00	5.14
	0.02	0.14	5.46	0.00	1.61	0.00	7.24
TERTIARY	0.00	0.32	0.51	0.00	3.61	0.00	4.44
	0.00	0.33	1.10	0.00	2.27	0.00	3.70
TOTALS	6.62	15.94	23.02	18.68	35.74	0.00	100.00
	6.79	18.44	38.55	12.47	23.64	0.12	100.00

FUNDING SUMMARY BY PRIORITY LIST DATE AND TREATMENT TYPE
Act 329 Priority List Date

TREATMENT	TOTAL	AVERAGE	# PROJS	%
PRIMARY	10427498.	2606874.50	4	67.51
	7912860.	1978215.00	4	68.97
ALL A.S.	2824894.	313877.11	9	18.29
	2203988.	315569.71	7	19.25
ALL T.F.	1065291.	266322.75	4	6.90
	639756.	213252.00	3	5.58
ALL LAGOON	1128813.	86831.77	13	7.31
	711648.	44478.00	16	6.20
ALL TERTIARY	0.	0.0	0	0.0
	0.	0.0	0	0.0
TOTALS	15446496.	514883.20	30	100.00
	11473252.	382441.73	30	100.00

1968 Priority List Date

TREATMENT	TOTAL	AVERAGE	# PROJS	%
PRIMARY	26496460.	3312057.50	8	71.18
	22488716.	2811089.50	8	72.17
ALL A.S.	7248578.	559121.38	13	19.53
	5715719.	439670.69	13	18.34
ALL T.F.	1255604.	418534.67	3	3.37
	1205054.	401684.67	3	3.87
ALL LAGOON	1468670.	61194.58	24	3.95
	1193418.	49725.75	24	3.83
ALL TERTIARY	736450.	736450.00	1	1.98
	558550.	558550.00	1	1.79
TOTALS	37225762.	759709.43	49	100.00
	31161457.	635948.10	49	100.00

1970 Priority List Date

TREATMENT	TOTAL	AVERAGE	# PROJS	%
PRIMARY	596571.	99428.50	6	1.11
	807944.	134657.33	6	1.24
ALL A.S.	42769281.	1125506.87	38	79.58
	47844749.	1226738.44	39	73.42
ALL T.F.	1599770.	228538.57	7	2.98
	2607845.	372549.29	7	4.00
ALL LAGOON	7595322.	140654.11	54	14.13
	12044727.	223050.50	54	18.48
ALL TERTIARY	1183700.	295925.00	4	2.20
	1856300.	464075.00	4	2.85
TOTALS	53744624.	493069.94	109	100.00
	65161565.	592377.86	110	100.00

1971-71 Priority List Date

TREATMENT	TOTAL	AVERAGE	# PROJS	%
PRIMARY	0.	0.0	0	0.0
	0.	0.0	0	0.0
ALL A.S.	42137452.	6019636.00	7	96.59
	20294351.	2899193.00	7	96.29
ALL T.F.	39970.	39970.00	1	0.09
	22618.	22618.00	1	0.11
ALL LAGOON	1449638.	1449638.00	1	3.32
	759007.	759007.00	1	3.60
ALL TERTIARY	0.	0.0	0	0.0
	0.	0.0	0	0.0
TOTALS	43627060.	4847451.11	9	100.00
	21075976.	2341775.11	9	100.00

1971-72 Priority List Date				
TREATMENT	TOTAL	AVERAGE	# PROJ'S	%
PRIMARY	0.	0.0	0	0.0
	0.	0.0	0	0.0
ALL A.S.	65609829.	3453148.89	19	78.62
	31752050.	1671160.53	19	79.47
ALL T.F.	570620.	570620.00	1	0.68
	259800.	259800.00	1	0.65
ALL LAGOON	8831720.	679363.08	13	10.58
	4106175.	293298.21	14	10.28
ALL TERTIARY	8436920.	8436920.00	1	10.11
	3834350.	3834350.00	1	9.60
TOTALS	83449089.	2454384.97	34	100.00
	39952375.	1141496.43	35	100.00

1972 Priority List Date				
TREATMENT	TOTAL	AVERAGE	# PROJ'S	%
PRIMARY	0.	0.0	0	0.0
	0.	0.0	0	0.0
ALL A.S.	0.	0.0	0	0.0
	0.	0.0	0	0.0
ALL T.F.	0.	0.0	0	0.0
	0.	0.0	0	0.0
ALL LAGOON	0.	0.0	0	0.0
	205401.	68467.00	3	100.00
ALL TERTIARY	0.	0.0	0	0.0
	0.	0.0	0	0.0
TOTALS	0.	0.0	0	0.0
	205401.	68467.00	3	100.00

FUNDING SUMMARY BY TREATMENT TYPE (ACT 329 - 1972)

EPA GRANT
BASIC STATE GRANT

TREATMENT	TOTAL	AVERAGE	# PROJS	%
PRIMARY	37520529.	12084472.83	18	16.07
	31209520.	1723862.22	18	18.46
ALL A.S.	160610014.	1867558.30	86	68.79
	107815857.	1268421.85	85	63.79
ALL T.F.	4531255.	283203.44	16	1.94
	4735073.	315671.53	15	2.80
ALL LAGOON	20474163.	194992.03	105	8.77
	19020376.	169824.79	112	11.25
ALL TERTIARY	10357070.	1726178.33	6	4.44
	6249200.	1041533.33	6	3.70
TOTALS	233493031.	1010792.34	231	100.00
	169030026.	716228.92	236	100.00

PERCENT OF MAJOR TREATMENT BY COUNTY
(WITH 1970 CENSUS POPULATION)

COUNTY	PRIMRY	ACT SL	TR FIL	LAGOON	TERTRY	TOTAL
ALCONA (7113.)	0.0	0.0	0.0	0.0	0.0	0.0
ALGER (8568.)	0.0	0.0	0.0	0.0	0.0	0.0
ALLEGAN (66575.)	0.0	0.0	0.0	0.06	0.0	0.06
ALPENA (30708.)	0.0	0.44	0.0	0.0	0.0	0.44
ANTRIM (12612.)	0.0	0.0	0.0	0.01	0.0	0.01
ARENAC (11149.)	0.0	0.0	0.0	0.01	0.0	0.01
BARAGA (7739.)	0.0	0.0	0.0	0.21	0.0	0.21
BARRY (38166.)	0.0	0.10	0.0	0.05	0.0	0.15
BAY (117339.)	0.0	0.24	0.0	0.06	0.0	0.30
BAY (117339.)	0.0	0.05	0.44	0.01	0.0	0.49
BAY (117339.)	0.0	0.11	0.60	0.02	0.0	0.73
BENZIE (8593.)	0.0	0.0	0.0	0.02	0.0	0.02
BENZIE (8593.)	0.0	0.0	0.0	0.06	0.0	0.06
BERRIEN (163875.)	0.0	0.92	0.0	0.06	0.0	0.98
BERRIEN (163875.)	0.0	2.18	0.0	0.07	0.0	2.25
BRANCH (37906.)	0.0	0.0	0.0	0.05	0.13	0.17
BRANCH (37906.)	0.0	0.0	0.0	0.10	0.24	0.34
CALHOUN (141963.)	0.0	0.0	0.0	0.0	0.0	0.0
CALHOUN (141963.)	0.0	0.0	0.0	0.02	0.0	0.02
CASS (43312.)	0.0	0.0	0.0	0.01	0.0	0.01
CASS (43312.)	0.0	0.0	0.0	0.03	0.0	0.03
CHARLEVOIX (16541.)	0.0	0.0	0.0	0.03	0.12	0.15
CHARLEVOIX (16541.)	0.0	0.0	0.0	0.07	0.30	0.37
CHEBOYGAN (16573.)	0.0	0.0	0.0	0.18	0.0	0.18
CHEBOYGAN (16573.)	0.0	0.0	0.0	0.11	0.0	0.11
CHIPPEWA (32412.)	0.0	0.0	0.0	0.0	0.0	0.0
CHIPPEWA (32412.)	0.0	0.0	0.0	0.0	0.0	0.0
CLARE (16695.)	0.0	0.0	0.0	0.03	0.0	0.03
CLARE (16695.)	0.0	0.0	0.0	0.06	0.0	0.06

CLINTON	0.0	0.27	0.0	0.05	0.0	0.32
(48492.)	0.0	0.27	0.0	0.11	0.0	0.38
CRAWFORD	0.0	0.0	0.0	0.03	0.0	0.03
(6482.)	0.0	0.0	0.0	0.06	0.0	0.06
DELTA	0.0	0.24	0.24	0.0	0.0	0.49
(35924.)	0.0	0.46	0.15	0.0	0.0	0.61
DICKINSON	0.0	0.05	0.0	0.0	0.0	0.05
(23753.)	0.0	0.06	0.0	0.0	0.0	0.06
EATON	0.06	0.20	0.16	0.08	0.0	0.44
(68892.)	0.06	0.36	0.11	0.12	0.0	0.65
EMMET	0.0	0.0	0.0	0.06	0.18	0.24
(18331.)	0.0	0.0	0.0	0.15	0.40	0.55
GENESEE	0.14	10.87	0.02	0.0	0.0	11.02
(444341.)	0.17	6.99	0.02	0.0	0.0	7.17
GLADWIN	0.01	0.0	0.0	0.0	0.0	0.01
(13471.)	0.02	0.0	0.0	0.0	0.0	0.02
GOGEBIC	0.0	0.0	0.0	0.04	0.0	0.04
(20676.)	0.0	0.0	0.0	0.10	0.0	0.10
GRAND TRAVERSE	0.0	0.21	0.0	0.0	0.0	0.21
(39175.)	0.0	0.45	0.0	0.0	0.0	0.45
GRATIOT	0.0	0.43	0.0	0.14	0.0	0.57
(39246.)	0.0	0.27	0.0	0.11	0.0	0.37
HILLSDALE	0.0	0.0	0.09	0.09	0.0	0.18
(37171.)	0.0	0.0	0.0	0.09	0.0	0.09
HOUGHTON	0.0	0.0	0.0	0.06	0.0	0.06
(34652.)	0.0	0.0	0.0	0.14	0.0	0.14
HURON	0.0	0.0	0.0	0.08	0.0	0.08
(34083.)	0.0	0.0	0.0	0.10	0.0	0.10
INGHAM	0.0	0.07	0.0	0.03	3.61	3.71
(261039.)	0.0	0.13	0.0	0.03	2.27	2.43
IONIA	0.0	0.11	0.0	0.11	0.0	0.21
(45848.)	0.0	0.10	0.0	0.17	0.0	0.27
IOSCO	0.0	0.0	0.0	0.0	0.0	0.0
(24905.)	0.0	0.0	0.0	0.0	0.0	0.0
IRON	0.0	0.0	0.0	0.18	0.0	0.18
(13813.)	0.0	0.0	0.0	0.10	0.0	0.10
ISABELLA	0.0	0.0	0.0	0.01	0.0	0.01
(44594.)	0.0	0.0	0.0	0.02	0.0	0.02
JACKSON	0.0	0.88	0.0	0.70	0.0	1.58
(143274.)	0.0	0.97	0.0	0.57	0.0	1.55

KALAMAZOO	0.0	1.76	0.0	0.0	0.0	1.76
(201550.)	0.0	2.43	0.0	0.0	0.0	2.43
KALKASKA	0.0	0.0	0.0	0.05	0.0	0.05
(5272.)	0.0	0.0	0.0	0.02	0.0	0.02
KENT	0.0	4.69	0.0	0.04	0.0	4.73
(411044.)	0.0	4.04	0.0	0.06	0.0	4.10
KEWEENAW	0.0	0.0	0.0	0.0	0.0	0.0
(2320.)	0.0	0.0	0.0	0.0	0.0	0.0
LAKE	0.0	0.0	0.0	0.0	0.0	0.0
(5605.)	0.0	0.0	0.0	0.0	0.0	0.0
LAPFER	0.0	0.0	0.0	0.08	0.0	0.08
(52317.)	0.0	0.0	0.0	0.15	0.0	0.15
LEFLANAU	0.0	0.06	0.0	0.22	0.0	0.28
(10872.)	0.0	0.04	0.0	0.14	0.0	0.17
LENAWEE	0.0	0.21	0.0	0.0	0.0	0.21
(81609.)	0.0	0.48	0.0	0.0	0.0	0.48
LIVINGSTON	0.0	0.0	0.0	0.02	0.0	0.02
(58967.)	0.0	0.0	0.0	0.02	0.0	0.02
LUCE	0.0	0.0	0.0	0.0	0.0	0.0
(6789.)	0.0	0.0	0.0	0.0	0.0	0.0
MACKINAC	0.0	0.0	0.09	0.04	0.0	0.13
(9660.)	0.0	0.0	0.23	0.10	0.0	0.33
MACOMB	0.63	0.0	0.0	0.08	0.0	0.71
(625309.)	0.94	0.0	0.0	0.10	0.0	1.04
MANISTEE	0.0	0.0	0.0	0.10	0.0	0.10
(20094.)	0.0	0.0	0.0	0.11	0.0	0.11
MARQUETTE	0.0	0.0	0.0	0.08	0.0	0.08
(64686.)	0.0	0.0	0.0	0.01	0.0	0.01
MASON	0.0	0.0	0.0	0.61	0.0	0.61
(22612.)	0.0	0.0	0.0	0.38	0.0	0.38
MECOSTA	0.07	0.0	0.0	0.03	0.0	0.10
(27992.)	0.09	0.0	0.0	0.04	0.0	0.13
MENOMINEE	0.0	0.71	0.0	0.02	0.0	0.72
(24587.)	0.0	0.44	0.0	0.04	0.0	0.48
MIDLAND	0.0	0.0	0.34	0.02	0.0	0.35
(63769.)	0.0	0.0	0.79	0.03	0.0	0.82
MISSAUKEE	0.0	0.0	0.0	0.0	0.0	0.0
(7126.)	0.0	0.0	0.0	0.0	0.0	0.0
MONROE	0.03	0.84	0.0	0.03	0.0	0.90
(118479.)	0.03	2.73	0.0	0.08	0.0	2.84

MONTCALM	0.0	0.0	0.06	0.02	0.0	0.08
(39660.)	0.0	0.0	0.15	0.02	0.0	0.17
MONTMORENCY	0.0	0.0	0.0	0.0	0.0	0.0
(5247.)	0.0	0.0	0.0	0.0	0.0	0.0
MUSKEGON	0.0	0.0	0.0	2.07	0.0	2.07
(157426.)	0.0	0.0	0.0	4.60	0.0	4.60
NEWAYGO	0.0	0.0	0.0	0.75	0.0	0.75
(27992.)	0.0	0.0	0.0	0.47	0.0	0.47
OAKLAND	3.65	2.82	0.0	0.0	0.32	6.78
(907871.)	3.82	5.59	0.0	0.0	0.33	9.74
OCEANA	0.0	0.0	0.0	0.26	0.0	0.26
(17984.)	0.0	0.0	0.0	0.17	0.0	0.17
OGEMAW	0.0	0.0	0.0	0.03	0.0	0.03
(11903.)	0.0	0.0	0.0	0.02	0.0	0.02
ONTONAGON	0.0	0.0	0.0	0.05	0.0	0.05
(10548.)	0.0	0.0	0.0	0.11	0.0	0.11
OSCEOLA	0.02	0.0	0.0	0.14	0.0	0.16
(14838.)	0.04	0.0	0.0	0.19	0.0	0.23
OSCODA	0.0	0.0	0.0	0.0	0.0	0.0
(4726.)	0.0	0.0	0.0	0.0	0.0	0.0
OTSEGO	0.0	0.0	0.0	0.0	0.0	0.0
(10422.)	0.0	0.0	0.0	0.0	0.0	0.0
OTTAWA	0.0	1.86	0.0	0.04	0.0	1.90
(128181.)	0.0	1.54	0.0	0.10	0.0	1.63
PRESQUE ISLE	0.0	0.11	0.0	0.0	0.0	0.11
(12836.)	0.0	0.16	0.0	0.0	0.0	0.16
ROSCOMMON	0.0	0.0	0.0	0.70	0.0	0.70
(9892.)	0.0	0.0	0.0	0.47	0.0	0.47
SAGINAW	0.18	3.65	0.09	0.07	0.0	4.00
(219736.)	0.27	3.11	0.14	0.10	0.0	3.63
ST. CLAIR	0.0	0.0	0.0	0.04	0.0	0.04
(120175.)	0.0	0.0	0.0	0.09	0.0	0.09
ST. JOSEPH	0.0	0.0	0.0	0.0	0.0	0.0
(47392.)	0.0	0.0	0.0	0.0	0.0	0.0
SANILAC	0.0	0.0	0.0	0.12	0.0	0.12
(34839.)	0.0	0.0	0.0	0.19	0.0	0.19
SCHOOLCRAFT	0.11	5.30	0.07	0.0	0.0	5.48
(8226.)	0.12	3.33	0.12	0.0	0.0	3.57
SHIAWASSEE	0.0	0.12	0.02	0.05	0.0	0.19
(63075.)	0.0	0.28	0.06	0.13	0.0	0.46

TIUSCOLA	0.0	0.0	0.0	0.05	0.0	0.05
(48603.)	0.0	0.0	0.0	0.10	0.0	0.10
VAN BUREN	0.0	0.11	0.0	0.59	0.0	0.70
(56173.)	0.0	0.07	0.0	0.42	0.0	0.48
WASHTENAW	0.12	1.07	0.0	0.0	0.09	1.28
(234103.)	0.12	1.11	0.0	0.0	0.17	1.39
WAYNE	11.05	30.64	0.37	0.0	0.0	42.06
(2666743.)	12.80	25.44	0.43	0.0	0.0	38.66
WEXFORD	0.0	0.0	0.0	0.0	0.0	0.0
(19717.)	0.0	0.0	0.0	0.04	0.0	0.04
TOTALS	16.07	68.79	1.94	8.77	4.44	100.00
	18.46	63.79	2.80	11.25	3.70	100.00

SUMMARY OF FUNDING BY COUNTY

COUNTY	TOTAL	AVERAGE	# PROJS	%
ALCONA	0.0	0.0	0	0.0
	0.0	0.0	0	0.0
ALGER	0.0	0.0	0	0.0
	0.0	0.0	0	0.0
ALLEGAN	150893.0	50297.67	3	0.06
	157705.0	52568.33	3	0.09
ALPENA	1035850.0	1035850.00	1	0.44
	684750.0	684750.00	1	0.41
ANTRIM	32480.0	32480.00	1	0.01
	58000.0	58000.00	1	0.03
ARENAC	35000.0	35000.00	1	0.01
	45000.0	45000.00	1	0.03
BARAGA	489440.0	489440.00	1	0.21
	222475.0	222475.00	1	0.13
BARRY	361098.0	120366.00	3	0.15
	511425.0	170475.00	3	0.30
BAY	1146844.0	286711.00	4	0.49
	1240129.0	310032.25	4	0.73
BENZIE	52340.0	52340.00	1	0.02
	100085.0	50042.50	2	0.06
BERRIEN	2276973.0	284621.62	8	0.98
	3804255.0	475531.87	8	2.25
BRANCH	406910.0	203455.00	2	0.17
	572700.0	286350.00	2	0.34
CALHOUN	0.0	0.0	0	0.0
	29260.0	29260.00	1	0.02
CASS	29245.0	29245.00	1	0.01
	52225.0	52225.00	1	0.03
CHARLEVOIX	341580.0	170790.00	2	0.15
	622525.0	311262.50	2	0.37
CHEBOYGAN	419210.0	419210.00	1	0.18
	190550.0	190550.00	1	0.11
CHIPPEWA	0.0	0.0	0	0.0
	0.0	0.0	0	0.0
CLARE	75400.0	37700.00	2	0.03
	106950.0	53475.00	2	0.06
CLINTON	746330.0	186582.50	4	0.32
	641336.0	128267.20	5	0.38

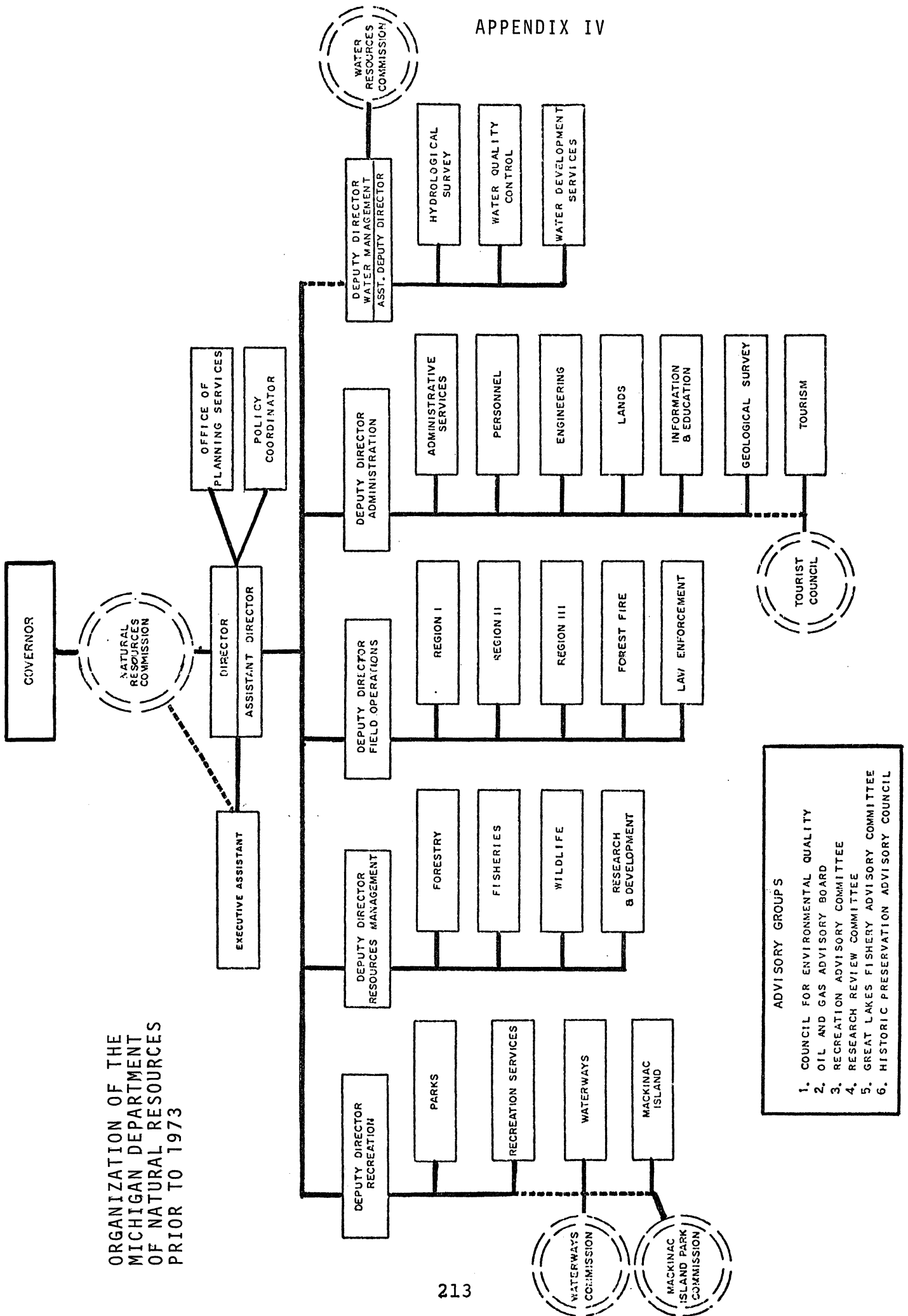
CRAWFORD	73600.00	73600.00	1	0.03
	104650.00	104650.00	1	0.06
DELTA	1134620.00	378206.67	3	0.49
	1038075.00	346025.00	3	0.61
DICKINSON	114750.00	114750.00	1	0.05
	92971.00	92971.00	1	0.06
EATON	1038116.00	129764.50	8	0.44
	1102650.00	137831.25	8	0.65
EMMET	559020.00	279510.00	2	0.24
	931250.00	465625.00	2	0.55
GENESEE	25730421.00	1715361.40	15	11.02
	12127035.00	932848.85	13	7.17
GLADWIN	17780.00	17780.00	1	0.01
	31750.00	31750.00	1	0.02
GOGEBIC	91330.00	91330.00	1	0.04
	163100.00	163100.00	1	0.10
GRAND TRAVERSE	490820.00	490820.00	1	0.21
	758000.00	758000.00	1	0.45
GRATIOT	1331099.00	332774.75	4	0.57
	629894.00	157473.50	4	0.37
HILLSDALE	421598.00	84319.60	5	0.18
	152209.00	38052.25	4	0.09
HOUGHTON	133390.00	66695.00	2	0.06
	236333.00	118166.50	2	0.14
HURON	191640.00	63880.00	3	0.08
	166801.00	55600.33	3	0.10
INGHAM	8665772.00	1733154.40	5	3.71
	4108945.00	821789.00	5	2.43
IONIA	498607.00	166202.33	3	0.21
	454754.00	113688.50	4	0.27
IOSCO	0.00	0.00	0	0.00
	0.00	0.00	0	0.00
IRON	414514.00	207257.00	2	0.18
	175856.00	87928.00	2	0.10
ISABELLA	24100.00	24100.00	1	0.01
	39125.00	39125.00	1	0.02
JACKSON	3685370.00	526481.43	7	1.58
	2615255.00	373607.86	7	1.55
KALAMAZOO	4117000.00	823400.00	5	1.76
	4112495.00	822499.00	5	2.43

KALKASKA	109318.00	109318.00	1	0.05
	36439.00	36439.00	1	0.02
KENT	11035084.00	1003189.45	11	4.73
	6937883.00	630716.64	11	4.10
KEWEEENAW	0.00	0.00	0	0.00
	0.00	0.00	0	0.00
LAKE	0.00	0.00	0	0.00
	0.00	0.00	0	0.00
LAPFER	177720.00	88860.00	2	0.08
	248490.00	124245.00	2	0.15
LEFLANAU	642450.00	321225.00	2	0.28
	292025.00	146012.50	2	0.17
LENAWEE	501260.00	125315.00	4	0.21
	812500.00	203125.00	4	0.48
LIVINGSTON	40050.00	40050.00	1	0.02
	41333.00	41333.00	1	0.02
LUCE	0.00	0.00	0	0.00
	0.00	0.00	0	0.00
MACKINAC	310610.00	155305.00	2	0.13
	554687.00	277343.50	2	0.33
MACOMB	1659276.00	553092.00	3	0.71
	1751408.00	583802.67	3	1.04
MANISTEE	236500.00	236500.00	1	0.10
	181476.00	90738.00	2	0.11
MARQUETTE	187720.00	187720.00	1	0.08
	17275.00	17275.00	1	0.01
MASON	1428680.00	1428680.00	1	0.61
	649400.00	649400.00	1	0.38
MECOSTA	242528.00	121264.00	2	0.10
	212503.00	106251.50	2	0.13
MENOMINEE	1690770.00	845385.00	2	0.72
	816725.00	408362.50	2	0.48
MIDLAND	826730.00	413365.00	2	0.35
	1389875.00	694937.50	2	0.82
MISSAUKEE	0.00	0.00	0	0.00
	0.00	0.00	0	0.00
MONROE	2176510.00	263313.75	8	0.90
	4802463.00	533607.00	9	2.84
MONTCALM	183486.00	61162.00	3	0.08
	285573.00	95191.00	3	0.17

MONTMORENCY	0.0	0.0	0	0.0
	0.0	0.0	0	0.0
MUSKEGON	4824550.0	2412275.00	2	2.07
	7776585.0	3888292.50	2	4.60
NEWAYGO	1745920.0	1745920.00	1	0.75
	793600.0	793600.00	1	0.47
OAKLAND	15834220.0	1759357.78	9	6.78
	16463850.0	1829316.67	9	9.74
OCEANA	616330.0	616330.00	1	0.26
	280150.0	280150.00	1	0.17
OGEMAW	67055.0	67055.00	1	0.03
	30600.0	30600.00	1	0.02
ONTONAGON	109410.0	36470.00	3	0.05
	182875.0	60958.33	3	0.11
OSCEOLA	375540.0	125180.00	3	0.16
	392295.0	130765.00	3	0.23
OSCODA	0.0	0.0	0	0.0
	0.0	0.0	0	0.0
OTSEGO	0.0	0.0	0	0.0
	0.0	0.0	0	0.0
OTTAWA	4428620.0	738103.33	6	1.90
	2760248.0	394321.14	7	1.63
PRESQUE ISLE	262160.0	262160.00	1	0.11
	263250.0	263250.00	1	0.16
ROSCOMMON	1632060.0	544020.00	3	0.70
	798617.0	266205.67	3	0.47
SAGINAW	9328890.0	1036543.33	9	4.00
	6130079.0	681119.89	9	3.63
ST. CLAIR	83080.0	41540.00	2	0.04
	148375.0	74187.50	2	0.09
ST. JOSEPH	0.0	0.0	0	0.0
	0.0	0.0	0	0.0
SANILAC	287758.0	57551.60	5	0.12
	322234.0	64446.80	5	0.19
SCHOOLCRAFT	12796280.0	2559256.00	5	5.48
	6028605.0	1205721.00	5	3.57
SHIAWASSEE	447701.0	74616.83	6	0.19
	785143.0	130857.17	6	0.46
TUSCOLA	123710.0	41236.67	3	0.05
	168952.0	56317.33	3	0.10

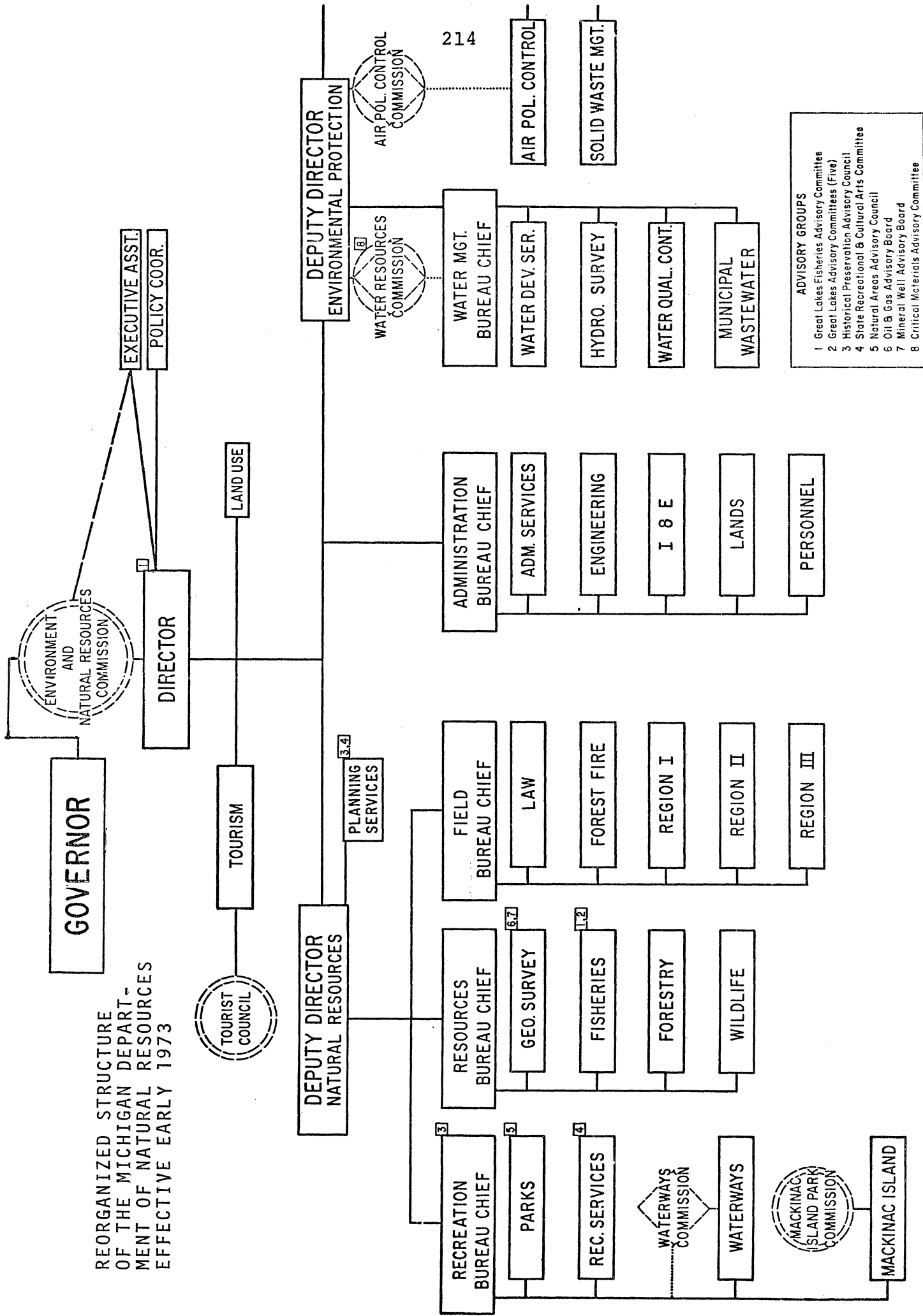
VAN BUREN	1637360.0	409340.00	4	0.70
	819739.0	204934.75	4	0.48
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WASHTENAW	2984700.0	596940.00	5	1.28
	2351939.0	470207.60	5	1.39
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WAYNE	98195855.0	8926895.91	11	42.06
	65351543.0	5941049.36	11	38.66
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WEXFORD	0.0	0.0	0	0.0
	71675.0	71675.00	1	0.04
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TOTALS	233493031.0	1010792.34	231	100.00
	169030026.0	716228.92	236	100.00
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ORGANIZATION OF THE
MICHIGAN DEPARTMENT
OF NATURAL RESOURCES
PRIOR TO 1973



- ADVISORY GROUPS
1. COUNCIL FOR ENVIRONMENTAL QUALITY
 2. OIL AND GAS ADVISORY BOARD
 3. RECREATION ADVISORY COMMITTEE
 4. RESEARCH REVIEW COMMITTEE
 5. GREAT LAKES FISHERY ADVISORY COMMITTEE
 6. HISTORIC PRESERVATION ADVISORY COUNCIL

REORGANIZED STRUCTURE
OF THE MICHIGAN DEPARTMENT
OF NATURAL RESOURCES
EFFECTIVE EARLY 1973



- ADVISORY GROUPS**
- 1 Great Lakes Fisheries Advisory Committee
 - 2 Great Lakes Advisory Committees (Five)
 - 3 Historical Preservation Advisory Council
 - 4 State Recreational & Cultural Arts Committees
 - 5 Natural Areas Advisory Council
 - 6 Oil & Gas Advisory Board
 - 7 Mineral Well Advisory Board
 - 8 Critical Materials Advisory Committee

APPENDIX V

March 9, 1973

Director
Office of Public Affairs
U.S. Environmental Protection Agency
Washington, D.C. 20460

Dear Sir:

We offer for your consideration comments on proposed regulations to implement Section 101(e) of P.L. 92-500 as published in the February 23, 1973, Federal Register (40 CFR Part 105).

The proposed regulations appear very fully to carry out the purposes of 101(e). They do so, however, without apparent consideration of the succeeding subsection, 101(f), which is certainly as emphatically worded as 101(e) and, by virtue of its equal position in the section, is presumably of equal weight.

We are fully convinced that the intents of both subsections can be very satisfactorily implemented if they are viewed in context, and the balance of our comments are devoted to that purpose. We are as thoroughly of the belief that failure to maintain that perspective in developing regulations for 101(e) will not only result in highly excessive costs in dollars and manpower but will openly invite intolerable if not ruinous delays in accomplishment.

The provisions of 105.4 very largely meet the requirements and purposes of 101(e) in items (a) Informational Materials and (e) Access to Information.

Items (d) Notification, and (g) Legal Proceedings are proper and acceptable except in their philosophy of the agency's having a responsibility to identify and seek out interested or affected persons or organizations. Such a responsibility would not only be extremely burdensome but would by its very nature, be impossible of assured completion. Some persons would unavoidably be missed, and if it were the agency's duty to reach them, they would very properly be entitled to protest. The final responsibility must rest with the person or organization to keep the agency currently apprized of his desire to receive notices and other specified information.

Specifically, we request that 105.4(d) be modified to read "Each agency, for its appropriate geographic area shall ~~develop-and~~ maintain a current list of interested persons and organizations ~~including-any~~ who ask to be on such list". We also ask that the sentence beginning with the word "Legislators" be deleted inasmuch as any Legislator or public officials would be on the list if they so request.

In items (b) Assistance to the Public, and especially in item (e) Consultation, we are very deeply concerned with the extension of agency duties beyond the intent of 101(e) into the field of spoon-fed education.

March 9, 1973

The great volume of projects required by the law to be processed timely by the agency, the inability of any but experienced and project-familiar professionals to engage in educational activities and the limited number of such professional who exist or who can be developed regardless of cost preclude the conduct of the proposed activities. To rectify these two items they should be stated in terms of desirable objectives consistent with the exigencies of work production and the responsibility of interested persons to inform themselves through reasonably provided agency material and other sources.

In this connection we ask that section 105.4(c) be modified to read in total "Each agency shall contribute to consultation and exchange of views with interested or affected persons and organizations on the development of revision of plans, programs or other significant actions through telephone discussion, office visits of reasonable duration or other means that may be mutually agreeable".

Under 105.6 Guidelines for Evaluation, we re-emphasize that it must not be the responsibility of the agency to "seek out" and "involve the interested public".

We ask that 105.6(b) be changed to read: "Has a suitable effort been made ~~to seek-out-and-involve~~ ADVISE the interested public . . . of the matter".

Under Guidelines for Public Hearings, the request under item (c) Discretionary Hearings that "a public hearing shall ordinarily be held if requested by interested or affected parties" goes too far. Experience has clearly shown that at least certain highly active private groups are making it a practice of pursuing every available avenue for examining, debating and influencing all projects of environmental impact. The agency must have discretion to recognize the professional objectors and to refuse their demands where unreasonable. We ask that the words shown in quotes above be deleted from item (c).

The requirement under (h) Scheduling, that "witnesses shall be scheduled in advance" is not to the advantage of the witnesses nor the agency. In our very considerable experience in conducting public hearings at the State level, we have found that most testimony tends to be reasonably brief and that it is more effectively handled--to the satisfaction of the witnesses as well as the convenience of the agency--by sequences and arrangements worked out at the hearing, when the extent of attendance and desires to testify are known. Since presentation-time requirements cannot be known in advance, pre-scheduling will unavoidably result in gaps and overlaps which will annoy participants. Flexibility rather than austere rigidity should characterize public hearings. This item should be deleted.

The requirement under (j) Records, that public hearings shall be promptly summarized is not fair to the testifying witnesses, since such summaries are not only inherently subjective but cannot possibly convey the shades of meaning and emphasis that a verbatim record does

Office of Public Affairs

-3-

March 9, 1973

We are impressed that the proposed regulations deal solely with agency functions and provide no guidance to the public on procedures for their participation. In general, the sense of such guidance should be instructive. In recognition, however, of the potential for disruptive action by those elements of the American public who espouse disorder, or by agents of other powers, they should be restrictive.

In this connection, the rule writers should recognize that there are many segments of the public--the largest and strongest of which is, by far, the one that goes about its business with a minimum of noise, a worried hope that its government is honest and efficient and a growing resentment against the wasting of its tax contributions in frivolity and bureaucratic excesses.

Very truly yours,

WATER RESOURCES COMMISSION

/s/ Ralph W. Purdy

Ralph W. Purdy
Executive Secretary

NE:ms

APPENDIX VI

Utilex Manufacturing Corporation

- Dec. 1952 -- Company requests "new use" permit to allow dumping of cyanide, copper, zinc, nickel, other matter in connection with plating operations, into adjoining small river.
- Jan. 1953 -- WRC makes order granting permit, attaching standards for water quality.
- July, Sept.
1953 -- Staff field report: effluent violates permit standards.
- Sept. 1954 -- Staff field report: effluent violates permit standards.
- Mar. 1955 -- Staff field report: effluent violates permit standards. Staff writes letter to Company suggesting new control equipment.
- Mar., Nov.
1956 -- Staff field report: effluent violates permit standards.
- June 1957 -- Violation noted for nickel only.
- Jan. 1960 -- Staff field report: effluent violates permit standards.
- May 1961 -- Staff field report: effluent violates permit standards. Biological test: longterm toxic effect, 15 river miles required for recovery of water quality in river.
- June, Sept.
1963 -- Staff field report: effluent violates permit standards.
- Jan. 1964 -- Biological test, no sign of life to $3\frac{1}{2}$ miles downstream, near lethal cyanide levels found $1\frac{1}{2}$ miles downstream.
- Oct. 1964 -- WRC writes Company that controls would be "most desirable".
- Nov. 1965 -- Staff field report: concentrations exceeding standards 9.3 miles downstream.
- Sept. 1966 -- Citizen complaints;
"Every day we do work in Fowlerville, Michigan we cross a pleasant stream on the west end of town. On this stream sits the Utilex Company, who dump a blue filth into it every day. The local residents claim it once held fish, but not any more. Can something be done."
Staff field report: effluent violates permit standards.

- Nov. 1966 -- University biological test shows complete eradication of sensitive animals up to 4.5 miles downstream.
- Jan. 1968 -- Staff field report: effluent violates permit standards; indications of "carelessness" in treatment of wastes.
- May 1968 -- In response to public environmental concern, WRC asks Company for stipulation of new standards; Company accepts, "prefers to have voluntary stipulation"; no mention of previous violations of permit.
- Dec. 1968 -- Excess effluents; Company submits plans for control equipment to meet new standards.
- July 1969 -- Company fails to install by promised date due to "changed engineering plans". New due date April 1970.
- Feb. 1970 -- Staff field report: effluents violate old permit as well as new standards.
- April 1970 -- Staff field report: effluents violate old permit as well as new standards. No equipment installed by due date.
- June 1970 -- Company requests postponement of due date due to "cold weather" and "shipping difficulties".
- Sept. 1970 -- Equipment installed.
- Oct. 1970 -- Staff field report: excess heavy metals in violation of 1953 standards.
- Dec. 1970 -- Staff report: effluents exceed standards.
- Mar. 1972 -- Staff field report: effluents exceed standards up to 2 miles downstream. Company writes letter explaining difficulty of cleaning up. Effluents do not meet 1953 permit standards.

(Source: The University of Michigan Environmental Law Society;
Summarized from WRC Files)

NOTES

Chapter One

1. Greater Michigan Foundation, 1973.
2. Lansing State Journal, July 14, 1968.
3. National Academy of Sciences, 1969, p16.
4. Ogburn, 1947, p81.
5. Thompson, 1965, p2.
6. Adapted from Haeffner, 1973, p19.
7. Isenson et al, 1966.
8. Marquis, 1969.
9. Adapted from Haeffner, 1973, p21.
10. U.S. Department of Commerce, 1967, p2.
11. Barnett and Morse, 1963, p10.
12. White, L., 1967, p1206.
13. Section 201(g)(2), P.L. 92-500.
14. See, e.g., Toffler, 1970.
15. White, G.F., 1969.
16. State of Michigan, Health Impact Project, 1973, p9-10.
17. Gazlay, 1973, p1.
18. U.S. Council on Environmental Quality, 1971, p217-8.

Chapter Two

1. Summarized in part from Antill, 1971, Chapter II.
2. Quoted in the Lansing State Journal, July 14, 1968.
3. State of Michigan, Joint Legislative Committee on Water Resources Planning, 1966.
4. Ibid, p V-1.
5. State of Michigan, Department of Treasury, 1968.
6. DeSantis, 1970, Chapter 3.
7. Reproduced from State of Michigan, Department of Conservation, 1968.
8. It appears that after the total amount of authorized federal funds are received by the State, an additional \$143 million in Bond Issue funds would be released for use. The explicit prefinancing of half of the federal share thus will in essence double the amount of State funds to be applied as State portions of project costs. The 1972 federal legislation further stretches the Bond Issue funds by providing a 75 percent federal grant to be matched by only a 5 percent State grant. Thus, the additional \$143 million could have the buying power of more than \$2.8 billion.
9. Act 21, P.A. 1969.
10. Data taken from State of Michigan, Water Resources Commission, Clean Water Bond Funds Status Report, March 1973.

Chapter Three

1. 24 Stat 329 (1886).
2. 30 Stat 1152 (1899).
3. Bald, 1961.
4. 39 Stat 309 (1912).
5. Act 98, P.A. 1913; M.S.A. 14.411.
6. Bald, 1961.
7. Act 245, P.A. 1929, Para 6.
8. Hines, 1966; Indeed, Massachusetts had such legislation in 1886, Wisconsin in 1876.
9. President Roosevelt vetoed a 1938 federal pollution abatement program due to a minor point relating to the separation of powers between the executive and legislative branches of government; see, e.g., Hines, 1967, p807.
10. 62 Stat 1155 (1948).
11. Hines, 1967, p810.
12. M.S.A. 14.411
13. Act 117, P.A. 1949.
14. State of Michigan, Joint Legislative Committee on Water Resources Planning, 1966.
15. Ibid.
16. M.S.A. 5.2770.
17. P.L. 84-660; 70 Stat 499 (1956).
18. 70 Stat 502.
19. Davies, 1970, p125.
20. Priorities based on political influence can be observed in Michigan as evidenced by the Case of the Huron River Interceptor in Chapter Six.
21. Act 329, P.A. 1966.
22. M.S.A. 3.533(53).
23. Hines, 1967, p820.
24. Davies, 1970, p43.
25. The National Conference on Water Pollution was convened by President Eisenhower in December 1960; see, e.g., Hines, 1967, p822.
26. 75 Stat 204 (1961).
27. Davies, 1970, p43.
28. P.L. 89-234; 79 Stat 903.
29. Ibid.
30. Hines, 1966, p207.
31. M.S.A. 3.526.
32. M.S.A. 3.5331(57).
33. M.S.A. 7.793(57).
34. Interstate standards were required by the 1965 federal legislation; this section provided new incentives to establish intrastate standards.
35. 80 Stat 1249.
36. See State of Michigan, Joint Legislative Committee on Water Resources Planning, 1966, p I-3.
37. See State of Michigan, Water Resources Commission, 1968.
38. 79 Stat 908.

Chapter Four

1. Burns and Stalker, 1961, p21.
2. DeFleur et al, 1971, p177-184.
3. Bulkley, 1972, p77.
4. Adapted from Driver, 1972.
5. Stern, 1937, p60.
6. Krech et al, 1962, p137.
7. Stern, 1937, p60.
8. Marquis, 1947, p76.
9. Stern, 1937, p61.
10. DeFleur et al, 1971.
11. Stern, 1937, p62.
12. Whitney, 1950, p247.
13. Bensman and Rosenberg, 1963, p262.
14. See, e.g., Toffler, 1970.
15. Remus, 1969, pl.
16. Bell, 1967.
17. Thompson, 1965, p4.
18. Thompson, 1969, p31.
19. Simon, 1960.
20. In a 1963 study, of the federal executives in grades GS-14 and above, only about one in forty-five had had college training in public administration; see Warner et al, 1963, p361.
21. Marquis, 1947, p78.
22. Ogburn, 1946, p60.
23. National Academy of Sciences, 1969.
24. Martino, 1972, p518.
25. An example of such an agency would be the U.S. Atomic Energy Commission.
26. Rourke, 1969, pl1.
27. Nimkoff, 1957, p68.

Chapter Five

1. For additional material on water management institutions, see Wengert, 1972.
2. State of Michigan, Executive Office, 1973.
3. Sax, 1971, p55.
4. Dworsky, 1971, p41-2.
5. New York Times, December 7, 1970.
6. See, e.g., U.S. Council on Environmental Quality, 1971, p218.
7. See, e.g., Kaufman, 1973.
8. Miller and Starr, 1967, p48.
9. See, e.g., Turner, 1970, p6.
10. Lansing State Journal, March 6, 1972.
11. Lansing State Journal, April 5, 1972.
12. Ayres, Lewis, Norris & May, March 1970, pl.
13. Lansing State Journal, April 5, 1972.
14. Ibid.
15. See, e.g., Maston, 1973; Stansbury, 1972.

16. State of Michigan, Joint Legislative Committee on Water Resources Planning, 1966.
17. Motor News, March 1971, p18.
18. Lansing State Journal, February 6, 1972.
19. Dworsky, 1971, p54.

Chapter Six

1. Black & Veatch, 1960, preface.
2. Ibid., p xiv.
3. Ibid., p49.
4. Ibid., p x.
5. Ibid., p36.
6. Ibid., p56.
7. Huron River Watershed Technical Advisory Subcommittee, 1960.
8. National Sanitation Foundation, 1964b.
9. National Sanitation Foundation, 1964a.
10. National Sanitation Foundation, 1964b, p I.
11. Ibid., p40.
12. Ibid., p51.
13. Ibid., p55.
14. Quoted in U.S. Public Health Service, 1965, p15.
15. Burns and Ross, 1972, p125.
16. See U.S. Department of the Interior, 1968.
17. National Sanitation Foundation, 1964a, p102.
18. Ibid., p138.
19. U.S. Public Health Service, 1965, p131.
20. Ibid., p173.
21. Ibid., p327.
22. New York Times, June 17,18,19, 1965.
23. Detroit Water Service, 1966, p4.
24. Ibid., p3.
25. Ibid.
26. Ibid., p16.
27. U.S. Department of the Interior, 1968, p38-9.
28. Ibid., p73.
29. Adapted from ibid.
30. Ibid., p72.
31. SEMCOG is the successor to the Supervisors' Inter-County Committee.
32. Adapted from State of Michigan, Water Resources Commission, 1969, p21.
33. See, e.g., Canale et al, 1973.
34. Adapted from State of Michigan, Water Resources Commission, February 1972, p II-7.
35. Hubbell, Roth, and Clark, Inc, and McNamee, Porter and Seeley, 1971, p1.
36. Ibid., p V.
37. State of Michigan, Water Resources Commission, 1971, p6.
38. National Sanitation Foundation, 1964a, p147.
39. State of Michigan, Water Resources Commission, February 1972, p V-2.

40. Ibid., p IV-19.
41. Ibid., p III-26.
42. Ibid., p III-15.
43. State of Michigan, Water Resources Commission, September 1971, p9.
44. P.L. 91-190.
45. U.S. Environmental Protection Agency, 1973, p v-vi.
46. It should be noted that the EPA sent a letter to WRC Executive Secretary Ralph Purdy on May 16, 1973 stating that several of the basic issues underlying the Huron River Interceptor controversy needed further exploration. This action will delay or halt further action on the Interceptor plan.
47. See Canale et al, 1973.
48. U.S. Environmental Protection Agency, 1973, p36.
49. See, e.g., Stansbury, 1972.
50. U.S. Environmental Protection Agency, 1973, p72.
51. Hubbell, Roth, and Clark, Inc, and McNamee, Porter and Seeley, 1971.
52. U.S. Environmental Protection Agency, 1973, p33.
53. Ibid., pl.
54. Personal communication, August 1973.

Chapter Seven

1. Summarized in part from Sheaffer, 1970; Bauer Engineering, Inc., 1971; Mummert and Simmons, 1972; and Davis and Dunham, 1971.
2. Mummert and Simmons, 1972, Section VI.
3. Davis and Dunham, 1971, p9.
4. The Lake Michigan Pollution Conference was attended by representatives of Wisconsin, Michigan, Illinois, and Indiana.
5. Mummert and Simmons, 1972.
6. Bauer Engineering, Inc., 1971, pl.
7. Chaiken et al, 1973.
8. Adapted from Bauer Engineering, Inc., 1971, p14.
9. Chaiken et al, 1973, p51-2.
10. Sheaffer, 1970, p64.
11. Chaiken et al, 1973, p52.
12. Bauer Engineering, Inc., 1971, p13.
13. Mummert and Simmons, 1972, Part VI.
14. Muskegon County Board of Supervisors, 1969.
15. Davis and Dunham, 1971 p47.
16. Ibid., p48.
17. Sheaffer, 1970, p65.
18. Quoted in ibid.
19. Nixon, 1970.
20. The National Observer
21. Davis and Dunham, 1971, p52.
22. Dr. Sheaffer is now associated with the U.S. Army Corps of Engineers' Wastewater Management Program, which is promoting the land disposal treatment process in regional areas around the nation.

23. Personal communication, 1973.
24. Walker, 1973, p15.
25. See, e.g., Governor Romney's comments in Lansing State Journal, July 14, 1968.

Chapter Eight

1. A more extensive analysis of this case will be published by the Sea Grant Program, The University of Michigan in late 1973.
2. Ayres, Lewis, Norris & May, July 1970, p32.
3. Ayres, Lewis, Norris & May, March 1970, pl.
4. Ayres, Lewis, Norris & May, July 1970, p32.

Chapter Nine

1. See, e.g., Battelle Laboratories, 1973, p3-2; Thompson, 1965, pl1; and Thompson, 1969, p42.
2. New York Times, December 7, 1970.
3. State of Michigan, Water Resources Commission, Minutes of Meeting, July 1973, p7.
4. State of Michigan, Joint Legislative Committee on Water Resources Planning, 1966, p V-3.
5. See, e.g., U.S. Council on Environmental Quality, 1971, p56.

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