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FINAL ENVIRONMENTAL IMPACT STATEMENT

ALTERNATIVE WASTEWATER TREATMENT SYSTEMS FOR RURAL LAKE PROJECTS

CASE STUDY No. 4: STEUBEN LAKES REGIONAL WASTE DISTRICT

STEUBEN COUNTY, INDIANA

Prepared by the

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION V, CHICAGO, ILLINOIS

AND

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This Final Environmental Impact Statement was prepared by WAPORA, Inc., under the guidance of Ted Rockwell and Kathleen Schaub, EPA Region V Project Officers. Mr. Edward Wandelt was WAPORA's Project Manager for the Final EIS. Invaluable assistance was provided by Gerald O. Peters, Dr. Ulrich Gibson, and Henry Bartholomot.

Much of the material in the Draft EIS was provided by numerous subcontractors; they are listed in that document.

EXECUTIVE SUMMARY

Background

The 1979 Draft Environmental Impact Statement (DEIS) on Alternative Wastewater Treatment for Rural Lake Projects, Steuben County, Indiana, addressed issues raised during the review of the 1976 Facilities Plan. Issues included: the high cost of centralized collection and treatment (1980 construction cost of $20.8 million), uncertain water quality improvements to the Steuben Lakes, economic effects on area residents, and the potential for induced growth with its associated secondary impacts.

The Facilities Plan, prepared by Mick, Rowland and Associates, proposed the construction of a regional wastewater collection system and a centralized treatment facility. On-site wastewater treatment systems, which are currently in use in the Study Area, would be abandoned. Gravity sewers, utilizing grinder pumps and low pressure sewers in some low-lying areas, would convey wastewater to a 140-acre treatment site, which has not yet been selected, in the northwestern part of the Study Area. The wastewater would be treated in aerated lagoons, chlorinated, and subsequently applied to the land via spray irrigation. The secondary effluent would be utilized for controlled farm operations with either row crops and/or forage crops. An underdrain system would be installed at the site to collect the renovated water for discharge to Crooked Creek. The effluent would meet the following National Pollution Discharge Elimination Systems (NPDES) permit limitations: BOD-10 mg/l, suspended solids-10 mg/l, pH-6.0 to 9.0, and fecal coliform-200 per 100 ml.

In order to assess the appropriateness and the environmental consequences of the proposed plan, EPA conducted a variety of tests. These tests included an aerial photographic survey of surface malfunctions; two septic leachate surveys of the eight potentially affected lakes (Jimmerson Lake, Lake James, Lake Charles, Snow Lake, Big Otter Lake, Little Otter Lake, Lime Lake, and Crooked Lake); a groundwater survey; and detailed soil, groundwater, and aquatic plant analyses of selected wastewater treatment systems in shoreline areas. However, data from the second septic leachate survey and the site-specific analyses, were not available in time to be used in the preparation of the 1979 DEIS.

All the above studies found that only a few on-site treatment systems were having any impact on water quality even though many systems did not comply with the Steuben County sanitary code. Water quality modeling indicated that none of the EIS or Facilities Plan alternatives would have a significant effect on lake water quality or trophic status.

A wide range of alternatives were developed and evaluated during the EIS process. These ranged from highly centralized (the Facilities Plan Alternative and some variants) to largely decentralized (Limited Action and No-Action). Total present-worth costs of alternatives ranged from $23.2 million for the Facilities Plan Alternative and $8.3 million for the DEIS Limited Action Alternative, to $6.4 million for the Final EIS (FEIS) Limited Action Alternative, which would serve the shorelines with on-site maintenance and upgrading. The alternatives differed greatly in their potential impacts on local costs, future population, and future land use.

The DEIS recommended the Limited Action Alternative, which would result in generally comparable water quality impacts at a much lower cost than any other alternative. The Limited Action Alternative would include decentralized systems for all parts of the Proposed Service Area and would include a program to replace and rehabilitate on-lot systems, where necessary, in order to alleviate existing water quality and public health problems. The utilization of on-site facilities throughout the Study Area would constrain future population growth to below the level that was anticipated with the provision of centralized wastewater treatment. Under the Limited Action Alternative, the in-summer population growth would be limited to 22% in excess of the 1975 level (from 1975 population of 22,440 to 2000 population of 27,346). This level of population growth would necessitate converting of 600 acres of undeveloped land to residential land use. The resultant development patterns would be more scattered and at a lower density than the potential density to be accommodated by a centralized treatment alternative.

Comments

After the November 1979 publication of the DEIS, a Public Hearing was held on 28 January 1980 in Angola, Indiana. Numerous people attended and many comments were received, many of them in writing (see Appendix A). In general, the comments concerned:

- Clarifying of the administrative elements of the alternative recommended in the Draft EIS
- Ascertaining the suitability of area soils for upgraded on-site treatment and their ability to provide long-term treatment
- Learning the costs and Federal funding eligibility for the Draft EIS Limited Action Alternative.

Responses

After the comment period closed, EPA scrutinized the results of the field studies conducted during the summer of 1979. These studies included a groundwater hydrology survey, a second septic leachate survey, and detailed soils, groundwater, and aquatic plant analyses of six on-site sewage treatment systems in shoreline areas. The results of prior work were confirmed and the body of knowledge about the effects of on-site systems was increased.

EPA also clarified Federal, State, and local administrative questions about the formation of a Small Waste Flows District. The new features of a district to manage on-site treatment systems include:

- A Regional standard for project needs documentation requirements (see Appendix B)
- Methods to reduce the cost and complexity of detailed site work and to expedite the processing of innovative and alternative grant applications

- A variety of approaches to simplify easement and access requirements. (This process, which is still ongoing, could eliminate the expense and complexity of easement acquisition [see Appendix C].)

Finally, EPA described the No-Action Alternative in greater detail than provided in the DEIS and re-examined the Limited Action Alternative. Costs of the Limited Action Alternative were revised to reflect the more detailed work plans for the site-by-site engineering and environmental analysis, as well as for long-term operation and maintenance. These costs were estimated on a conservative basis. The cost review of the Limited Action Alternatives also revealed some calculation errors that showed the present worth to be higher than it should have been. In total, these changes reduce the present worth of the Limited Action Alternative from $8,268,700 to $6,443,200. This decrease does not change the ranking of alternatives. The present worth of the No-Action Alternative was estimated to be $3,363,100.

The Final EIS

This FEIS is considerably shorter than the DEIS. Elements that were discussed at length in the DEIS are summarized here, with emphasis placed on responses to comments and explanations of management procedures and costs. This approach is consistent with the Council on Environmental Quality's 1978 National Environmental Policy Act (NEPA) compliance regulations.

Recommendations

The various administrative changes, field surveys and responses to public comments have not changed basic assumptions or information published in the DEIS. Changes and new information have not substantially altered the nature or ranking of alternatives. Therefore, the recommended action remains basically as it was in the DEIS:

- To design and implement the Limited Action Alternative
- To perform site-specific environmental and engineering analyses of existing on-site systems in the Proposed Service Area
- To repair and replace on-site systems, as required.

Should the Steuben Lakes Regional Waste District (SLRWD) wish to proceed with the Limited Action Alternative. EPA recommends that careful consideration be given to the sections of the FEIS on Management and Implementation, (Chapter II, Sections B-2 and B-3), which presents the nature and advantages of many of the available choices. In addition, the SLRWD should initiate the management structure that will operate in the future so that citizens and local officials can take part in the site-by-site design treatment choices. This will allow all concerned individuals to become familiar with the procedures necessary to maintain and improve water quality in the Steuben Lakes area.

The no-action alternative was evaluated but rejected as a viable solution to the problems of the Steuben Lakes area for the following reasons:

- It fails to detect and remedy existing and future malfunctions in a timely manner,

- It places substantial financial burdens on those individual property owners who would have to install holding tanks or costly on-site systems at their own expense,

- It offers no provision of developing a database on the design, usage, and impacts of on-site systems; such as database would be useful in making future permit decisions.

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CHAPTER I

PURPOSE OF AND NEED FOR ACTION

A. THE APPLICANT'S FACILITIES PLAN AND ENVIRONMENTAL IMPACT STATEMENT ISSUES

In August 1976, Mick, Rowland and Associates completed the Facilities Plan for the Steuben Lakes area. They evaluated alternative wastewater collection and treatment strategies for residences around numerous lakes in the Study Area. Their Facilities Plan proposed the construction of new wastewater collection and land treatment facilities. The proposal was submitted to the US Environmental Protection Agency (EPA) Region V by the Steuben Lakes Regional Waste District (SLRWD), the grant applicant, for funding under the EPA Construction Grants Program. Figure 1 shows the service area addressed in this EIS.

Following are the major issues that are examined in the EIS. These five issues are closely related to the proposal to build sewers around the various Steuben Lakes.

1. Cost-Effectiveness

The total capital cost ($3,800 excluding connection costs) and annual user charges ($450) for the project proposed in the Facilities Plan are very high. Those costs are especially high considering the fact that a majority of the population is seasonal and that many of the permanent residents in the area are of retirement age. The Facilities Plan did not adequately address whether or not the local share of the cost burden was acceptable.

2. Sizing

The use of per capita flows of 100 gpcd for both permanent and seasonal residents was not justified in the Facilities Plan. As a result of this suggestion residents might be required to pay for substantially larger systems than they need.

3. Primary Impacts

Steep slopes exist in many parts of the Proposed Service Area, particularly in the east. Construction of sewers and treatment plants may cause substantial erosion of these slopes, with the consequent deterioration of water quality. The Facilities Plan also failed to discuss the impacts that construction would have on nearby tamarack bogs, which are the habitats of two orchids on the Federal list of threatened species (*Plantanthera flava* and *Plantanthera leucophaea*).

4. Secondary Impacts

Often, availability of a regional sewer system such as that proposed in the Facilities Plan induces significant growth in a community. Such growth could lead to the contamination of surface and groundwaters, pressures for the development of wetlands, and increased demand for infrastructural services. A trend towards the development of wetlands is already visible on Snow Lake, Lake James, Jimmerson Lake, and Crooked Lake. It is, therefore, important that regional and subregional systems be compared for their potential to create secondary impacts that are associated with induced growth.

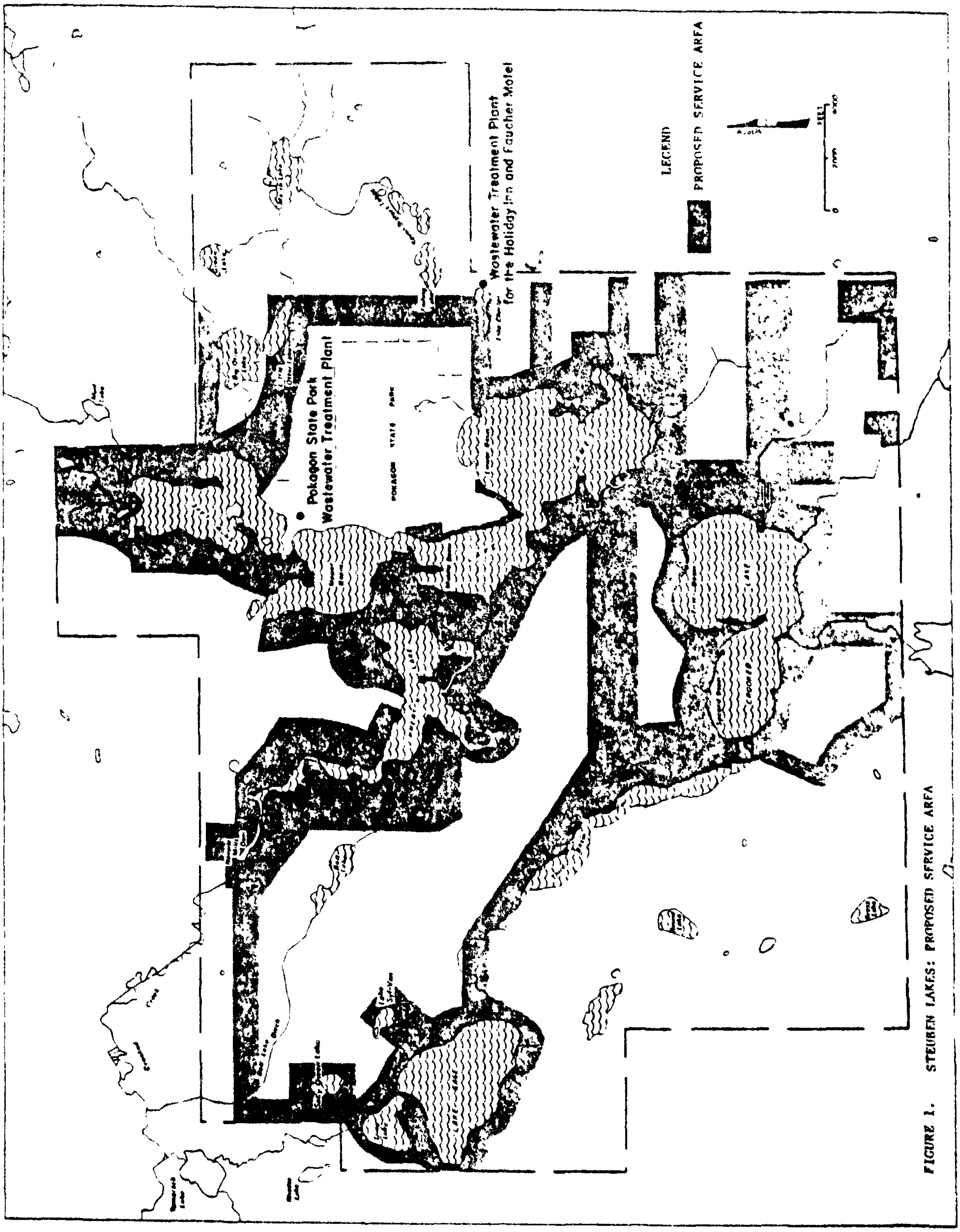

FIGURE 1. STEUBEN LAKES: PROPOSED SERVICE AREA

5. Socioeconomic Impacts

Estimated capital costs of the Facilities Plan Proposed Action are at the very high level of $3,800 per residence. Because it is also likely that a substantial portion of the costs may not be eligible for Federal funding, local costs may be very high. High local costs may lead to both a shift from seasonal to permanent residence, and the displacement of low, moderate, or fixed-income families.

Subsequent project studies to research the above difficulties uncovered the following additional concerns all of which would require resolution or mitigative measures:

- The large, non-point source phosphorus plume originating in Marsh Lake and extending through the two Otter Lakes, Snow Lake, and Lake James
- The ongoing destruction of wetlands within the Study Area and its relationship to secondary impacts (Linked with this is the role of cut-and-fill techniques in creating shoreline channels that tend to become sinks for septic tank effluent leachate.)
- The location of numerous non-point sources, notably dozens of unofficial dumps or landfill areas
- The management requirements for operation of an On-Site Wastewater Management District (OSWMD).

B. THE NEED FOR IMPROVED WASTEWATER MANAGEMENT

The Facilities Plan identified the following problems associated with the existing on-site systems in the Steuben Lakes area:

- Most of the septic systems are quite old and were constructed when there were few rules governing their installation. In the past, there was very little inspection of the construction of septic systems. In some summer cottages, out-houses are still in use.
- The Facilities Plan indicated that most of the nitrates and phosphate from septic tank effluents near lakes will eventually reach the lakes.
- Some of the septic systems in low-lying areas near the lakes are located below the highest groundwater table. The Facilities Plan stated that in periods of high precipitation, septic tank effluent reaches the lake quickly.
- Some lake lots are quite narrow (i.e., 40-foot frontage) and contain a well and septic system. Many of the wells are shallow. Proper separation of the water supply and the wastewater disposal system cannot be maintained on such small lots.
- Dye tests of septic tank effluents have been conducted by the County Health Department and some of the lake associations. Several areas of pollution have been detected by these tests. Furthermore, it was stated in the Facilities Plan that much of the pollution caused by septic systems is of a slow nature and is not readily detectable by dye tests.

Several tests were conducted during the preparation of the Draft EIS to evaluate in greater detail the water quality and public health problems related to use of on-site systems around the Steuben Lakes. Several of the studies were reported in the Draft EIS. These studies and their major conclusions are:

1. Studies Included in the Draft EIS

a. Eutrophication modeling--On-site sewage disposal systems contribute an estimated 3% of the phosphorus load to Snow Lake, 5% of the load to Lake James, 21% of the load to Jimmerson Lake, 7% of the load to Crooked Lake, and 10% of the load to Lake Gage. They do not play a role in the phosphorus loads to Marsh Lake, Little Otter Lake, Lime Lake, and Big Otter Lake. According to Dillon's lake eutrophication model, Crooked Lake, Jimmerson Lake, Lake Gage, and Lime Lake are mesotrophic, and Lake James, Big Otter Lake, Snow Lake, and Marsh Lake are eutrophic. Little Otter Lake is classified as hypereutrophic. Removing the contribution that phosphorus from septic tanks makes to the lakes would lead to negligible changes in the lakes trophic status.

b. Aerial photographic survey--EPA's Environmental Photographic Inter pretation Center (EPIC) conducted an aerial photographic survey to determine the location of surface malfunctions within the Study Area. During the survey, only four surface malfunctions were detected within the Proposed Service Area; the malfunctions were later confirmed by on-site investigation.

c. Septic leachate study--An investigation of septic leachate discharges around the Steuben Lakes took place in December 1978. The study was to determine whether groundwater plumes from nearby septic tanks were emerging along the lakeshore.

An instrument called the "Septic Snooper" was used to detect septic leachate plumes. This instrument is equipped with analyzers to detect both organics and inorganics from domestic wastewater. The device was towed along the lakes; holes were drilled in ice-covered areas in order to obtain a profile of septic leachate plumes discharging to surface waters.

A total of 69 plumes were found, irregularly scattered around the shorelines of the lakes. This is a comparatively small number of plumes for 3,494 lakeshore residences in the Proposed Service Area to produce. Almost all of the plumes were found on three lakes: Lake James, 24 plumes (35%); Crooked Lake (first and second basins), 20 plumes (29%); and Lake Gage, 15 plumes (22%). Erupting plumes numbered 42, which was equivalent to 61% of the total. There were 23 passive plumes (33%), and four stream source plumes (6%).

The frequency of the plumes was directly related to the soil classification. The majority of the plumes, 41 of 69, were associated with moderately rapid and rapidly permeable soils, or occurred in cut-and-fill canal regions with uncertain soil types.

A large, stream source plume, principally of bog-like organic composition, (as distinct from wastewater effluent), was found entering Little Otter Lake via the connecting stream from Marsh Lake. This plume became progressively less concentrated as it flowed through Little Otter Lake, Big Otter

Lake, and the lower half of Snow Lake; it finally dissipated in the middle basin of Lake James. Associated with this plume was a noticeably high level of total phosphorus, ranging from 0.096 mg/l at the entrance to Little Otter Lake to 0.011 at the discharge from Lake James to Jimmerson Lake. Old sediment deposits in Marsh Lake, the result of effluent discharges from the Fremont sewage treatment plant (east of Marsh Lake), were indicated as the likely source of the high phosphorus concentrations. Although the plant no longer discharges phosphorus to Marsh Lake, the acidic leachate from the extensive bogs around Marsh Lake is thought to release phosphorus from its carbonate binding in the Marsh Lake sediments. This and the other stream source plumes were identified as the major sources of phosphorus to the lakes surveyed.

The bacteriological survey of the lakes revealed very few locations with fecal contamination (shown by the presence of fecal coliforms). The recommended limit of 200 fecal coliform organisms/100 ml was only exceeded at three locations: the storm drain outlet on the western shore of Lake Charles, the stream entering Big Otter Lake in the northeast, and a point on the north shore of the third basin of Crooked Lake. Four other elevated concentrations (≧ 100 organisms/ 100 ml) were found in canals on the eastern shore of Crooked Lake and on the stream linking Crooked Lake and Lake Gage.

d. Well water sampling--This study was undertaken by the Tri-State University Engineering and Research Center (TSUERC). It was designed to obtain supplementary information about the existing groundwater quality in the Study Area and an indication of the effects that current wastewater disposal practices have on groundwater quality. A total of 101 residential drinking water wells were sampled for bacteriological and chemical analyses. Sampling was distributed throughout the 13 subareas of the Study Area, in proportion to the number of residences in each subarea. Each sample was analyzed for total coliforms, fecal coliforms, fecal streptococci, phosphates, nitrates as nitrogen, chlorides, and specific conductance.

Based on the results of the study, the quality of groundwater (bacteriological and chemical) in the Study Area is of a high standard. The effects of more than 50 years of septic tank/soil absorption systems on water quality seem to be insignificant.

Less than 10% of the 101 samples were confirmed positive for total coliforms. Less than 2% of the samples were positive for both total and fecal coliforms. The bacteriological quality of the groundwater is very high; the groundwater appears to be uncontaminated by human wastes.

In all cases, nitrate levels are well below the USEPA's Interim Primary Drinking Water Standards permissible 10 mg/l as nitrogen. The values range from 0.03 to 2.60 mg/l. Only 5 samples (5% of the total) were above 2 mg/l, and 8 samples were between 1 and 2 mg/l. These low levels and the absence of significant increases in nitrate concentrations over background levels indicate that the soils throughout the Study Area have been efficiently treating septic tank wastes.

Chloride levels are generally well below 100 mg/l, with the exception of two wells on Crooked Lake (138 and 650 mg/l), one well on Jimmerson Lake (194 mg/l), and one well on Lake Gage (136 mg/l). In all four cases, the associated levels of nitrates (which, like chlorides, are also soluble in water) are very low. These low nitrate levels indicate that the main source of the elevated chlorides is unlikely to be human wastes.

There is no drinking water standard for phosphates, but phosphate levels are generally low throughout the area; only 16 samples exceed 0.02 mg/l. Most of the elevated phosphate levels (maximum measured 0.15 mg/l) are found in off-lake rural areas east and south of Crooked Lake, and north of Lime Lake, which suggests agricultural fertilizer is the source.

2. Additional Studies

After the Draft EIS was issued, additional studies were concluded. These studies and their major findings follow.

a. Septic leachate study--A second investigation of septic leachate discharges around Crooked Lake, James Lake, and Jimmerson Lake took place in August 1979. The patterns of erupting plumes from on-lot septic systems were compared with the pattern that emerged in the winter survey. The summer survey revealed that groundwater plumes occurred irregularly around the shorelines of the three surveyed lakes; their locations coincide closely with plume locations found in the winter survey. Plumes again seemed directly related to soils classified as moderately rapid to rapidly permeable; plumes were especially grouped in stream inlets or stagnant cut-and-fill canal regions common on each of the lakes. The actual number of plumes revealed was low; 25 sites on Lake James, and less than ten each on Crooked Lake and Jimmerson Lake had plumes (see Figure 2).

The fecal coliform bacterial survey of Jimmerson Lake and Crooked Lake turned up only three locations that exceeded the State's maximum safe level of bacteria for full body contact. Bacterial impacts are isolated and do not appear to be a significant hazard to recreational swimming areas.

The complete septic leachate study is presented in Appendix D.

b. Near-shore hydrology study--Seventy-six sites were chosen around Lake Gage, Big and Little Otter Lakes, Snow Lake, Crooked Lake, Jimmerson Lake, and Lake James. These sites were used to determine the rate and direction of shallow groundwater flow at the near-shore water table surface. The flows were measured with a meter that generates a heat pulse, then measures the pattern of heat dispersion. Soil was excavated to the water table at three points for each location; the probe was inserted just below the water level and oriented with a compass fixed on the body of the probe. Recordings from the three points were averaged to describe the rate and direction of flow at each location. The results are illustrated in Figure 3.

The groundwater flow patterns show some irregularities that result from complex soil matrices (which include marl and mucks), but they portray a general southwesterly flow, with a low velocity (estimated at less than 10 feet per day).

c. Analysis of near shore aquatic productivity problems--Studies of other mid-western lakes have suggested a correlation between the growth of a filamentous green algae, *Cladophora glomerata*, and effluent emergence at the

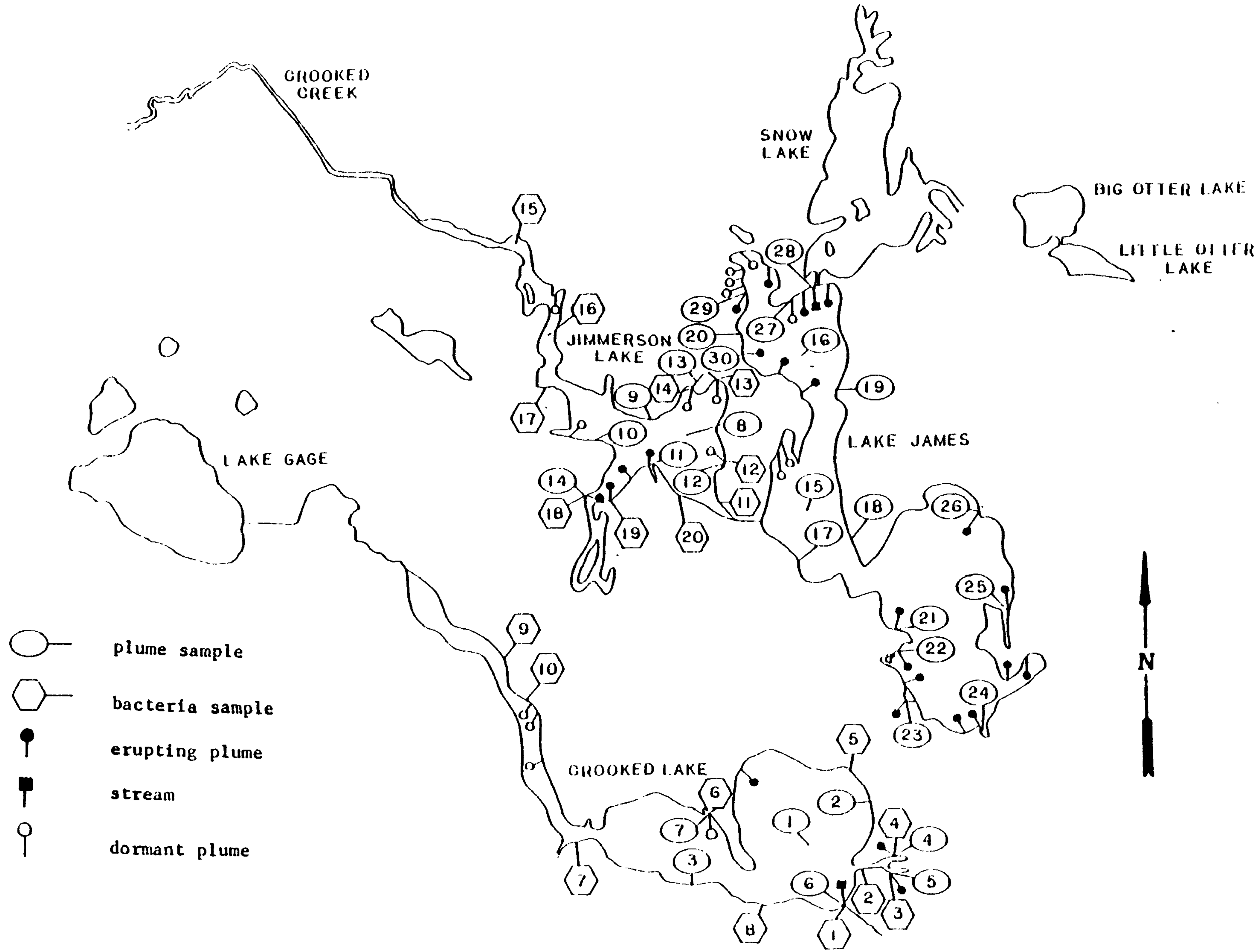

FIGURE 2. PLUME LOCATIONS ON STEUBEN LAKES - AUGUST 1979

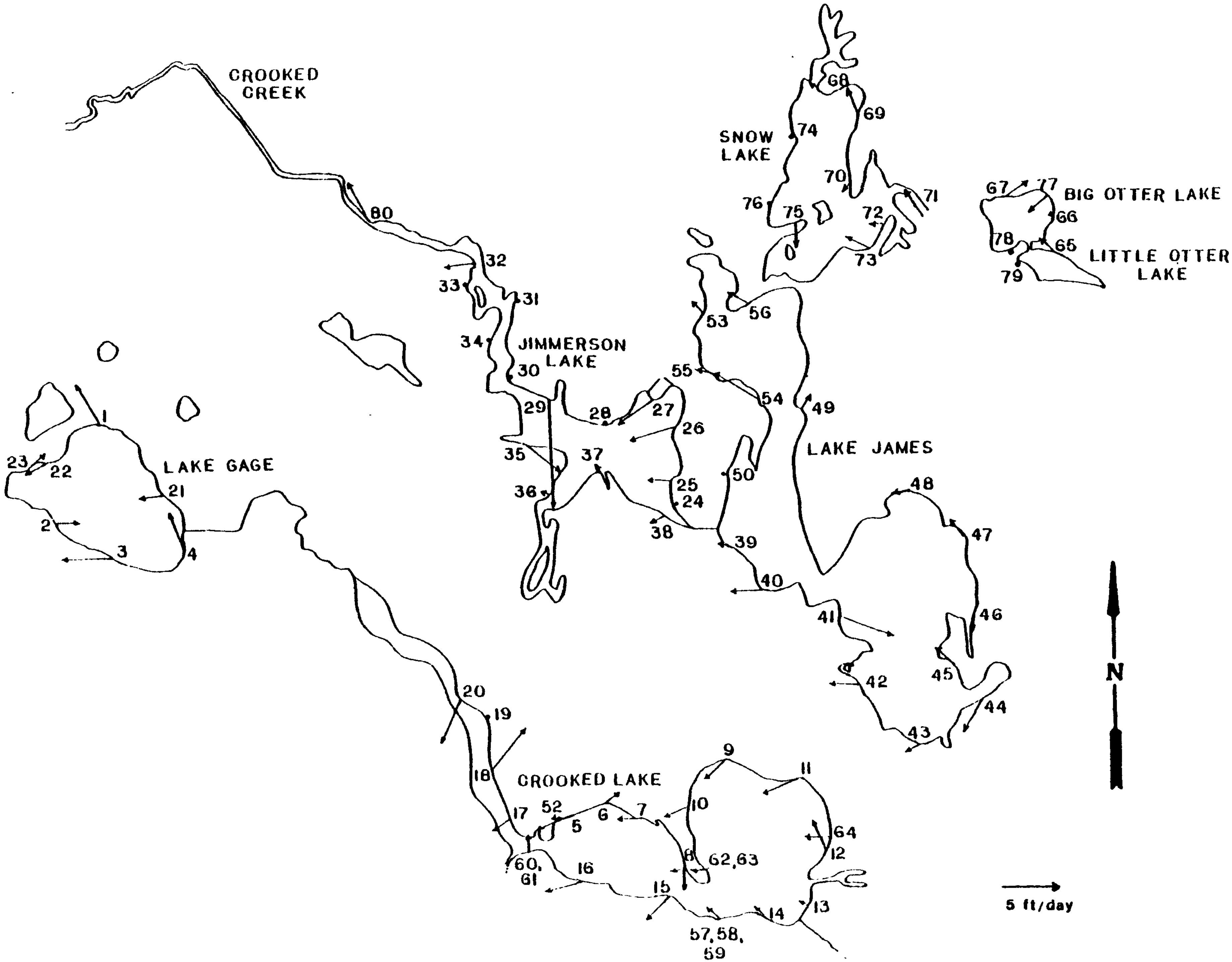

FIGURE 3. DIRECTION AND RATE OF GROUNDWATER FLOW AT SELECTED STATIONS AROUND THE STEUBEN LAKES SHORELINE, AUGUST 1979

shoreline. Previous studies, however, did not establish a cause and effect relationship between effluent emergence and growth of this algae. To evaluate this relationship and to study factors controlling effluent plume movement, six on-site systems close to Crooked Lake were selected for detailed monitoring.

At two of the sites, C. glomerata grew mainly on rock walls in the splash zone and, to a lesser extent, in shallow water just off-shore. This green algae did not grow in readily visible amounts at the other four sites. The presence of C. glomerata did not correlate with the phosphorus concentration in septic tank leachate at the shoreline. Although the leachate at one C. glomerata site contained elevated total phosphorus (3 mg/l-P), another site with high phosphorus had no C. glomerata. The other site with C. glomerata had background concentrations of phosphorus.

Shallow areas near two other sites had slight to moderate growths of Chara Sp., a branched green algae, and several rooted, aquatic organisms.

For all six sites, at depths of 1 meter and more extensive and dense mats of Chara Se. grew interspersed with the rooted aquatic plants found in shallow water.

The distribution of plant growth in this productive lake does not correlate with the observed and expected locations of plume emergence at the shoreline. The densest growth is found in deep water. Sparser growths in shallow waters and in the splash zone may be locally stimulated by septic tank leachates but the relationship is not strong. Other factors such as wave action, water temperature, boating and swimming activity, use of herbicides, or amount of light, appear to control near-shore plant growth more than septic tank leachates do.

Analysis of groundwater samples collected at each site showed that phosphorus and nitrogen compounds were reduced to background concentrations at three sites before effluents entered Crooked Lake. This result was found despite the age of the dwellings and location of their soil absorption systems in or just above, the groundwater. Two other sites had total phosphorus concentrations in groundwater at the shoreline of 3 and 4 mg/l-P and total inorganic nitrogen concentrations (ammonia, nitrite and nitrate) at the shoreline of 19.7 and 22.7 mg/l-N. The sixth site had background levels of phosphorus but a high total inorganic nitrogen concentration of 22.8 mg/l-N.

Taken as a small sample of the lakeshore dwellings in the Study Area, the groundwater sampling supports the septic tank loading assumptions that were used to model the lakes' eutrophication potential. The sampling also shows that there can be wide variations in leachate nutrients, even though the average nutrient levels are low.

CHAPTER II

ALTERNATIVES

A. THE FACILITIES PLAN PROPOSED ACTION

The Facilities Plan recommended the construction of a regional collection and centralized treatment system. The collection system would be a combination of pressure sewers/grinder pumps and gravity sewers with lift stations.

The Facilities Plan also proposed treatment of 1.9 million gallons per day (mgd) of wastewater by aerated lagoons and land applications. Spray irrigation was selected with an underdrain system to collect the effluent for discharge to Crooked Creek. Figure 4 illustrates the Proposed Service Area and location of the proposed stabilization pond.

The Draft EIS found that septic tank effluent pumps (STEP) were more cost-effective than the grinder pumps recommended in the Facilities Plan. For this reason, STEP systems were substituted in the Proposed Action discussed in this EIS. In this respect, the Proposed Action differs from that in the Facilities Plan.

Costs developed in the Draft EIS for the Facilities Plan Proposed Action are:

Construction costs (1980) (including engineering, legal, and contingency costs)	$ 20,839,800
Future construction costs	$ 125,600 per year
Annual operation and maintenance expense	$ 253,050 per year
1980 Local cost user charge	$ 450 per year

The 1980 average annual user charge includes all operation and maintenance costs for the year plus annual payment on the debt of privately. as well as publicly, financed construction costs (interest rate of 6-5/8%, with a payback period of 30 years). The relatively high local costs of the Facilities Plan Proposed Action stem, in part, from the ineligibility of all collector sewers. Costs for these ineligible sewers must be met entirely at the local level without Federal and State assistance.

Appendix K-2 of the Draft EIS outlines the major components of this Alternative and the detailed costs of these components.

B. THE EIS RECOMMENDATION - LIMITED ACTION

As described in the Draft EIS, the Limited Action Alternative would continue the use of on-site systems throughout the Proposed Service Area. Upgrading or replacement of on-site systems is included where the existing systems are obviously of inadequate design, are malfunctioning, or could be expected to malfunction based on comparisons with similar systems. The Limited Action Alternative is estimated to result in:

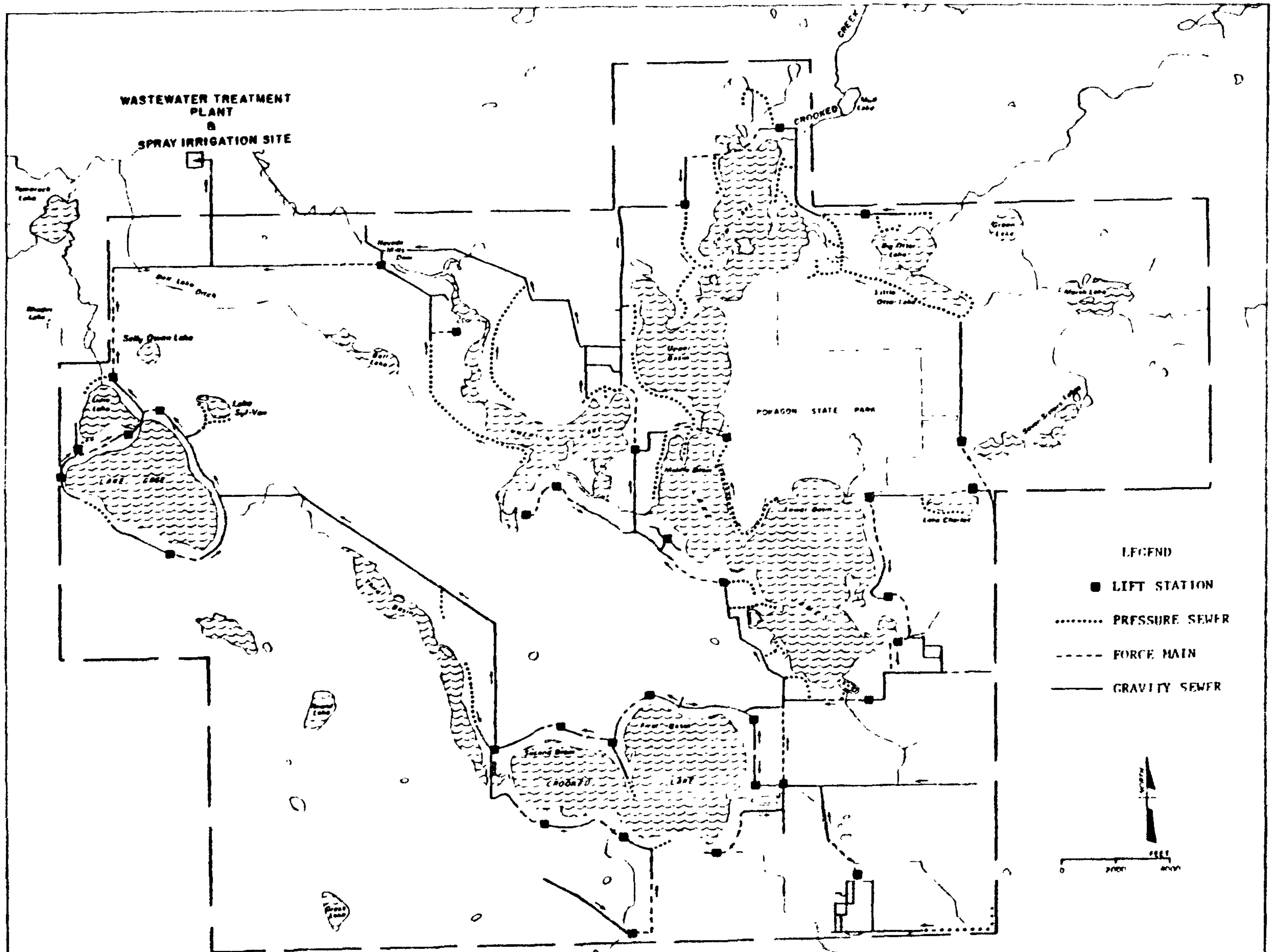

FIGURE 4. STEUBEN LAKES: FACILITIES PLAN PROPOSED ACTION

- Replacement of approximately 50% of the existing septic tank/soil absorption systems (ST/SASs) in the year 1980
- Replacement of approximately 10% of the drainfields in the Study Area.

The present worth of the Limited Action Alternative has been revised for the Final EIS and is estimated to be $6,523,700 (as detailed in Appendix E). This compares to $8,268,700 for the Limited Action Alternative (described in the Draft EIS) and $23,166,800 for the Facilities Plan Proposed Action.

The total present worth cost for the Limited Action Alternative has decreased by 27% from the Draft EIS to the Final EIS. This is a result of the following major factors:

- Detailed estimates of operation and maintenance (O & M) cost's reduced the annual O & M from $45/yr to $41/yr. Annual O & M for future construction increases the total O & M costs less than $41/yr.

- Detailed estimates of engineering costs that were based on house-by-house site analysis increased the present capital cost slightly.

While many of the elements of the Limited Action Alternative have been estimated, described, and costed, the final details will not be known until: house-by-house analysis allows a selection of treatment methods for each house, and the Applicant and community decide on the method and degree of management to be provided. These two considerations are described below.

1. Treatment Methods Selection

Identifying on-site systems problems and causes of the problems is the first step in specifying technologies for individual residences. Site-specific analysis is necessary to accomplish this. The analysis should be sequential, beginning with a review of available health department records, interviewing residents on the use and maintenance of their systems, inspecting the site for obvious malfunctions, and inspecting the location and condition of any on-site wells or springs. Based on the information gathered, additional investigations may be warranted in order to identify the cause and possible remedies for any recognized problems. Examples of additional investigations keyed to problems are:

Problem	Investigations in Sequential Order
Recurrent backup into house or evident ground surface malfunction	Install and monitor water meter
	Uncover, pump out, and inspect septic tank for obstruction and groundwater inflow
	Rod the house sewer and effluent line
	Excavate and inspect drainfield distribution lines, if they are present

	Determine soil absorption system size and degree of clogging by probing, and sample pit excavation. Note soil texture and depth to groundwater
Inadequate separation distance from septic tank or soil absorption system to well	Inspect well for proper seal, vent drainage, and grouting
	Sample well and analyze for fecal coliform bacteria, nitrates, and fluorescence
	Monitor groundwater flow if drinking water aquifer is shallow or unconfined
Inadequate separation distance from septic tank/soil absorption system to lakeshore, or inadequate separation distance from soil absorption system to groundwater, or evidence of increased plant growth	Monitor groundwater flow direction and rate
	Locate effluent plume in vicinity of lakeshore, using groundwater probe and fluorescent analysis
	Sample groundwater in leachate plume at lakeshore. Analyze for total phosphorus, total Kjeldahl nitrogen, nitrate, nitrogen, and fecal coliform bacteria
Septic tank or soil absorption system size or design suspected of being less than code requires	Inspect property to assess feasibility of replacement or upgrading
	If feasible, document system inadequacies by probing and excavating sample pit
Septic tank or soil absorption system size or design known to be less than code requires	Inspect property to assess feasibility of replacement or upgrading.

In the selection of technologies for individual sites, this EIS strongly recommends that:

- Alternatives other than those covered by existing codes be considered
- State and local officials legally responsible for permitting on-site systems be involved in selection.

- The availability and cost of skilled manpower for maintaining and monitoring innovative or subcode systems be weighted against the feasibility and cost of requiring conventional on-site systems or off-site systems

- There be a multidisciplinary team, consisting of the sanitarian-administrator and available specialists in a number of fields (see Management Section) to advise the Sanitary Review Board on a case-by-case basis

- The individual homeowner be informed of the different options under consideration (and their costs both to the individual and the district) when technology selections are being made. The owner's opinion and advice should be solicited.

Based on information gained from the site-by-site analysis, a technical expert should discuss feasible problem-solving approaches with the owner. Primary criteria for identifying the appropriate technology should be cost, benefits, and risk of failure. Undoubtedly, the analysis will also consider eligibility for Construction Grants funding. General guidelines for eligibility of on-site technologies are presented below:

- The replacement of facilities with obviously inadequate designs will be eligible, if feasible. Cesspools are an example of obviously inadequate facilities. Septic tanks in very poor repair or substantially smaller than required by State codes are another example. Small drainfields, dry wells, or unusually designed systems are not of obviously inadequate design and thus replacement of them is ineligible unless they fall within guidelines described below.

- Parts of systems that cause recurrent surface failures, backups, or the contamination of potential drinking water aquifers are eligible for repair or replacement. This does not apply to water using fixtures. Systems that fail because they are abused will not be eligible unless the abuse is terminated and the usage of the system is documented by water meter readings and/or reinspection of the system and failure is still being experienced.

- Facilities not currently causing public health or water quality problems may be eligible for repair or replacement if similar systems in the area are failing. "Similarity of systems" includes design and site characteristics that are shown to be contributing to failures.

- Compliance with State and local on-site design regulations in design of repairs and replacements is desirable, where such compliance is feasible and effective. Compliance is not a condition of eligibility if subcode design or alternative processes can reasonably be expected to eliminate or substantially mitigate public health and water resources problems. Similarly, innovative designs will be eligible, with the added condition of assured inspection and monitoring commensurate with the degree of risk be assured. For subcode, alternative, or innovative systems, it is expected that water conservation devices commensurate with the degree of risk for hydraulic overloading will be installed at owner or Applicant's expense.

- For the Steuben Lakes Study Area, methods will be eligible that modify the flow or chemical characteristics of effluent plumes entering the Lakes if the modification might reduce the near-shore plant growth. Construction Grants guidelines consider such methods innovative. Monitoring of their effectiveness will be required.

- On-site systems built after December 1977 are not eligible for repair or replacement but will be eligible for site analysis. Accommodation of new water-using devices (such as garbage disposals, dishwashers) added since December 1977 will not be a basis for determining eligibility. Systems adequately designed for the building they serve but malfunctioning because of hydraulic or organic overloading or other abuse will not be eligible, except as explained above.

It is recognized that some developed lots may never be serviceable by on-site technologies. Off-site treatment and disposal will be eligible for Federal funding if:

- there is a documented public health or water resource contamination problem that any combination of on-site conventional, innovative, subcode, flow reduction, or waste restriction methods cannot abate, or

- the life cycle costs of off-site treatment and disposal for an individual building or group of buildings is less than costs of appropriate on-site technologies for the same buildings.

The recommendations apply only to existing systems. EPA is recommending and funding the Limited Action Alternative in order to help the community and system owners minimize the risk to water quality and public health. For systems to be built for new housing, EPA makes no recommendations on the permitting process because the Agency does not provide funding for future construction.

2. Community Management

In regard to funding privately-owned, on-site systems, current EPA regulations (40 CFR 35.918-1) require that:

> ...the grant application shall:...Certify that such treatment works will be properly installed, operated, and maintained and that the public body will be responsible for such actions.

This requirement also applies to publicly-owned, on-site systems.

Within this limitation, communities have a wide range of options available. Many of these options are discussed in the Draft EIS, Section III.E.2. Three additional topics and their interrelationships are discussed here. They are: risk, liability, and scope of the Applicant's responsibilities.

"Risk", as used here, refers to the probability that wastewater facilities will not operate as intended, thereby causing water quality or public health problems or inconvenience for the user. Whether centralized, small-scale, or on-site, all wastewater facilities have inherent risks; the degree of risk depends upon skill in design, construction, operation, and maintenance.

"Liability," as used here refers to the responsibility of various parties to minimize risk and to accept the consequences of facility failure. In the past, the state or county has accepted liability for facilities around the Steuben Lakes only in sofar as permitting and inspection activities minimized risk. The consequences of facility failure rest with system owners. In building sewers around Steuben Lakes, the proposed Steuben Lake Regional Waste District (SLRWD) essentially would have accepted liability for all failure except plumbing and house sewer blockages. With the Limited Action Alternative, the community still has the opportunity to assume increased liability in whatever manner it sees fit--the only limitation is that the Applicant will be responsible for actively identifying failures of interest to the community (inconvenience for the user not included) and attempting to remedy the failures. Strictly speaking, the SLRWD's responsibility under 40 CFR 35.918-1 applies only to those individual systems funded by EPA.

Many of the assumptions made in describing and costing the Limited Action Alternative were based on the Applicant playing a very active role in improving, monitoring, and maintaining all wastewater facilities around Steuben Lakes. EPA encourages but does not require such a role. The scope of the responsibilities depends on how much liability for wastewater facilities the Applicant wants, and is legally capable to assume. EPA will, by funding facilities planning, design, and construction, assist the SLRWD in meeting those liabilities it assumes when those liabilities reduce the risk of water quality and public health problems.

To illustrate the range of approaches the Applicant might take, three management scenarios are described below:

Minimum Management Requirements

The SLRWD would act as the recipient and distributor of Construction Grant funds. Homeowners who wished to improve their on-site facilities could voluntarily apply to the SLRWD for this assistance. After documenting that minimum requirements for on-site system eligibility are met, the SLRWD would receive the funding and distribute it to homeowners who show proof of satisfactory installation. These homeowners would be assessed an annual fee thereafter to cover the cost of a site inspection perhaps every three to five years, and would be required to show proof of appropriate maintenance activities as part of the site inspection. A groundwater monitoring program would include taking well water samples during the site inspection.

With this approach, the SLRWD would not incur any long-term debt. The SLWRD would not necessarily have any responsibility for, or interest, in permitting future on-site systems. Without a comprehensive site inspection and evaluation program, it is unlikely that all water quality and public health problems would be identified and abated because property owners would not be required to participate. Liability for facility malfunctions would remain wholly with the owners.

Comprehensive Wastewater Management

This is the approach recommended for adoption by the Applicant. It involves instituting the small waste flows district concept discussed in the Draft EIS (see particularly pages 137-143, 202-205, and Appendix J). All buildings within the district's service area boundaries would be included. At a minimum, each building's wastewater system would be covered in the site-specific analysis, and would be inspected at intervals. Owners or residents of each building would be responsible for a user charge to repay their share of necessary operating costs. The local debt for construction of each system can be directly assessed to individual homeowners, as in the Minimum Management scenario, or they could be funded as long-term debt.

This approach should identify all wastewater generation, treatment, and disposal problems in the service area, and should ensure that future problems are minor or short-lived. In contrast to the Minimum Management scenario, the higher level of responsibility resulting from this approach would allow the authority greater discretion in sharing liability for facility operation with the resident or building owner.

Technical expertise would come from any one of numerous sources. The Steuben County Health Department (SCHD) could expand their staff to accommodate this type of operation for the Steuben Lakes as a demonstration project, with additional projects possible in other parts of the county.

Watershed Management

The Applicant's concern with prevention and control of water pollution need not be restricted to wastewater facilities. It is obvious from comments on the Draft EIS that citizens of the Study Area are interested in maintaining the water quality of the Steuben Area Lakes. If that interest is expressed in the form of willingness to pay for additional governmental services, the Comprehensive Wastewater Management scenario could be augmented in the following ways:

- by monitoring non-point sources of water pollutants
- by controlling non-point sources of water pollutants
- by educating residents and visitors about individual pollution control practices, costs, and benefits
- by inventoring the biological resources of the lakes and their tributaries
- by studying the chemical, hydrological, and biological dynamics of the lakes
- by coordinating with other local, State, and Federal agencies on pollution control activities and availability of funding.

3. Implementation

As recommended in the Draft EIS, the Recommended Action is to construct on-site systems (on an as required basis) with administrative powers being given to the SLRWD. Please note that the Limited Action Alternative may vary from the technology assumptions listed in Appendix E and pages 11 to 19 of this Final EIS. This is because the detailed Step 2 or 3 site-by-site design work will be needed to finally decide the level of on-site upgrading for each house may indicate that particular dwellings have problems requiring different technologies than those incorporated in the Limited Action Alternative.

These changes, while affecting specific houses, should not greatly impact the total amount of work for any one segment, much less the entire Study Area. When it is impractical to upgrade existing conventional septic tank/soil absorption systems, alternative on-site measures should be evaluated. These include technologies such as composting or other alternative toilets, flow reduction, holding tanks, and separate greywater/blackwater disposal.

Specific aspects of implementing the Steuben Lakes project were discussed in Section VI.C. of the Draft EIS. Modifications to those discussions follow.

a. Ownership of on-site systems serving seasonal residents--On page 25 of the Draft EIS, it was stated that privately-owned systems, serving seasonally-residences are not eligible for Federally funded renovation and replacement. EPA Program Requirements Memorandum 79-8, issued very shortly before the Draft EIS went to print, modified this policy to allow eligibility of seasonally used, privately-owned, on-site systems as long as the responsible public agency is given "complete access to and control of" the system. (See Comments and Responses, under the "Implementation/Management" heading, Section V-E).

b. Completion of step I requirements for the small waste flows district--EPA Region V developed a new memorandum clarifying project needs documentation (see Appendix B). It provides that, at most, a representative sampling (15 to 30%) of on-site systems need to be developed in Step I for a site-specific data base. The remaining 70 to 85% should be done in Step 2 (see Appendix A). Other remaining Step I requirements remain as stated in the Draft EIS. USEPA has determined that a county ordinance providing for access, inspection, and upgrading of systems (as needed) would satisfy the requirements for public ownership (see Appendix C).

For the purposes of technology selection and organization development in Step 2 and construction supervision in Step 3, the grantee should establish a Sanitary Review Board. This board can consist of members of the various lake associations or be an independently elected body. The board's responsibilities will be to:

- Supervise the direction and progress of the site-specific analysis
- Ensure homeowner input to technology selection
- Encourage community participation in the management and technology decisions to be made
- Review and act on any proposed facilities designs that are not in conformance with present regulations

- Provide an appeal process for owners who object to the technology selected for their property

- Ensure that a multidisciplinary team conducts the analysis and technology selection. The team should consist of persons with knowledge and experience in soil science, water chemistry, geohydrology, wastewater characteristics, innovative, alternative and conventional decentralized treatment technologies and practical aspects of decentralized system construction and maintenance.

The application for Step 2 funds should include a description of the grantee's organization for this review board and the qualifications of the individuals proposed for the Step 2 site analysis and technology selection. The Step 2 grant will be contingent upon review and approval of the application by the Technology Section of EPA Region V's Water Division.

This EIS recommends that the necessary technical expertise be sought from several sources, such as:

- Steuben County Health Department
- Purdue University
- Tri-State University
- US Soil Conservation Service
- Corporate consultants
- Individual consultants.

Similarly, if assistance in developing the organizational structure of the review board and supporting activities is needed, legal and management consulting services should be sought. Within reason, costs for these services will be grant eligible.

C. THE NO-ACTION ALTERNATIVE

The No-Action Alternative is broadly defined as an EPA rejection of Construction Grants applications for the Study Area. This would consist of EPA providing no Federal funds for construction of wastewater collection and treatment systems in the Study Area. If this course of action were followed, all existing on-site systems in the Study Area would presumably continue to be used in their present condition.

The need for improved wastewater management around the Steuben Lakes is not as extensive as stated in the Facilities Plan. The USEPA Environmental Photographic Interpretation Center (EPIC) 1979 remote sensing and ground survey of ST/SASs located only 4 malfunctioning septic systems in which effluent back-up to the soil surface occurred. This represents an insignificant 0.1% of the homes in the Proposed Service Area. Perhaps, the Steuben County Health Department's (SCHD) dye-test program has played a significant role in minimizing this problem. While failures such as those located by EPIC and also by the SCHD's dye-test program may occur in the future, the threat to public health seems an insignificant one, controllable by management.

The SCHD can play a major role in the management of local on-site wastewater management systems by continuously inspecting systems as they have been in the past, using technologies now available. This effort would require increased funding from both the State and local levels. The survey methods outlined in the Limited Action Alternative would be suitable for the Health Department's use.

No-Action does not mean "no cost." Assuming that existing systems will fail at a rate of 1% per year and be replaced by a mix of conventional septic tank and or mound systems, the costs associated with the No-Action Alternative for the Steuben Lakes Area are shown below. Back-up data for these costs are included in Appendix F.

	(1978 $)
1) Construction Costs (including salary of sanitarian to permit systems)	
a) Replacements for existing systems	$ 87,140/yr
b) New systems	$ 203,340/yr
2) Operation & Maintenance Costs	
a) Existing systems	$ 32,230/yr
b) Future systems	$ 800/yr
3) Total Present Worth (@ 6-5/8%)	$3,420,300

D. OTHER ALTERNATIVES

Many other alternatives have been considered in the Applicant's Facilities Plan and in EPA's Draft EIS. Alternatives considered and reasons for their rejection or other status are summarized below:

1. Facilities Plan Alternatives

Alternatives	Findings
Centralized collection system utilizing conventional gravity and lift stations	Because of the topography of several parts of the Study system Area, a complete gravity system would be extremely expensive to construct
Centralized collection system using low pressure sewer system with grinder pumps	Grinder pumps and low pressure sewers were recommended for portions of the Study Area, such as waterfront locations, hilly terrain, and low population density areas. However, because of the long distances involved in the system, a complete low pressure system would not be feasible
Centralized collection systems, vacuum sewage transport, and collection	As a result of the limited pressure range available in a vacuum system, the system would

Alternatives	Findings
	not be a viable alternative for the Study Area because of the large differences in elevations and high heads required in some areas
Centralized collection system, using collection gravity system and low pressure sewer system with grinder pumps	Accepted as the Facilities Plan Proposed Action and the application for Construction Grants funding
Land application by spray irrigation of the secondary effluent to controlled farm operations	Rejected in the Facilities Plan because treatment scheme was not readily adaptable to receive the varying weekend and summertime flows
Mixed-media filtration of the secondary effluent	Rejected in the Facilities Plan because treatment scheme was not readily adaptable to receive the varying weekend and summertime flows
Land application by spray irrigation preceded by lagooning (flow equalization) secondary effluent. (equalized secondary effluent flow would be applied to a controlled farm operation)	Accepted as the Facilities Plan Proposed Action and the application for Construction Grants funding.

2. EIS Alternatives not Already Considered in Facilities Plan

Residential flow reduction (various devices)	Expected to be effective in maintaining on-site systems and minimizing the impacts of on-site systems in the EIS Recommended Action
Small diameter sewers	Rejected because of marginal cost advantage over conventional gravity sewers for large collection systems (could be advantageous in the design of small waste flows systems)
Alternative toilets (various designs)	Not specifically incorporated in EIS Recommended Action but could be useful where control of nutrients is sought

Alternatives	Findings
On-site treatment and disposal (various designs)	Incorporated in EIS Recommended Action for the Steuben Lake area (discharging systems excluded from use)
Off-site treatment and disposal (various designs - cluster system)	Incorporated in EIS Recommended Action for Steuben Lakes area where shown to be worth the expense
Septage disposal by co-treatment local sewage treatment plants	Mentioned as a possibility - (needs additional analysis)
Septage disposal by land application	Mentioned as a possibility (needs additional analysis)

CHAPTER III

AFFECTED ENVIRONMENT AND IMPACTS OF NO ACTION

A. SOILS

Study Area soils are typical of those formed in glacial drift deposits. They are loamy (composed of clay, silt, and sand) and highly variable in nature, ranging from poorly-drained silty and clayey loams, to the well-drained loamy sands, and excessively well-drained gravelly sandy loams.

A majority of the soils in the area have been rated suitable by the USDA Soil Conservation Service for on-site waste disposal systems. In the southern portion of the Steuben Lakes Study Area, well-drained Fox and Boyer soils predominate. These loamy soils are underlain by coarse sands and gravel, and have slight to moderate limitations for septic absorption fields. Both the Oshtemo Series and Riddles Series are well drained loams appearing throughout the Study Area. The Oshtemo Series is underlain by coarse sand and gravel.

As a result of the various field studies conducted by EPA (see Chapter I), it can be concluded that most ST/SASs are working well. However, several soil conditions in the Study Area could lead to increased problems in the future. High water tables may be found in clay soils with permeabilities so low that water is trapped in them, or in perched water tables of thin permeable soils over impermeable clays and clayey materials. Where these occur in low areas and depressions, soils exhibit severe wetness, ponding of water, and periodic flooding, possibly making them unsuitable for on-site disposal systems.

In addition, slopes that exceed 12% exist contiguous to many lakes in the Study Area. In these areas inadequately treated wastewater effluent from absorption fields are more likely to emerge at land surfaces. Some areas have soils with very high permeability rates. This suggests the possibility that septic tank effluents may not be adequately treated before they emerge into the lake. Survey data and detailed site investigations suggest that treatment, particularly removal of nutrients, is variable.

Building of new dwellings and on-site systems will continue under the No Action Alternative. Some erosion will occur because of this construction.

B. SURFACE WATER RESOURCES

The major surface water features located in the Study Area are Snow Lake, Lake James, Jimmerson Lake, Crooked Lake, Lake Gage, Lime Lake, Lake Sylvan, Lake Charles, Marsh Lake, Little Otter Lake, Big Otter Lake, and Crooked Creek. Surface water drainage in the watershed is dominated by Crooked Creek, which flows south from Michigan through Snow Lake, the upper and middle basins of Lake James, and northwest through Jimmerson Lake. Another branch of Crooked Creek also flows in a northwesterly direction through Crooked Lake, Lake Gage and Lime Lake until it reaches the Pigeon River. The Pigeon River is a tributary to the St. Joseph River, which in turn discharges to Lake Michigan near Benton Harbor. Follette Creek originates in the northeast corner of the Study Area and flows northwesterly through Marsh Lake, Little Otter Lake, and Big Otter Lake before emptying into Snow Lake.

The drainage basins for each lake cover from 1.0 to 51.6 square miles. The larger ones act as significant catchments of precipitation that reaches the lakes as runoff and groundwater. Ratios of drainage basin-to-lake surface area range from a low of 2:1 (Crooked Lake--Basin #2) to a maximum of 296:1 (Little Otter Lake). The high ratios exhibited by Little Otter Lake, Lime Lake, and Big Otter Lake suggest a relatively great impact from non-point source runoff reaching these lakes. All the lakes have relatively short mean hydraulic retention times, varying from a low of 44 days to a high of 2.8 years.

Based on water quality models described in the Draft EIS, Crooked Lake, Jimmerson Lake, Lake Gage, and Lime Lake are mesotrophic, and Lake James, Big Otter Lake, Snow Lake and Marsh Lake are eutrophic. Little Otter Lake is classified as hypereutrophic. Phosphorus limits the algae production of the lakes. The major sources of phosphorus for lakes in the Study Area, in their order of significance, include:

- tributary inflow
- immediate drainage around the lake
- precipitation
- septic tanks (considered as non-point source pollution)
- point sources

The changes in phosphorus loading imposed by various wastewater alternatives are not significant enough to change any of the present trophic conditions of the lake. Snow Lake would exhibit a 17% decrease in phosphorus loading, mainly because the new tertiary treatment plant at Pokagon State Park went into operation in May 1979. This reduction of phosphorus loading is expected regardless of the alternative implemented.

Localized growths of algae and aquatic weeds have created nuisance problems, particularly in Jimmerson Lake and Crooked Lake. Removal of the current septic tank nutrient loading from the lakes would not change the trophic status.

C. GROUNDWATER RESOURCES

Sand and gravel units within the 250 to 350 feet thick unconsolidated glacial drift constitute the major groundwater sources in the Study Area. The aquifers are mostly the discontinuous types characteristic of glacial deposits. Driller's well logs have indicated the presence of thick clay layers, outcropping in many areas and interspersed with sand and gravel deposits. These clay layers create confining (artesian) conditions, the limits of which are unknown. The situation is essentially one in which artesian conditions and water table (unconfined) conditions can be expected at unidentified intervals.

Groundwater sources provide all of the domestic water supplies of the Study Area. The present groundwater use within the Study Area is one million gallons per day (mgd) and should double by the year 2000.

Clayey soils locally limit the vertical and lateral flow of soil water. Most shoreline regions exhibit moderate to low groundwater inflow conditions (less than 10 feet per day lateral flow). Where clay deposits occur, the bedded material restricts flow through the porous deposits, even though the sand and gravel deposits may hold considerable trapped water. However, if an extensive lateral deposit of porous material underlies the poorly permeable soils, and the deposits extend into the lake bottom, it is possibile that leachate could be transported.

A detailed study of well-water quality was initiated by Tri-State University during 1979 to determine if any groundwater impacts were apparent from on-lot septic system functioning. The water from well samples was observed to generally exhibit a high standard of quality. For well contamination to occur, the well point must intercept the plume of poorly-treated wastewater, which originates from the leaching fields. Because the position of the well point varies in 3 dimensions, the probability of coincidence with the plume is low. Five of twenty samples (20%) showed a coincidental rise in the nitrate and chloride elements frequently associated with leachate conditions. It is important to note that the rises in nitrate were well below USEPA's Interim Primary Drinking Water Standards of 10 mg/l as nitrogen.

The results of the Aquatic Productivity Study (see Chapter I) indicate that subsurface waste disposal has only localized effects on groundwater. However, the effluent plumes are not notably stimulating nearshore aquatic vegetation in the Steuben Lakes. Other factors, such as wave action, water temperature, boating and swimming activity, use of herbicides, or amount of light, appear to control near-shore plant growth more than septic tank leachate transported to the lakes by groundwaters does.

D. POPULATION AND LAND USE

Residential development is concentrated around Lake Gage, Crooked Lake, Lake James, Jimmerson Lake, Lime Lake, Snow Lake, Big Otter Lake, and Little Otter Lake. Most of the lot sizes around these lakes are small, with 65% of them less than 1/3 of an acre (see Table III-14, page 99 of the Draft EIS). Additionally, numerous subdivisions exist in the Study Area, with lot sizes averaging well below 10,000 square feet (see Table II-13, page 95 of the Draft EIS).

Approximately 86% of the Proposed Service Area population are seasonal residents. Tables 1 and 2 present data about the existing and future numbers for dwelling units and population in the Proposed Service Area.

E. ENVIRONMENTALLY SENSITIVE AREAS

Environmentally sensitive areas within the EIS Study Area include floodplains, steep slopes, wetlands, prime agricultural lands, and the possibility of archaeological sites.

Neither the Facilities Plan Proposed Action nor any other alternative would directly affect the floodplain of the lakes and streams in the Study Area (See Figure III-12 of the Draft EIS for extent of floodplain). If landowners are provided with centralized sewer service, building lots can be

Table 1. Existing and Projected Dwelling Units within the Proposed Service Area (1975 and 2000)

SUBAREA*	1975			2000		
	PERMANENT	SEASONAL	TOTAL	PERMANENT	SEASONAL	TOTAL
Lake Gage	103	255	358	127	314	441
Lime Lake	11	28	39	13	35	48
Lake Syl-Van	6	10	16	10	12	22
NW Study Area	216	0	216	532	0	532
Jimmerson Lake	251	598	849	321	737	1,058
Lake James	327	570	897	522	702	1,224
Snow Lake	87	214	301	108	262	370
Otter Tail Lake	47	85	132	74	106	180
Crooked Lake (East)	293	0	293	722	0	722
Crooked Lake (South)	128	0	128	314	0	314
Crooked Lake (North)	40	0	40	98	0	98
Crooked Lake (3rd Basin)	111	118	229	214	145	359
Crooked Lake (Main)	193	480	673	237	591	828
TOTAL	1,813	2,358	4,171	3,292	2,904	6,196
Off Lake	862	0	862	2,122	0	2,122
On Lake	951	2,358	3,309	1,170	2,904	4,074

* See Figure II-14 in the Draft EIS.

Table 2. Estimated Population of the Steuben Proposed Service Area (1975), and Projected Population (2000)

SUBAREA	1975			2000		
	PERMANENT	SEASONAL	TOTAL	PERMANENT	SEASONAL	TOTAL
Lake Gage	309	1,839	2,148	380	2,262	2,642
Lime Lake	33	201	234	41	247	288
Lake Syl-Van	18	72	90	30	88	118
NW Study Area	648	0	648	1,596	0	1,596
Jimmerson Lake	753	4,311	5,064	963	5,302	6,265
Lake James	981	4,110	5,091	1,565	5,055	6,620
Snow Lake	261	1,545	1,806	321	1,900	2,221
Otter Tail Lake	141	612	753	221	754	975
Crooked Lake (East)	879	0	879	2,165	0	2,165
Crooked Lake (South)	384	0	384	946	0	946
Crooked Lake (North)	120	0	120	295	0	295
Crooked Lake (3rd Basin)	333	852	1,185	642	1,048	1,690
Crooked Lake (Main)	579	3,459	4,038	712	4,254	4,966
TOTAL	5,439	17,001	22,440	9,877	20,910	30,787
Off Lake	2,586	0	2,586	6,368	0	6,368
On Lake	2,853	17,001	19,854	3,509	20,910	24,416

developed near the floodplain (if they comply with the set-back provisions of the Steuben County Master Plan).

Steep slopes exist primarily in the areas around Lake James and Jimmerson Lake (see Figure II-1 of Draft EIS). The difficulties of installing on-lot systems on steep slopes appear to be among the factors that historically have limited home construction mostly to lakeshore and other level-to-rolling sites. However, sewers and specially designed on-site systems can be constructed on steep slopes. Minor to moderate impacts could result from implementation of the Facilities Plan Proposed Action.

None of the facilities either by their construction or by their operation, that are from the Facilities Plan Proposed Action are expected to disrupt wetlands. Sewer alignments have been selected to avoid direct passage through wetlands. However, the induced growth that is associated with sewering in the system alternatives may increase pressures for development of wetlands not protected by State ownership.

As illustrated by Figure III-7 of the Draft EIS, the prime agricultural soils in the Study Area are fragmented and scattered throughout the area, occurring mainly in upland areas rather than along lakeshores and other sections of the Proposed Service Area. The No-Action or Limited Action Alternatives could result in the conversion (at a maximum of approximately 325 acres or 5%) of all agricultural lands in the Study Area to residential use. The Facilities Plan Proposed Action could convert approximately 230 acres or 4% of agricultural lands. In all cases, the impacts on prime agricultural lands are likely to be insignificant.

Prior to the construction of any wastewater facilities on publicly-owned land in the Study Area, the Indiana Department of Natural Resources will require an archaeological survey.

F. ECONOMICS

The permanent population of the Study Area is characterized by a relatively low income that is below the average income for Indiana. In 1970, 52% of family incomes were under $10,000, 47% from $10,000 to $25,000, and only 3.5% over $25,000.

Table V-6, page 191 of the Draft EIS shows the percentage of households estimated to face a significant financial burden under each of the alternatives. The centralized alternatives would place a financial burden on 30 to 50% of households in the Steuben Lakes area, while the Limited Action Alternative would only impact about 2 to 5% of the households. Only 50 to 80% of the area's households would be able to afford the centralized systems, while 95 to 98% of the residents could afford the Limited Action Alternative.

The costs of the No-Action Alternative will fall most heavily on property owners whose on-site systems fail. The homeowner could be required to choose and pay for one of the following options, depending on the nature of the failure and individual site conditions:

Table 3. Options and Costs for Installing On-Site Systems

Option	Construction Cost			Operation and Maintenance Cost	
	Initial Investment		Annual Equivalent	Permanent Residence	Seasonal Residence
Drill a new well (50' deep)	$ 700	=	$ 65/yr	-0-	-0-
Install a holding tank*	450	=	42/yr	$3,300/yr	$720/yr
Connect to a cluster system	5,350	=	500/yr	75/yr	67/yr
Install a new ST/SAS	1,270	=	119/yr	20/yr	12/yr
ST/Sand mound	8,850	=	827/yr	75	67

* Although this cost could be reduced substantially by installation of effective flow reduction devices and negotiating with the hauler, the cost would still be high. The high cost would be an incentive for homeowners to find other, perhaps dangerous, means of disposing of wastewater.

The most likely type of repair that will be required in the Study Area will be the replacement of septic tanks and/or drainfields. In the No-Action Alternative, these problems would be corrected as they occurred. In the Limited Action Alternative, those systems that were discovered during the sanitary survey to have problems would receive initial attention.

As long as their systems do not fail, other homeowners could get by with very minimal expense, perhaps $45 every 10 years for maintenance pumping of their septic tank. Residents whose systems fail but who can make a standard repair would incur a one-time expense of perhaps $1,000 to $3,000. If dosed mound systems are necessary, costs could be as high as $9,000.

CHAPTER IV

ENVIRONMENTAL CONSEQUENCES OF THE ACTION ALTERNATIVES

This chapter presents the environmental impacts of the conceptual or system alternatives embodied in the Facilities Plan Proposed Action and in the EIS's Limited Action Alternative. Please note that, at present, the Limited Action Alternative is not a set of explicit construction proposals for each building. It is an approach, based on the assimilative capacity as well as the environmental sensitivity of the local natural resources, that relies on environmental management. Such management should be in the form of continued attention to the use and effects of small-scale systems, and it must include the ability to make balanced decisions, exceptions to regulations in the best interest of the local environment.

A. SURFACE WATER RESOURCES

According to either the Facilities Plan Proposed Action or the Limited Action Alternative, the future phosphorus loads to any of the Study Area lakes would be minimally effected (see Table 4). The changes in phosphorus loading imposed by various wastewater alternatives are not significant enough to alter the present trophic conditions of any Study Area lakes (see Figure 5). Even in Snow Lake, where reduction of phosphorus loadings is significant, because of the newly opened tertiary treatment plant at the Pokagon State Park, the water quality modeling results do not indicate enough improvement to change the trophic condition from eutrophic to mesotrophic. Jimmerson Lake, with its phosphorus loading to be reduced 21% by the Facilities Plan Proposed Action, will remain in its present mesotrophic condition.

Table 4. Comparison of Phosphorus Loading under Alternatives with the Average Present Conditions (projected for the Year 2000)

Lakes	Limited Action	Facilities Plan
Crooked	1% increase	7% decrease
Gage	<1% increase	10% decrease
Lime	2% increase	3% decrease
Little Otter	No change	2% decrease
Big Otter	No change	4% decrease
Snow*	17% decrease	20% decrease
James	No change	5% decrease
Jimmerson	No change	21% decrease

* Decrease of 17% in all alternatives as a result of the Pokagon State Park's Tertiary treatment plant, which began operating in May 1979.

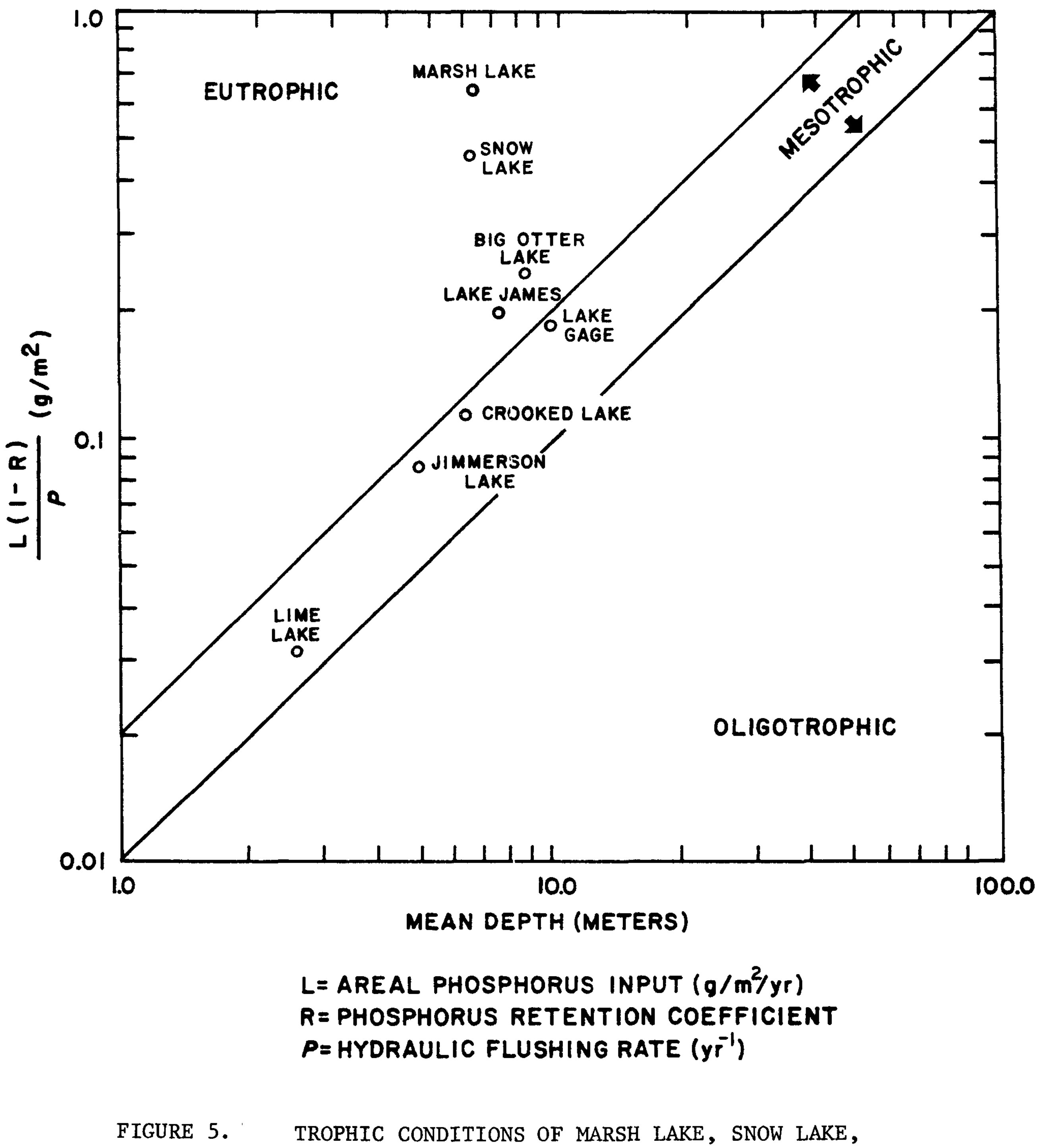

FIGURE 5. TROPHIC CONDITIONS OF MARSH LAKE, SNOW LAKE, BIG OTTER LAKE, LAKE JAMES, LAKE GAGE, CROOKED LAKE, JIMMERSON LAKE, AND LIME LAKE (1973-1974)

The Facilities Plan Proposed Action would eliminate septic tank effluent disharges to the Steuben Lakes. However, as discussed in Chapter I, septic tanks currently do not have significant impacts on water quality and aquatic vegetation in the lakes.

In the Facilities Plan Proposed Action, there is a possibility of pumping station breakdown causing significant raw wastewater discharges to the lake. Careful design and close supervision of the pumping stations would minimize this possibility. Small wastewater pumping units (3,000 to 5,000 gpd) may be required for cluster systems or individual homes. Reliable alarm systems and periodic maintenance (1 to 4 times per year) will be needed to ensure against backups or overflows to the lakes. Because the magnitude of spills with the Limited Action Alternative is about two orders of magnitude less than it is with the Facilities Plan Proposed Action, the threat of impact from equipment failure is less great under the Limited Action Alternative.

B. GROUNDWATER

No significant short-term impacts on groundwater quality would result from the construction of any of the alternatives. Long-term impacts on bacterial concentration, shoreline algal growths, and nitrate concentrations are also expected to be insignificant.

The Facilities Plan Proposed Action would eliminate the discharge of wastewater effluents to the groundwaters around the Steuben Lakes. The threat of well water contamination from septic tank effluents would be removed. However, actual improvement of potable groundwater supply would be minor at best. Based on the results of the 1979 well water study, the quality of groundwater (bacteriological and chemical) in the Study Area is of a high standard. The effects of more than 50 years of septic tank/soil absorption systems on water quality are insignificant.

The Limited Action Alternative would minimize potential hazards to drinking water by 1) inspecting existing wells and filter fields, 2) sampling all wells, and 3) selecting on-site or off-site measures to stop actual or possible drinking water contamination. These repair measures will include the elimination of cesspools and inadequately sized septic tanks, and the replacement of malfunctioning ST/SAS's. Costs for these measures are included in Appendix E and G. Also, the actual repair (such as grouting) of wells may often prove less expensive than treatment modifications.

C. POPULATION AND LAND USE

Significant population growth differentials are found when the Facilities Plan Alternative is compared with the Limited Action Alternative. Restriction to on-site facilities throughout the Study Area would constrain future population growth below the level that is anticipated with the provision of off-site (centralized) wastewater treatment. In-summer population in the Proposed Service Area is projected to grow by 33% from 1975 to 2000. Under the Limited Action Alternative the growth would be limited to an estimated 22% above the 1975 level.

Adoption of the Limited Action Alternative would result in conversion of 600 acres of land to residential use, while the Facilities Plan Proposed

Action would result in conversion of approximately 420 acres. The greater residential land requirement of the Limited Action Alternative, despite its lower rate of population growth, is because of the scattered lower-density development that is associated with it. Thus, it is estimated that the Limited Action Alternative will result in the consumption of over 40% more land to accommodate 33% fewer people between 1975 and 2000 than the Facilities Plan Alternative would.

D. ECONOMIC IMPACTS

The economic impacts of either alternative are a result of direct cost to system users. The estimated direct cost is the most significant difference between the two alternatives, in terms of either environmental or social impacts. With the Facilities Plan Proposed Action, the 1980 average annual homeowner's cost* around the Steuben Lake would be $450. In contrast, with the Limited Action Alternative the 1980 average annual homeowner's cost around the Steuben Lakes is $50.

The impact of these user charges is defined in terms of the percentage of the population facing significant financial burdens and displacement pressure. EPA defines "significant financial burden" as a charge greater than 1.5 to 2.5% of total income; the variable threshold rate is determined by level of income. "Displacement pressure" is the stress placed upon families to move away from the service area as a result of costly user charges. It is measured by the percentage of families who would have to pay 5% or more of their income. Table 5 presents the percentage of the population that would experience significant financial burden and displacement pressure for the Facilities Plan Proposed Action and the Limited Action Alternative.

* "Average annual homeowner's cost" includes one residence's equal share of his community's 1980 debt retirement cost, plus 1980 operating expenses, plus a reserve fund contribution of 20% of this debt retirement share. To this is added an equivalent annual payment for private costs (such as house sewers) as if they were paid at 6-5/8% for 30 years.

Table 5. Percentage of Population that would Experience Financial Burden and Displacement Pressure

Alternative	Displacement pressure	Financial burden	Can afford
Facilities Plan Proposed Action	10-20%	40-50%	50-60%
Limited Action	<2%	2-5%	95-98%

CHAPTER V

PUBLIC AND AGENCY COMMENTS

Substantive public and agency comments on the Draft EIS were received. They have been summarized in this chapter. Those comments that were offered through testimony at the Public Hearing on the Draft EIS (28 January 1980) and through written correspondence, and are essential to the EIS decisionmaking process are responded to here. The comments and appropriate responses are organized by Draft EIS subject area, including:

- Water quality
- Soils
- Field data collection
- Alternative
- Implementation/Management
- Impacts
- The EIS process

Citizens who offered substantive comments on the Draft EIS at the public hearing or by written correspondence to EPA are listed below. Numbers which follow the citizen's names identify the comments addressed in this chapter. All substantive written comments on the Draft EIS are included in Appendix 4.

Name	Affiliation	Comment Number
Buell Ferguson	USDA Soil Conservation Service	5
Richard Mick	Mick, Rowland and Associates, Inc.	8, 9, 10, 18
Craig Benson	Steuben Lakes Regional Waste District	11, 12, 13, 14, 15, 18, 19, 20, 25, 26
Joseph Cloud	State of Indiana - Dept. of Natural Resources	23
Gordon Leisch	US Dept. of Interior	24
Donald Ahlersmeyer	Study Area Resident	1, 2, 27
Charles Whitacre	Study Area Resident	3, 4, 7, 21
Mr. Hippensteele	Study Area Resident	6, 16, 17
Evelyn Hensel	Study Area Resident	22

A. WATER QUALITY

Comment 1 — Why are the manmade channel areas suspect for water quality problems? (Ahlersmeyer)

Response 1 — The septic leachate studies have revealed a number of effluent plumes in the cut-and-fill canal developments on the lakes. Average levels of ammonia were observed to be about 2 mg/l in winter and 10 mg/l in summer for groundwater plume samples taken from canals, harbors, and sheltered or semi-enclosed small bays, particularly the Lagoona Bay, Lake James Marina, and Red Sand Beach areas. The higher levels found during the August survey included one sample from a canal below Pokagon State Park on the northeast shore (lower basin), which registered as high as 62 mg/l.

Two factors produce the above-average frequency of plumes in the canals. First, septic tank systems are installed in the dredge spoils pulled out of the wetlands to make canals. This fill material and the decaying vegetation covered by the fill do not provide adequate treatment of septic tank effluent. Second, because the canals do not receive much flow and are protected from the wind, there is little mixing of the effluent with lake water. This makes the effluent plume stronger and more easily detected than plumes entering the main body of the lake.

Comment 2
Why has no recommendation been made for the elimination of the phosphorus plume emanating from Marsh Lake? (Ahlersmeyer)

Response 2
Marsh Lake is currently classified by the State of Indiana as a Northern Pike fishery. EPA has discussed lake renovation programs to clean up the lake with the State. The State has decided that renovation activities would harm the fishery. Also, the lake is listed for nomination as a National Natural Landmark.

Comment 3
It appears that the National Eutrophication Survey's (NES) study assumption that all septic tank/soil absorption systems (ST/SASs) within 300 feet of lakes allow septic leachate into the lake cannot be substantiated, nor can the ST/SAS regulation with regards to minimum distance between lakes and wells. (Whitacre)

Response 3
Sampling programs in other rural lake communities in the midwest indicate that there is more assimilative capacity for wastewater in this particular setting than assumed previously. The Steuben Lakes are a prime example of a vigorous enforcement program and high assimilative capacity combining to provide a high level of protection for water resources and public health.

As discussed in this Final EIS, EPA does not suggest abandoning State- or locally-approved design standards. The design standards are appropriate for new systems on new lots, for existing lots where the standards can be met, or in other situations where the cost of detailed soils and groundwater studies cannot be justified. We are proposing that variances to current design standards be considered for existing dwelling if site studies show the risks of subcode or innovative designs to be acceptable.

Some states (not Indiana) have objected to the suggestion of allowing variances on the basis that it is administratively unworkable and will substantially increase the State's costs for rural wastewater management. If the alternative to variances is sewering, then the states will achieve a false economy in their operating expenses and a false stability in their administrative routines. The costs of sewering rural communities is much greater than the costs of site analysis, decentralized technologies and communities management. With sewers the states may hold their costs to a minimum, but at the expense of residents who pay the local costs.

As for the NES assumption that all nearby effluent plumes reach a lake, this apparently does not hold true for many lakes. Therefore, it is a conservative assumption that needs to be verified when expensive decisions rest on its validity. Another NES assumption is that 0.25 pounds of phosphorus per year per person are carried into a lake with each plume. This assumption is more costly to verify. Data collected so far suggest that this is a reasonable average for those plumes that do enter a lake. However, individual systems may generate widely varying phosphorus inputs, however, as evidenced by the groundwater sampling results reported in Chapter I of this Final EIS.

B. SOILS

Comment 4 — The Draft EIS has not addressed the 196 acre Industrial Park within the Study Area, nor has it mentioned a change of use for two areas: the Lake James Country Club, and the Pokagon Girls Camp. Both have been converted from recreational areas to residential uses. Both of these areas have soils that will not support ST/SASs. (Whitacre)

Response 4 — Comments noted. Information for design purposes in the Draft EIS was obtained from the best available sources, including the Facilities Plan and the Steuben County Planning Department. However, the Limited Action concepts could be applied to light industrial parks (by use of large cluster systems) as well as to the two residential areas.

Comment 5 — The soils data utilized in the Draft EIS have changed. (US Department of Agriculture--Soil Conservation Service)

Response 5 — Comment noted. New data are included in Appendix F of this EIS.

C. FIELD DATA COLLECTION

Comment 6 — Why is there a large discrepancy between the number of positive dye tests (septic effluent entering lake) and the number of plumes detected by the Septic Snooper? (Hippensteele)

Response 6 — Figure II-18 of the Draft EIS shows the locations of malfunctioning ST/SASs that were identified in eight dye test programs by the Steuben County Health Department (SCHD). Owners of such systems were required to take immediate corrective actions. The SCHD's monitoring and enforcement programs have probably been effective in reducing a large majority of adverse impacts on surface water quality.

Most of the positive dye tests found by the Health Department were located on upland sites and evidently represented surface malfunctions. Unless these systems were still malfunctioning and their wastes were running off into the lake, the septic leachate detector would not find them.

The dye studies did not find many malfunctioning systems along the shoreline, possibly because the dye was too diluted to be visible. The leachate detector is a more sensitive means of finding effluent and actually found more shoreline plumes then the dye study.

D. ALTERNATIVES

Comment 7 — The EPA estimate that 50% of the STs and 10% of the SASs will need to be replaced is greatly understated. (Whitacre)

Response 7 — The data collected about the Steuben Lakes' on-site systems are more extensive than ever available for communities of this size. EPA recognizes that additional observation and analysis of these systems may alter our understanding of their use and their effects on the environment. However, it is the Agency's judgment that changes, based upon new data, in the recommendation for Limited Action will be changes in detail, not in concept. The Agency is prepared to fund 85% of the detailed site evaluation's as a Step 2 grant (75% if conducted with a Step 1 grant) in order to , first, provide necessary information for site specific facilities design and, second, verify or modify our conclusion that continued use of on-site systems will be environmentally acceptable in the Study Area.

The Agency feels that the alternatives' cost estimates are presented in sufficient detail to determine cost-effectiveness. For those alternatives which include continued use of on-site systems, factors subject to uncertainty were estimated conservatively high, especially the percent replacement of septic tanks and drainfields. In addition, costs for operation and maintenance and for the site specific analysis have been re-examined for this Final EIS in more detail and with conservative estimates. Boosting these cost estimates has made no difference in the ranking of the recommended Limited Action Alternative. It appears unlikely that additional improvements in the cost estimates based on actual designs will alter the rankings either.

To clarify the site-specific work needed in Step 1 or Step 2, EPA Region V prepared a memorandum clarifying needs documentation procedures (Appendix B). The great majority of any such work should take place in Step 2.

For these reasons and because of the 50% savings to the Applicant, EPA will fund the site specific evaluation as a Step 2 grant.

Comment 8 — The EIS Recommended Action is only a temporary solution for wastewater needs of the Study Area. (Mick, Rowland & Associate, Inc.)

Response 8 — There is sufficient information on the condition and effects of the existing on-site systems to predict that their continued use in most areas around the Steuben Lakes area will be acceptable for years to come. The existing systems are up to 50 years old; many are undersized and poorly maintained. Yet the failure rate is low at present and can be reduced even further and kept at very low levels with the procedures recommended for the Limited Action Alternative.

Three key requirements for maximizing the reliability and cost-effectiveness of the Limited Action Alternative are:

- Selection of appropriate technologies for each home based upon well-planned and executed site analysis

- Provision of adequate community supervision of all wastewater facilities, and

- Measurement of and designing with the natural assimilative capacity of local soil/groundwater/surface water resources.

The Limited Action Alternative may not be the optimal solution for the Steuben Lakes area beyond the year 2000. Housing density, demands for commercial development and difficult on-site system problems could increase to the point that centralized treatment becomes economically justifiable. If and when that point will be reached cannot be predicted. EPA's judgement, based on a considerable amount of data which will be tested and augmented by the site specific evaluations, is that the point has not been reached yet and will not be reached within the next 20 years and perhaps, never.

Comment 9 The cost of the Limited Action Alternative is completely unknown and cannot be estimated until a great deal of on-site engineering is accomplished. (Mick, Rowland & Associates, Inc.)

Response 9 The data obtained and utilized in the formulation of the Limited Action Alternative is felt to be sufficient to determine the alternatives' feasibility and cost effectiveness. EPA has estimated conservatively high those factors that are subject to uncertainty. This estimate includes costs for the detailed site-by-site analysis as well as costs for operation and maintenance. The design work for the Limited Action Alternative will be totally dependent upon the actual conditions that the site-by-site analysis uncovers.

Comment 10 The Draft EIS Limited Action Alternative shows initial capital costs of $4.894 million and 1980 to 2000 capital costs of $4.751 million. This looks like 9.645 million in total capital cost. Will that 4.751 million required between 1980 and 2000 be funded by EPA or will it end up being paid by local residents as O & M costs? (Mick, Rowland & Associates, Inc.)

Response 10 Federal participation for on-site wastewater management only applies to homes constructed prior to December 1977 the same as for centralized sewer projects. All other homes will be excluded from Federal Construction Grants funding. This means in effect that all costs beyond those shown for 1980 will have to be borne locally by the small flows district or by the individual homeowner.

If the small waste flows district wants to, it can develop a local reserve fund to pay for future on-site waste management systems. We have assumed that future construction costs are going to be borne by the homeowners who are going to use the system. Therefore, a large part of the total capital cost for the project is deferred to the future and it rests on those people who are demanding additional service. They will pay in direct proportion to the sewage that is going to be generated.

Comment 11 — Uncertainty exists for the availability of Federal funds for Step 1, 2, or 3. (Steuben Lakes Regional Waste District - SLRWD)

Response 11 — The future financial status of EPA's Construction Grants program rests with the United States Congress. The possibility does exist that in the future money may no longer be available. However, the action recommended by this EIS represents the least cost project, independent of Federal funding.

Comment 12 — For systems that do not have existing problems, would preventive measures to delay or avoid future problems be eligible? (SLWRD)

Response 12 — Preventive measures would be eligible where detailed site analysis on similar lots shows a high rate of failure and indicates the causes of failure.

Measures that address these causes for failure will be eligible as long as other eligibility criteria are met. See also Section II.B of this Final EIS.

Comment 13 — Could problems other than public health, groundwater quality, or surface water quality be eligibile for the funding of repairs, renovations or replacements? Examples of "other problems" are odors, limited hydraulic capacity, and periodic backups. (SLRWD)

Response 13 — Region V-EPA has clearly defined its policies on Federal funds for on-site waste management in a document titled "Site-Specific Needs Determination and Alternative Planning for Unsewered Areas." This document is included as Appendix B of this EIS. Unless other problems were associated with odors (such as surface ponding or well water contamination), odors alone would not qualify a system for Federal aid. On-site solutions for the other two aforementioned problems would qualify for Federal aid. See also Section II. B of this Final EIS.

Comment 14 — Is nonconformance with modern sanitary codes suitable justification for eligibility to fund repairs, renovations or replacements? Can nonconformance be used as a measure of need for preventive measures? (SLRWD)

Response 14 — No. Nonconformance can be used as a reason to closely examine the usage, condition, and water quality impacts of individual systems. See also R-12.

Comment 15 — If a system is causing public health, groundwater quality, or surface water quality problems but site limitations prevent a new on-site system from satisfying sanitary codes, would a nonconforming on-site replacement be eligible if it would solve the existing problems? (SLRWD)

Response 15 — Yes, if structure was built prior to December 1977.

Comment 16 — Are cluster systems considered alternative and innovative wastewater management? Are they eligible for 85% grants and 100% federally-paid-for replacement with a conventional sewer system, if the EIS proposal fails within ten years? (Hippensteele)

Response 16 — The 1977 Clean Water Act authorized for a three year period ending in September 1981, a program of financial incentives to municipalities willing to incorporate innovative and alternative technology in their plans for sewage treatment projects. The program is to be funded by EPA Construction Grants.

"Innovative technology" includes methods and processes which, though already developed and offering definite economic or environmental benefits, are not yet fully proven, and therefore, at least theoretically, involve some risk of failure. "Alternative technologies," although they differ from those used in standard sewage treatment plants, are proven methods of wastewater treatment. Cluster systems and ST/SAS's would fall in this latter category.

To communities that incorporate new and different technology in their sewage treatment planning, EPA is authorized to offer substantial financial incentives. EPA will provide 85 percent of the design and construction (Step 2 and Step 3) costs of approved projects that use innovative or alternative technology, instead of the usual 75 percent. (The 85 percent funding also applies to those portions of a conventional project considered innovative or alternative). In the rare instance where such a project fails to meet its design goals within its first two years of operation, EPA will repay 100% of the costs of measures taken to correct or replace the failed system. The correction or replacement would not necessarily be a conventional sewer system.

Comment 17 — At what point will Federal funding for on-site wastewater management be stopped? (Hippensteele)

Response 17 — The Applicant is not prohibited from filing Construction Grants applications in the future. The response to future applications will be directed by Construction Grants policies at that time. See also Response #10.

E. IMPLEMENTATION/MANAGEMENT

Comment 18 — The Limited Action Alternative requires establishment of a small flows district. Currently, there is a lack of statuatory authority to administer this district in Indiana. (SLRWD and Mick, Rowland & Associates, Inc.)

Response 18 — The Indiana State Board of Health has consulted with their legal department and has stated that the Steuben Lakes Regional Waste District (SLRWD) has enough authority currently to plan, install, and operate cluster systems. In addition, it was stated that this authority also extends to on-site systems. EPA has sought a concurring opinion from the State's Attorney General but has not received a response in time to incorporate it into this Final EIS.

Comment 19 The Steuben Lakes Region Waste District (SLRWD) does not have the ability to raise matching monies required for continuation of Step 1 or 2. (SLRWD)

Response 19 This problem would exist even if the Facilities Plan Alternative were chosen. The Limited Action Alternative represents the least cost to the SLRWD to take care of its problems.

Comment 20 Doubt exists as to whether the State Board of Health will ever modify any standards it has adopted concerning septic tank and soil absorption system (ST/SAS's) guidelines. (SLWRD)

Response 20 There is a program currently underway by the Indiana State Board of Health that would modify existing regulations concerning on-site wastewater management. The State Board of Health is funding a study by the Purdue University Department of Agronomy that has already produced the preliminary recommendation that the existing codes be modified to allow operation on tighter soils, using such techniques as wastewater dosing.

Comment 21 Can we expect to see some realistic regulations based on the data gathered during the preparation of the Generic EIS? (Whitacre)

Response 21 The Generic EIS will discuss several aspects of current on-site management procedures, including regulations, in light of information published in the literature as well as data collected for the Generic and the seven individual EIS's. It is possible that the Generic EIS will recommend changes in on-site management procedures. Outside of specific projects funded by EPA, adoption of any recommended changes is the perogative of State and local governments. EPA would like to see several comprehensive Step 2 site analyses completed before any changes in design regulations for other than existing systems are recommended.

Comment 22 Reservations exist about the establishment of a small waste flows district. Why can't the County Health Department be given these responsibilities? (Hensel)

Response 22 The Steuben County Health Department (SCHD) has been exemplary in its approach to monitoring on-site system performance and in conducting water quality studies. Given the Department's available expertise, local knowledge and legal authorities, it is obvious that it should play a major role in management of the decentralized system.

F. <u>IMPACTS</u>

Comment 23 Several valuable and high quality natural areas exist within the Study Area and aren't noted in the Draft EIS. (State of Indiana--Department of Natural Resources)

Response 23 Comment noted. This information has been included in Appendix A. In addition, an analysis was made to ascertain whether these sites would be directly impacted by either the No-Action Alternative, Limited Action Alternative, or the Facilities Plan Alternative. It was determined that these areas would not be impacted.

Comment 24 — The Final EIS should indicate that Marsh Lake Basin is a potential national natural landmark currently recommended for designation. (Leisch, US Department of the Interior)

Response 24 — Comment noted. Marsh Lake lies near but outside the Study Area and will not be impacted by the Alternative recommended in the Final EIS.

G. THE EIS PROCESS

Comment 25 — The findings of the Citizens Advisory Committee apparently were ingnored in the Draft EIS. (SLRWD)

Response 25 — Information generated by the Citizens Advisory Committee was utilized in this EIS. Much of the information, however, was personal opinion gathered during a survey of the area. This information, although useful for ascertaining attitudes towards sewers, does not help in the technical analysis of alternatives.

Comment 26 — The Board of Trustees was bypassed on information as it was compiled, most noticeably in receipt of the Draft EIS. It is felt that the Trustees should have been the prime recipient of any information because they are the entity that will have to take the lead in implementing the suggested alternative and raising the matching funds required. (SLRWD)

Response 26 — EPA has had numerous meetings and telephone contacts with the SLRWD and especially with its attorney, Mr. Craig Benson. It is felt that adequate information flow between EPA and the Waste District did indeed take place.

Comment 27 — Why was the Public Hearing held on a weeknight in the off-season? (Ahlersmeyer)

Response 27 — The hearing was held on January 28, 1980 because Federal Regulations state that a Public Hearing be held within a certain amount of time after publication of the Draft EIS. The information and recommendations presented at the Public Hearing were essentially the same as those presented at a public information meeting held in the summer of 1979 when seasonal residents could attend.

APPENDIX A

Letters and Written Comments

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
AREA OFFICE
151 NORTH DELAWARE
INDIANAPOLIS, INDIANA 46204

REGION V
300 South Wacker Drive
Chicago, Illinois 60606

January 10, 1980

IN REPLY REFER TO:
5.4SS:BGD

Mr. Gene Wojcik
Chief, EIS Section
U.S. Environmental Protection Agency
Region V
230 South Dearborn Street
Chicago, IL 60604

Dear Mr. Wojcik:

Subject: Draft EIS
Alternative Waste Treatment Systems
Steuben Lakes Regional Waste District
Steuben County, Indiana

We have completed our review of the Draft Environmental Impact Statement relative to the subject proposal. Please be advised that we have no comments to add at this time. We appreciate the opportunity to review the Draft EIS and will look forward to receiving a copy of the Final EIS upon its completion.

Sincerely,

Howard L. Campbell

Howard L. Campbell
Area Manager

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

January 16, 1980

IN REPLY REFER TO:
HED-05

Ms. Kathleen Schaub
Project Monitor
U.S. Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60609

Dear Ms. Schaub:

The draft environmental statement for alternative waste treatment systems for rural lakes project - case study number 4, Steuben Lakes Regional Waste District, Steuben County, Indiana, has been reviewed. The alternate waste treatment systems for the rural lakes projects should have no effect on Federal-aid highways or highway projects. We, therefore, have no comments on the proposed action.

Sincerely yours,

Donald E. Trull
Regional Administrator

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

United States Department of Agriculture

Soil Conservation Service

5610 Crawfordsville Road
Suite 2200
Indianapolis, Indiana 46224

February 6, 1980

Mr. Gene Wojcik, Chief
EIS Section
Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Wojcik:

We have reviewed the draft environmental impact statement on Alternative Waste Treatment Systems for Rural Lake Projects, Steuben County, Indiana, and offer the following comments:

Page 37

The soils data were provided to you in December 1977 by Art Mumma, District Conservationist, Angola Field Office. This data was correct at that time, however, some changes have been made since then. We recommend modifying this section to reflect these changes.

1. The Fox series is now the Kosciusko series.

2. Effective March 31, 1978, both the Boyer and Kosciusko series are now listed as having severe limitations for septic tank absorption fields. Soils with permeability rates greater than 6 inches per hour in any layer below 24 inches are rated severe due to poor filter. Both of these soils have a layer between 34 and 60 inches with permeability greater than 20 inches per hour.

3. Permeability of the Riddles series ranges from 0.6 to 2.0 inches per hour.

4. Permeability of the Oshtemo series ranges from 2 to greater than 20 inches per hour.

Figure II-6 on page 38 should be corrected to reflect these changes in limitations.

Page 41, Table II-2

The following soils are now listed as being Prime Agricultural Lands of Steuben County:

Soil Symbol	Soil Name
Ad	Adrian muck, drained
BnA	Blount silt loam, 0 to 3 percent slopes
BtA	Brems fine sand, 0 to 2 percent slopes
Bz	Brookston loam
CcA	Carmi sandy loam, 0 to 2 percent slopes
CrA	Crosier loam, 0 to 3 percent slopes
Dr	Del Rey silt loam, 0 to 3 percent slopes
Ed	Edwards muck, drained
GnB	Glynwood silt loam, 2 to 6 percent slopes
HaA	Haskins loam, 0 to 3 percent slopes
Hw	Houghton muck, drained
KoA	Kosciusko sandy loam, 0 to 2 percent slopes
KoB	Kosciusko sandy loam, 2 to 6 percent slopes
MbA	Martinsville loam, 0 to 2 percent slopes
MbB	Martinsville loam, 2 to 6 percent slopes
MfB	Metea loamy sand, 1 to 6 percent slopes
MfC	Metea loamy sand, 6 to 12 percent slopes
MhB	Miami loam, 2 to 6 percent slopes, eroded
Mn	Milford silty clay loam
Mm	Millgrove loam
Mx	Morocco loamy sand
Mz	Muskego muck, drained
OhA	Oshtemo-Ormas loamy sands, 0 to 2 percent slopes
OhB	Oshtemo-Ormas loamy sands, 2 to 6 percent slopes
OhC	Oshtemo-Ormas loamy sands, 6 to 12 percent slopes
OsC	Oshtemo-Kosciusko-Riddles, complex, 4 to 6 percent slopes
Pa	Palms muck, drained
Pe	Pewamo silty clay loam
RaB	Rawson loam, 2 to 6 percent slopes, eroded
Rb	Rensselaer loam
RxA	Riddles sandy loam, 0 to 2 percent slopes
RxB	Riddles sandy loam, 2 to 6 percent slopes, eroded
Ry	Riverdale loamy sand
Wa	Wallkill silt loam
Wh	Washtenaw silt loam
WsB	Wawasee loam, 2 to 6 percent slopes
Wx	Whitaker loam

Some of these soils names and mapping symbols were changed during final soil mapping correlation. Enclosed is a copy of the final correlation showing the old field symbols and map unit names and their corresponding new publication symbols and map unit names.

Table II-7 on page 42 should be checked and corrected to reflect changes in the above listed soils and the enclosed final correlation.

Page 174, 3rd Paragraph

There are no state or local erosion control requirements, therefore we recommend this paragraph be changed as follows:

> Recommendations for erosion control measures will be requested from the Angola Field Office. These recommendations will be followed during installation of this system.

We appreciate the opportunity to review and comment on this draft environmental impact statement. If you need additional data, please contact us.

Sincerely,

Robert E. Mast
Acting

Buell M. Ferguson
State Conservationist

Enclosure

cc: w/o enclosure
Administrator, SCS, USDA, WO 20013
Director, Office of Fed. Activities, EPA, WO 20460(5)
R. Mast, ASTC, SCS, Indianapolis, IN
F. Schoeck, AC, SCS, Kendallville, IN

RLS:C:7/2-4

CONVERSION LEGEND FOR STEUBEN COUNTY, INDIANA JANUARY 1979

Field symbol	Publication symbol	Field symbol	Publication symbol	Field symbol	Publication symbol	Field symbol	Publication symbol
Ad	Ad	FxC	KsC	MxA	Mx	WsC	WsC
Am	Ad	Gf	Co	Mz	Mz	WsC3	WvC3
AuA	Ry	Gp	Pg	OcA	PnA	WsD	WsD
BaA	BnA	Gs	Gs	OcB	PnB	WsD3	WvD3
Be	Be	HaA	HaA	OcC	PnB	WsE	WsE
				Of	Ud		
Bn	Mn	Ht	Ht	OhA	OhA	WtA	Wx
BoA	BoB	Hw	Hw	OhB	OhB	WvC3	WvC3
BoB	BoB	Hx	Hn	OhB2	OhB	WvD3	WvD3
BoB2	BoB	Lb	Be	OhC	OhC		
BoC	BoC	Ma	Hn	OhC2	OhC		
BoC2	BoC			OhD2	BoD		
BoD	BoD	MbA	MbA	OsC	OsC		
BoD2	BoD	MbB	MbB	OsC2	OsC		
BpA	Ry	MbB2	MbB	Pa	Pa		
Bp	Ry	MbC	MbC	Pd	Pa		
Bs	Ry	MbC2	MbC	Pe	Pe		
BtA	BtA						
Bx	Bz	Mc	Mc	Pg	Pg		
Bz	Bz	Md	Gs	PnA	PnA		
CaB	CaC	Me	Gs	PnB	PnB		
CaB2	CaC	MfA	MfB	PnC	PnB		
CaC	CaC	MfB	MfB	RaB	RaB		
		MfC	MfC				
CaC2	CaC	MhB	MhB	RaB2	RaB		
CaC3	CaC	MhB2	MhB	RaC2	RaB		
CaD2	CaD2	MhC	MhC	Rb	Rb		
CaD3	CaD2	MhC2	MhC	RcB2	RaB		
Cf	Ud	MhD	MhD	RcC2	RaB		
				Rh	Rb		
ChA	ChB	MhD2	MhD	RxA	RxA		
ChB	ChB	MhE	MhE	RxB	RxB		
ChC	ChC	MhE2	MhE	RxB2	RxB		
ChD	ChC	MkC3	MkC3	RxC	RxC		
CrA	CrA	MkD3	MkD3	RxC2	RxC		
CsA	CrA	Mn	Mn	RxD	RxD		
De	Dr	MoB	GnB	RxD2	RxD		
DrA	Dr	MoB2	GnB	Sb	Mm		
Dr	Dr	MoC2	MoC2	Se	Mm		
Ed	Ed	MoD2	MoD2	Sf	Hn		
				Sh	Sh		
FoA	KoA	MoE2	MoE2	Td	Mx		
FoB	KoB	MrC3	MrC3	Wa	Wa		
FoB2	KoB	MrD3	MrD3	WcA	CcA		
FoC	KsC	MsC3	MrC3	Wh	Wh		
FoC2	KsC	MsD3	MrD3	WsB	WsB		

TABLE 5.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
Ad	Adrian muck, drained	915	0.4
Be	Beaches	141	0.1
BaA	Blount silt loam, 0 to 3 percent slopes	10,717	5.2
BoB	Boyer-Ormas loamy sands, 0 to 6 percent slopes	5,468	2.6
BoC	Boyer-Ormas loamy sands, 6 to 12 percent slopes	4,654	2.2
BoD	Boyer-Ormas loamy sands, 12 to 18 percent slopes	2,071	1.0
BtA	Brems loamy sand, 0 to 2 percent slopes	338	0.2
Bz	Brookston loam	4,198	2.0
CaC	Casco gravelly sandy loam, 6 to 12 percent slopes	1,328	0.6
CaD2	Casco gravelly sandy loam, 12 to 18 percent slopes, eroded	1,335	0.6
CcA	Carmi sandy loam, 0 to 2 percent slopes	651	0.3
ChB	Chelsea fine sand, 1 to 6 percent slopes	927	0.4
ChC	Chelsea fine sand, 6 to 12 percent slopes	655	0.3
Co	Cohoctah sandy loam	1,283	0.6
CrA	Crosier loam, 0 to 3 percent slopes	4,010	1.9
Dr	Del Rey silt loam	610	0.3
Ed	Edwards muck, drained	1,411	0.7
GnB	Glynwood silt loam, 2 to 6 percent slopes	23,018	11.1
Gs	Granby Variant loamy sand	1,483	0.7
HaA	Haskins loam, 0 to 3 percent slopes	1,447	0.7
Hm	Histosols, ponded	5,795	2.8
Ht	Houghton muck, undrained	6,558	3.2
Hw	Houghton muck, drained	4,253	2.1
KoA	Kosciusko sandy loam, 0 to 2 percent slopes	3,829	1.8
KoB	Kosciusko sandy loam, 2 to 6 percent slopes	6,633	3.2
KsC	Kosciusko gravelly sandy loam, 6 to 12 percent slopes	5,810	2.8
MbA	Martinsville loam, 0 to 2 percent slopes	284	0.1
MbB	Martinsville loam, 2 to 6 percent slopes	1,565	0.8
MbC	Martinsville loam, 6 to 12 percent slopes	701	0.3
Mc	Martisco muck, undrained	739	0.4
MfB	Metea loamy sand, 1 to 6 percent slopes	1,516	0.7
MfC	Metea loamy sand, 6 to 12 percent slopes	808	0.4
MhB	Miami loam, 2 to 6 percent slopes	6,424	3.1
MhC	Miami loam, 6 to 12 percent slopes	642	0.3
MhD	Miami loam, 12 to 18 percent slopes	843	0.4
MhE	Miami loam, 18 to 25 percent slopes	251	0.1
MkC3	Miami clay loam, 6 to 12 percent slopes, severely eroded	689	0.3
MkD3	Miami clay loam, 12 to 18 percent slopes, severely eroded	374	0.2
Mm	Millgrove loam	1,580	0.8
Mn	Milford silty clay loam	2,311	1.1
MoC2	Morley silt loam, 6 to 12 percent slopes, eroded	11,876	5.7
MoD2	Morley silt loam, 12 to 18 percent slopes, eroded	979	0.5
MoE2	Morley silt loam, 18 to 25 percent slopes, eroded	239	0.1
MrC3	Morley silty clay loam, 6 to 12 percent slopes, severely eroded	2,695	1.3
MrD3	Morley silty clay loam, 12 to 18 percent slopes, severely eroded	946	0.5
Ms	Morocco loamy sand	397	0.2
Mz	Muskego muck, drained	490	0.2
OhA	Oshtemo-Ormas loamy sands, 0 to 2 percent slopes	2,293	1.1
OhB	Oshtemo-Ormas loamy sands, 2 to 6 percent slopes	2,064	1.0
OhC	Oshtemo-Ormas loamy sands, 6 to 12 percent slopes	807	0.4
OsC	Oshtemo-Kosciusko-Riddles complex, 4 to 12 percent slopes	979	0.5
Pa	Palms muck, drained	1,367	0.7
Pe	Pewamo silty clay loam	7,371	3.6
Pg	Pits, gravel	358	0.2
PnA	Plainfield fine sand, 0 to 2 percent slopes	1,213	0.6
PnB	Plainfield fine sand, 2 to 10 percent slopes	1,481	0.7
RaB	Rawson loam, 2 to 6 percent slopes	5,173	2.5
Rb	Rensselaer loam	3,504	1.7
RxA	Riddles sandy loam, 0 to 2 percent slopes	1,659	0.8
RxB	Riddles sandy loam, 2 to 6 percent slopes	8,403	4.1
RxC	Riddles sandy loam, 6 to 12 percent slopes	5,689	2.7
RxD	Riddles sandy loam, 12 to 18 percent slopes	713	0.3
Ry	Riverdale loamy sand	759	0.4
Sh	Shoals loam	1,331	0.6
Ud	Udorthents, loamy	2,500	1.2
Wa	Wallkill silt loam	751	0.4
Wh	Washtenaw silt loam	1,367	0.7
WsB	Wawasee loam, 2 to 6 percent slopes	3,374	1.6
WsC	Wawasee loam, 6 to 12 percent slopes	4,095	2.0
WsD	Wawasee loam, 12 to 18 percent slopes	956	0.5
WsE	Wawasee loam, 18 to 25 percent slopes	369	0.2
WvC3	Wawasee sandy clay loam, 6 to 12 percent slopes, severely eroded	991	0.5
WvD3	Wawasee sandy clay loam, 12 to 18 percent slopes, severely eroded	459	0.2
Wx	Whitaker loam	1,847	0.9
	Water	9,600	4.6
	Total	207,360	100.0

United States Department of the Interior

OFFICE OF THE SECRETARY
NORTH CENTRAL REGION
175 WEST JACKSON BOULEVARD
CHICAGO, ILLINOIS 60604

February 4, 1980

ER 79/1169

Mr. John McGuire
Regional Administrator
U.S. Environmental Protection Agency
Region V
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. McGuire:

We have received the draft environmental statement for Alternative Waste Treatment Systems for Rural Lake Projects, Case Study No. 4, Steuben Lakes, Steuben County, Indiana (ER 79/1169) and have the following comments.

Basically, we were pleased to note that the Limited Action Alternative is the recommended plan and will preserve remaining wetlands in the area. If within this alternative any lands in Pokagon State Park will be converted to other than recreational uses, a Section 6(f) conflict might result since Land and Water Conservation Funds are involved. Contact should be made with the State Liaison Officer (S.L.O.) responsible for Land and Water Conservation Funds in the State of Indiana. The S.L.O. for Indiana is Mr. Joseph D. Cloud, Director, Department of Natural Resources, 608 State Office Building, Indianapolis, Indiana 46204.

Based upon the information provided in the draft environmental statement, we do not expect any adverse effects to the Marsh Lake area. The final statement should indicate that Marsh Lake Basin is a potential national natural landmark, currently recommended for designation. It lies near but outside the study area. If you have any questions regarding the potential landmark, please contact the Heritage Conservation and Recreation Service, Lake Central Region, Federal Building, 200 East Liberty, Ann Arbor, Michigan 48107 (FTS 8-378-2027, commercial 313/668-2027).

The statement in general indicates proper consideration of the potential for impacts on ground water; however, septic disposal should be included in the discussion of alternatives and in the assessment of impacts. A discrepancy between the estimates for ground-water storage appears in the first and last paragraph on page 56.

Sincerely yours,

D. Gordon Lesicky

Regional Environmental Officer

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
CENTER FOR DISEASE CONTROL
ATLANTA, GEORGIA 30333

February 4, 1980

Mr. Gene Wojcik
Chief, EIS Section
U.S. Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60609

Dear Mr. Wojcik:

We have reviewed the Draft Environmental Impact Statement (EIS) for Alternative Waste Treatment Systems for Rural Lake Projects, Case Study Number 4, Steuben Lakes Regional Waste District, Steuben County, Indiana. We are responding on behalf of the Public Health Service.

Our review of this statement indicates that the impacts of the proposed action and the alternatives have been adequately addressed.

Thank you for the opportunity of reviewing this draft document. We would appreciate receiving a copy of the final statement when it is issued.

Sincerely yours,

Frank S. Lisella, Ph.D.
Chief, Environmental Affairs Group
Environmental Health Services Division
Bureau of State Services

STATE of INDIANA

INDIANAPOLIS, 46204

DEPARTMENT OF NATURAL RESOURCES

JOSEPH D. CLOUD
DIRECTOR

FEB 14 1980

Mr. Gene Wojcik, Chief
EIS Section
U.S. Environmental Protection Agency
230 South Dearborn St.
Chicago, Illinois 60609

Re: DNR #1534, D.E.I.S. - Steuben Lakes Study Area, Steuben County, Indiana.

Dear Mr. Wojcik:

The above referenced project has been reviewed by the Indiana Department of Natural Resources to enable you to assess its effect on the environment.

When a final project plan has been developed, and if it is anticipated that any of the lake shorelines will be altered or if any lake or stream beds will be crossed by sewer lines, then approval of the Indiana Natural Resources Commission will be required.

No known historical or architectural sites will be affected. The area is suitable for sites of prehistoric occupation, and there must be an archaeological reconnaissance of all undisturbed areas which will be impacted by construction associated with the project. The survey must be carried out by professionals meeting qualifications established by the Department of the Interior. Before this project can be approved, a description of the survey methods and results must be submitted to our Division of Historic Preservation for review and comment.

According to our Division of Nature Preserves, there are several high quality natural areas within the study area and undoubtedly others that are unknown at this time. These areas, for the most part, are wetlands and our understanding, based on the report that you submitted, is that they will not be impacted by the proposed project. However, because of the importance of these types of areas, they are brought to your attention so that any unanticipated impacts can be avoided or mitigated.

These areas, briefly described, are as follows:

a. Binkley East Bog - A large bog located in the center of the W 1/2 of Sec. 31, T38N, R13E and a portion of the E 1/2 of the E 1/2 of Sec. 36, T38N, R12E. This tract is a high priority for preservation and both the Division of Nature Preserves and the Izaak Walton League have hopes of acquiring it. It includes a forested tamarack bog community, a tall shrub bog community, a low shrub bog community, a gramineous bog community, a quaking sedge meadow, and a quaking bullrush - royal fern community.

b. Arethusa Bog - Located in Sec. 19, T38N, R13E. This site has a large lowland peat bed forest of red maple and yellow birch and a tamarack-spahagnum bog forest.

c. Jimmerson Lake Tamarack Stand - This site is located in Sec. 30, T38N, R13E and is predominantly composed of tamarack.

In addition, several vulnerable plants and animals of state significance are known to occur at the above mentioned sites. For further information, please contact our Division of Nature Preserves.

The Natural Heritage Program's data has been checked and to date, two additional sites have been reported as locations for vulnerable plant species of state significance. These sites are located in the NW 1/4 of Sec. 36, T38N, R12E and in the NE 1/4 of Sec. 1, T37N, R12E.

As to the two plant species, *Platanthera flava* and *P. leucophaea*, that were discussed on pages 74 and 75 of your report, our most recent information indicates that these are now in the genus *Habenaria*. Before November 10, 1979, these plants were of federal significance and to date, are of state significance. According to our data, the only reported occurrence for *Habenaria leucophaea* in Steuben County is from Graveyard Lake and the habitat for this species at this site has been destroyed. The reported occurrence for *H. flava* is probably in fact *H. flava* var. *herbiola*, which is not of federal concern. To our knowledge, these species have not been reported to occur within the project area, although the wetlands described by our Division of Nature Preserves are indeed suitable habitat for both *Habenaria flava* var. *herbiola* and *H. leucophaea*, but not for *H. flava*.

We appreciate this opportunity to be of service. If we can be of further assistance, please do not hesitage to contact me.

Sincerely,

Joseph D. Cloud, Director
Department of Natural Resources

JDC:JRA:bb

COMMENTS ON DRAFT E I S
FOR
STEUBEN LAKES REGIONAL WASTE DISTRICT
by
RICHARD H. MICK, P. E.

In view of the unfavorable and unfair comparisons presented in this Draft EIS, I feel compelled to present the following comments in defense of the integrity of the program as presented in the Facilities Plan prepared by Mick, Rowland & Associates, Inc., and in defense of our reputation as professional engineers.

First of all allow me to state that as Professional Engineers, we are not at liberty to recommend the spending of large sums of the public's money for uncertain, unproven, experimental programs. Planners, whatever they are, are bound by no such ethical professional restraints. If what they planned does not work out, there is no professional license at stake or no law suit for professional incompetence.

They state on page iii of their summary that the "recommended action would provide a satisfactory solution - - -". They would be more accurate if they called it a "temporary solution".

At the outset, let us get one thing understood. At the time the Facilities Plan was in preparation, the main thrust of EPA was toward large regional systems (see news article reprint, page 14, Appendix A-2). At that time many small local plants that were perfectly adequate were being abandoned with their sewage pumped to large regional plants, thus creating large regional systems.

Large regional systems are the most efficient if smaller local plants are inadequate, non-existant, or poorly operated, all of course, dependant upon the economics of the situation. At the time the Steuben Lakes Regional Waste District Facilities Plan was prepared, the EPA would not have considered anything else. At any rate, **it** was a typical situation for a regional system.

As its name implies, it is a regional study area, and a large region at that with no small plants to be abandoned. In fact, the State SPCB and the EPA increased the area to be studied at the preapplication conference. So with this said, let's put an end to criticism of our plan - - it was the only one EPA policy at the time would permit.

What is the cost of this EIS? There were five other contracts awarded in addition to the main contract to WAPORA. Much of this work and its results are of doubtful value. For instance, the infra-red photography failed to indicate septic effluent lying on the surface to say nothing of what it detected beneath the surface. The famed Snooper-Sniffer survey conducted by K-V Associates is entirely experimental, untested, incomplete and unproven. In addition, most of the detailed on-site sutdy data was provided to WAPORA by Mick, Rowland & Associates, Inc., and the Steuben County Health Department, free of charge, other information and data was obtained by telephone calls to state agencies from people who have little knowledge of local conditions. None of their data, to our knowledge, was gathered, assembled and evaluated by their own people working in the area. What are the costs of the Services of:

WAPORA
Environmental Photographic Interpretation Center
Arthur Beard Engineers
A. T. Kearney Associates
K-V Associates
Tri-State University

The cost comparisons in the Draft EIS are deliberately misrepresented. They are assuming that all collector sewers were grant ineligible at the time our Facilities Plan was submitted which was not the fact. At that time only $1,340,000, or 11%, of our proposed project was determined by EPA to be ineligible. Almost all of this was subsequently eliminated as unnecessary in a revision to our plan dated May 3, 1977. What they fail to mention is that eligibility of sewers was drastically changed by PRM 78-9 issued March 3, 1978. PRM 78-9 practically eliminates any collection system funding, but it instituted a change in policy 18 months after our Plan was submitted, and five months after the EIS was started. This should be clearly understood by all - - our financial analysis and local costs were correct at the time they were submitted, but are now made to look ridiculous by a policy change instituted 18 months later - - this is grossly unfair to us and makes us appear to be incompetent. This fact should be explained in the EIS final draft although I'm sure most people will not read the final draft after seeing this unfair cost comparison in this preliminary draft.

For their Limited Action Alternative, the EIS (Appendix Table K-2) shows initial capital cost of 4.894 million and 1980 to 2000 capital cost of 4.751 million. This looks like 9.645 million in total capital cost. Will that 4.751 million required between 1980 and 2000 be funded by EPA or will it end up being paid by local residents as O & M cost? If it ends up as O & M costs, that will make the O & M cost 6.54 million which will certainly blow their claimed $50 per year per customer to pieces.

Can you please explain how Table IV-2 shows a project cost of 1.968 million and Appendix K-2, page 22 shows a total present project cost of 4.894 million? All of the local costs of $177,000 are based on the 1.968 million and not on the initial cost of 4.894 million or the total capital cost of 9.654 million, half of which could possibly be without Federal & State participation of any kind.

At the initial meeting held on July 21, 1978 where WAPORA presented the preliminary report on the engineering portion of the report, they had no Limited Action alternative. We are convinced that they were in agreement with us, that a real sewage collection and treatment system was needed.

They presented Alternatives 1 thru 6, a couple of which were real possibilities and the rest were a necessity to develop the required cost effectiveness analysis. In fact, their recommendation at that time was so close to ours that they were almost saying, "you already have the right solution to the problem". At this point, EPA, in its determination to deny the application, told them to go back to the drawing board and come up with an on-site experimental system. There is no Facility Plan, only estimates of costs where the numbers come out right. The engineering is yet to be done and will be astronomical in comparison with conventional engineering costs. Checking the condition of 4000 septic tanks and leach beds will be time consuming and very costly. Even the EPA (Alfred Krause) expects engineering costs for preliminary engineering investigations, before designing can begin, to exceed 25% of construction costs. Acquisition of sites for cluster systems, where indicated, will be very difficult and costly. The cost of this Limited Action Alternative is completely unknown and can not be estimated until a great deal of on-site engineering is accomplished.

As far as implementing the proposed EIS Alternative is concerned, the proposed system can not be implemented under existing Indiana law (page 137) and changing existing laws and regulations seem highly unlikely, or if possible, a lengthy proposition.

ADDITIONAL COMMENTS

It would seem appropriate to mention what the EPA cused delays, administration and policy changes has done to our small engineering firm financially. Our initial engineering cost estimate was $84,141 plus reimbursible out-of-pocket expenditures of $2,500, based on the existing requirements and the expected time required to complete. Because of the many delays and changes in requirements and policy, our costs exceeded $144,000 by December, 1976. Let me emphasize, this is our cost not including overhead and profit. Our $86,641 contract was cut arbitrarily by EPA to $65,130 total without explanation or justification. Of this amount, we have been paid a total of $60,459, leaving us short $83,500 of recovering our cost, to say nothing about a reasonable profit for our efforts. We are certainly losers of more than $100,000.

It would be interesting to compare the $60,459 paid to us with the amounts paid to the six private firms hired by EPA to pick our plan apart which they did not do very effectively or fairly.

RR#5 Box 455
Angola, In. 46703
February 9, 1980

Kathleen Schaub
E I S Section
U.S. E.P.A.
230 So Dearborn
Chicago, Il.

Dear Kathleen,

We are most pleased that the EPA tests proved what we've been sure of all this time. Consequently, we are also pleased that there will be no Central Sewer.

However, we do have reservations about the necessity for and value of a Small Waste District for Steuben Co. We know that the present department (Co. Health) is capable and effective.

We have strong reservations about the attitude, ability, and etc. of a Waste Board and its employees. We would be locked into a system with no alternatives because of the lack of competition for installation, repair, tank pumping, and etc.

Hopefully the County can manage all the Water Monitoring we need. The lake associations should be able to furnish manpower to assist in septic tank testing. With some good water control laws, the lakes should be at their best.

Thank you for taking the time to do a thorough test program before making a decision.

Sincerely yours,

Evelyn (Mrs. Wynn) Hensel

Charles D. Goodale
R. R. 5 - Box 140-A
Angola, Indiana 46703

5/31/80

Mr Gene Wojcik E & S Section
Water Div. U.S. EPA Region 5
230 S. Dearborn St Chicago Ill. 60604

Dear Sir;

This is in reference to the EPA study of the sewage system for Steuben Co (In) lakes as presented Jan 28 at Tri State University, Angola In. My wife & I own a permanent (year around) home on Spring Point, Lake James house no. 2336, but are temporarily visiting my oldest son in Ca. Another son, who teaches at Tri State has briefed me on your proposal as filed in their library.

Your studies have shown the lakes are not poluted to the point of requiring a general sewage system & this is undoubtedly due to generally good septic systems around the lakes, The well water tested was 100% OK.

It would therefore seem that we, & most other property owners around the lake, would be assessed, under the new EPA proposal to bail out a small percentage of property owners who are in trouble with their septic systems. The latter are installed in low-lying areas where houses should never have been built.

I am therefore strongly opposed to this new EPA proposal.

Sincerely yours,
Charles D Goodale

Feb. 5th 80

Dear Mr Wojcik

We live in the Steuben County Lake Area, and we are very opposed to a waste - water - treatment plant

1. We replaced our leach field last summer at a cost of $790.00

2. My wife and I both work in this area - and the pay scale is very low, its hard making ends meet now, so if a plant was put in we would probably

2) have to sell our house.

3. It seems to me, that the people who are pushing this plant are the "well to do."

4. I maintain a small waste water package plant, and have been to plant seminars and it seems to me that all large plant operators due not fully agree, on how a plant should operated.

5. My big worry is, pour millions of dollars into it and as a fellow said,

3) D. I. O. A.
"Do it over again"

6. The initial cost is staggering and the up-keep-and maintance are not far behind.

I would have written sooner but I thought the issue above had be closed.

Yours —
Mr & Mrs Roy May
R. 5 Box 994
Angola, In. 46703

1/28/80

Mr. Gene Wojcik, Chief
EIS Section, Water Division
United States Environmental Protection Agency, Region V
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Wojcik:

My comments are directed toward the Environmental Impact Statement; Alternative Waste Treatment Systems for Rural Lake Projects; Case Study #4, Steuben Lakes Regional Waste District, Steuben County, Indiana; November, 1979 Draft.

Further I might identify myself as owner of Cottage #830, Glenwood Addition to Glen Eden Springs, Lake James, Indiana; However, I reside at 2909 W. Woodbridge, Muncie, Indiana. My name is Donald E. Ahlersmeyer and I am a professor at Ball State University.

First, if the majority of landowners in the area are "seasonal", why did you have this hearing on a Monday night? (1/28/80 7:00pm.) It practically excludes the majority from voicing their opinion. Why wasn't the meeting held on a Friday night or Saturday?

Second, while I agree with most of your conclusions, it is difficult to ascertain the data that lead to your comment on page 202 of the draft "The manmade channel areas .... are the areas for closest study." While I agree that the channel areas are suspect, there is no data in the draft to support focusing the spotlight of attention on these areas.

Third, (and perhaps most important to the longevity of Lake James) is that terrible threat to the whole of Lake James from the source plume of the wastewater plant of Fremont referred to initially on page ix (and several times later). It is obvious that the creeping effects of that pollution have nearly progressed as far as Lone Tree point. Yet, no recommendation for eliminating that pollution threat have been made. This is important!

Finally, don't pick on the little people -- the small cottage owner. Despite all your efforts, you couldn't find enough pollution to warrant a sewer system. Now look at the big polluters -- industry, Fremont + other small towns & clean up their act.

Thank you.

Donald E. Ahlersmeyer

January 26,1980

Mr. Gene Wojcik
Chief, EIS Section
United States Environmental Protection Agency
Region V
230 South Dearborn St.
Chicago, Illinois 60604

Dear Mr. Wojcik:

I am taking this opportunity to comment on the Environmental Impact Statement (EIS) for the Steuben Lakes Regional Waste District (SLRWD), Steuben County, Indiana.

The USEPA and WAPORA, Inc., have expended a tremendous amount of time, 2 years plus, and money in preparing this EIS. I believe the EPA has overlooked some important facts, has made some inconsistant assumptions, has come to some inaccurate conclusions and has not taken into consideration the expressed preferences of the public into account.

It would appear that a reassement or existing regulations would be in order.

REFERENCE - Page 29-

"Evaluation of the course of action open to USEPA must start from an analysis of existing situation".

It is questionable as to whether the regulations written by EPA governing clean water did follow an analysis of existing situations. Otherwise the State would not have written the regulations for private sewage disposal systems that cannot be met or apparently do not need to be met.

It appears that the NES Study assumption that all Septic Tank/Soil Absorbtion Systems (ST/SAS) within 300' of lake allow septic leachate into the lake can not be substainiated, nor can the ST/SAS regulation with regards to minimum distance between lakes and wells. If the EPA had analyized the existing situation the conflicting regulations would not have been written or if you choose to ignore these studies and follow the national goal of clean water by 1985, the EPA should be recommending the facilities plan proposed action.

REFERENCE - Page 22 -

Can we expect to see some realistic regulations based on the data gathered during the preparation of this EIS?

REFERENCE - Appendix J-2 -

The changes in State Law required to operate your recommended "Limited Action Proposal" would be very close to being illegal. Statements such to allow authorized agent to check out a "source of pollution" or "protect the public health" could allow the stretching of the law beyond what existing public utilities (electrical-telephone) require to maintain service.

The EIS has not addressed 196 acre Industrial Park within the study area, nor has it mentioned change in two areas, the Lake James Country Club and the Pokagon Girls Camp from park or recreation to residential in either present of future land use. (Ref. Figure II-15 and Figure II-16.) Both of these areas have soils which will not support ST/SAS , Ref. II-6. The Country Club area will also add to the point and non-point polution into the drainage ditch which goes into Lake James at Lagoona Park.

REFERENCE - Page 159 -

I believe the EPA estimate that 50% of the ST and 10% of the SAS will need to be replaced - is greatly under stated. I find it

hard to believe that if a Septic Tank is too small, too old, not functioning properly, etc, that the SAS was installed properly, was maintained properly and is functioning properly.
With the cost of SAS running between $1.50 to $2.00 per square foot, I have extimated an additional 1405 residences will require SAS at a cost of $1,800,000.00 more dollars.

In conclusion, I feel the EPA has over estimated its ability to Up-grade ST/SAS to solve an ever growing and continuing problem which a centralized sewer would correct much more effectively.

Submitted by,

Charles J. Whitacre

Charles J. Whitacre
R.R. #2 Box 61-E
Angola, Indiana 46703

Subject: Notice of Public hearing on 1-28-80 Steuben County Lake waste water project

Mr Gene Wojcik

Dear Sir:

We have owned property on Feicks Point addition lot #9 for more than 20 yrs, and we are sure that some kind of waste water treatment is necessary now and for the future good of the lakes in the area.

As to the method to be used this must be determined by Engineering People. The Small Cluster System would possibly be Cheaper and would be a start in protecting the lakes.

With reference to the subject meeting we feel sure the attendance will be poor, if this meeting was held in the summer months there would be a large attendance.

There are nine homes in our addition and are owned as follows.

Name	Location
Richard Banister	Dayton Ohio
Mrs Marlene Getz	Garrett Ind
Fred Feick	Elkart Ind
Dale Feick	Toledo Ohio
Unknown (New)	Ohio
"	Central America
William Wangler	Chicago Ill
Carl Geller - Ft Wayne Ind & Marco Island Fla	

While many of the homes are owned by people that live on the lakes all year some are owned by people that live quite some distance away and will not attend

the meeting.
We have talked many times with our neighbors and the large majority are highley in favor of some type of system that will be practical and helpful in saving our beautiful lakes.
We are hopeful that a good system will be recommended by your Environmental Protection Agency.
Your Environmental Impact Statement was very informative and very well done.

Yours Truley
Mr & Mrs Carl W Geller
2211-1 Abbey Dr
Ft Wayne Ind 46815

RECEIVED

Fremont, Indiana
'79 DEC 31 PM, 1979

WATER DIVISION

Mr. Gene Wojcik
Chief, EIS Section
Chicago, Illinois

Dear sir:

We received the environmental report, and are anxiously awaiting action to relieve the antiquated living conditions that many of us find increasingly difficult. Needless to say, we believe sewers will be the ultimate solution. I guess I would say this will be more money down the drain, only to require greater expenditure in the not too distant future.

The report seemed extensive; however, it seemed that much of the data was based on older local testing, and telephone calls to various people in this area. I know funds for such testing would be a great hardship for such a small community. Perhaps it would not be so difficult if more Federal Tax dollars would be returned to communities. Last week an article was in the Fort Wayne Sentinel, stating Pres. Carter would be extending more aid to rural areas in relation to sewers etc. This is an election year.

Any remark that I may make is not of a personal nature, and all are the result of trying to cope with a frustrating dirty situation. I wish to comment on the following:

I. Adjust life style to accommodate existing facilities:

a. Life style now has reverted to conditions similar to the Dark Ages. When the poor old dredged muck refuses to absorb the 8 Oz. of water to brush your teeth, you have cut back further than any gadget will do. On site solutions seem remote. Springs bubble up here and there, and we are not about to stop them. I am not talking about a microscopic lot, such as around Lake James or Crooked Lake. I am talking about a larger lot with a new expensive septic system. These are times and situations that one feels the need of a Ralph Nader to explore and expose.

II. Cost:

b. The Clivis Multrum Corp. sent out literature on their solution to the problem. The cost of this monstrosity will range from $1600 to 2000, this does not include freight or installation.

I can not imagine the cost of rebuilding your home to accommodate this monstrosity. I would imagine that by the time one installed all the gadgets, the $400/year sewer would seem like the best dollar one ever spent. I believe Senator Proxmire resently awarded The Golden Fleece Award to the Clivis Multrum or the study thereof. I am only saying we are already using more stringent methods than any of these methods will produce in the conservation of water

III. Population:

a. Since your report went to press the following has occurred.

1. Pokagon Girl's Camp is now Timber Bay. Four homes are constructed. This will be a large development. I fear for the wetlands in that area.

2. Otter Lake Development: In this area wetlands were disturbrd, and I do not know what action has been taken, Steuben County must have known at the time permission permits were issued that Marsh Lake was polluting these other lakes, thus all the more reason to keep the wetlands undisturbed.

3. There is another development between Lake James and Crooked Lake. At the present time there are 13 to 14 new homes, it would seem this will be a large development of expensive water using homes, This sewage will all run down.

4. North Snow Bay keeps going and going. Now believe me, this is only part of the growth. With or without sewers the people will settle around a body of water, be it clean or filthy. I feel the energy shortage will only increase the multitude of existing problems. I feel a moratorium should be called on all building in this area. I know "Ignorance is no excuse", but many poor souls will become involved in this situation. I know how much we have spent, it could be enough to bankrupt a family. The contribution to the study in itself was two hundred dollars, but we felt the area deserved to be saved.

IV. Water Quality;

a. I can sumarize my feelings very quickly, regardless of any report, I do not want the water in me or on me. Un fortunately now and then I must go against my better judgment. Last spring the lake water had a foul musty sour odor. Standing on the pier you could see the sediment suspended in the water.

b. I would surely question the relisbility of reports on the number and kind of fish.

We found a beautiful northern pike on our beach this summer, and noone who saw it could detect any injury. I saw another near Timber Bay. I just wish they would float to another area, I have dogs who invariably find them, and I certainly do not feel they should eat them, but dogs will be dogs.

One last comment, this November I met a doctor in Florida who was from Michigan. I told him about our severe problems, the condition of the lakes, and the unsanitary living conditions. His comments did not improve my morale. He said "you need not tell me anything about that lake area. I fought the battle in the Health Department for years, and never got anywhere. Every lake in that area in itself is a septic field. I stood by and saw the death of beautiful lakes, forget it if you think anything will be done."

I will hope that with your help that living conditions will be improved. So many have invested in this area, and frankly have already over extended themselves in trying to solve these problems they find themselves in. These sewage problems are too much, indeed impossible for any one person to do on their own. I hope Steuben County will have mercy on any future souls who desire to settle here.

Sincerely,

Betty J Goodson

Betty J. Goodson
R. R. #4, Box 164
Fremont, Indiana
46737

LARRY HOLLMAN
2023 MATHIAS
FORT WAYNE, INDIANA ~~46805~~ 46815
219/424/3646

RECEIVED
'79 DEC 28 AM 11 20
WATER DIVISION

Dear Sir,

2/26/79

I own Cottage #316 Snow Lake in the Steuben County lakes sewage district Steuben county Indiana. I wish to point out my septic problems and ask what my options may be under PHASE II updating on site septic systems.

My lot size is 33' X 100'. My place is year around but, has a very large draw back. It has only a 350 gallon steel holding tank. We catch around 90% of the running water in a dish pan and empty it outside. Our tub and shower naturally are not used. 10% of water usage and the stool usage are all that enter my holding tank.

My tank needs pumped every two weeks with weekend use only and pumped weekly if used like on a vacation. At $40.00 per pumping it is very expensive plus being rather expensive it is very inconvenient.

There are other cottage near me that have other holding tanks similar to mine. I therefore I a m not alone with my septic problems. What are the options available to us under PHASE II??????

I am submitting to the county for a septic permit. I am positive it will be refused and rightfully should be. With my tank being steel and old it is only a matter of time until it leaks directly into the lake as it is located on the lake front.

LARRY HOLLMAN
2023 MATHIAS
FORT WAYNE, INDIANA ~~46805~~ 46815

Am I in consideration as a prime candidate for limited action alternatives like in Section # 9, item # 1 page # 159 of case study # 4 ?? Or I may be best suited for Item # 2 section A page 202. Perhaps a cluster system? Probably this would be determined in implementation of Phase II correct??

I therefore volunteer to be an example or test site. I will co-operate with you in every way possible. Please feel free to contact me when ever I may be of assistance. If necessary my cottage could be available as a working headquarters or office for you.

Enclosed is a letter from Clivus Multrum with another way to go.

I am interested and concerned. I am also willing to assist in any way possible. Thank You for your time and information.

Best Regards,

Larry L. Hollman

Larry L. Hollman

Clivus Multrum

Hello:

Recently the Environmental Protection Agency drafted an Environmental Impact Statement (EIS) for the Otter Tail Lake area in Minnesota which recommended a Limited Action Alternative as opposed to sewering the area which was recommended by the County Commissioners facilities plan. The main reason for the differing opinion was due to the high cost of sewering and the financial burden that would be placed on the individual homeowner as well as the County. In addition, EPA has recently announced a finding that over 60% of the 17,000 municipal sewerage plants in operation in the U.S. fail to meet minimum clean discharge standards.

The Limited Action Alternative which would be funded by EPA in summary would:

a. repair and upgrade existing on-site systems

b. separate Grey water/Black water along problem high groundwater areas and the installation of either air compressor toilets or composting toilets such as "Clivus Multrum".

Since this is considered an innovative and alternative waste treatment system, federal funding would be 85%. The state contributing an additional 9% would leave only 6% of the installation expense to be borne by the local homeowner. EPA estimates that to be approximately $700 for the air compressor type toilet and only $250 for the composting Clivus Multrum toilet. In addition, the compressor type toilet requires a holding tank which involves pumping and proper disposal (another additional expense).

Enclosed is some information about Clivus Multrum and our composting toilet. There are already over 1,000 installed here in the U.S. and many more in Sweden and other countries.

> Clivus Multrum is a much more sensible way to handle the treatment of organic wastes. It does not use our water resources nor does it pollute the environment. Please give us your consideration.

If you wish additional information, please call or write our office in Cambridge, Massachusetts.

Best regards,

William Wall

14A ELIOT STREET, CAMBRIDGE, MASS. 02138 • (617) 491-5820

APPENDIX B

EPA Region V Guidance Site-Specific Needs Determination and Alternative Planning for Unsewered Areas

REGION V GUIDANCE

SITE SPECIFIC NEEDS DETERMINATION AND ALTERNATIVE PLANNING FOR UNSEWERED AREAS

I. Objective

The objective of this guidance is to simplify fulfillment of the requirements regarding the demonstration of need for sewage treatment associated with the application of Program Requirements Memorandum (PRM) 78-9, "Funding of Sewage Collection System Projects," and PRM 79-8, "Small Wastewater Systems." This guidance is written particularly with respect to the needs of small, rural communities and the consideration of individual on-site and small alternative technology. It suggests procedures which may be utilized to reduce the time, effort, and expense necessary to demonstrate facilities needs. It is also intended to provide guidance pertaining to the selection of alternatives for a cost-effectiveness comparison. It is not intended to allow indiscriminate definition of need based upon "broad brush" use of a single criterion.

The procedure recommended herein may not be the optimum procedure for all projects. Compliance with this analysis will be prima facie evidence for the acceptability of the "needs" portion of a proposed plan of study. If another method is proposed for obtaining and documenting the needs justification, it is recommended that the grant applicant discuss the proposed approach with reviewing authorities prior to the submission of the plan of study and the Step 1 grant application.

This guidance is predicated on the premise that planning expenditures should be commensurate with the cost and risk of implementing feasible alternatives for a specific planning area. The guidance further recognizes the complexity of planning alternative technology. It presents procedures for, and rationally limits, the amount of detailed site investigation necessary to determine the suitability of alternative technology for site specific areas within the community, and allows for a degree of risk inherent to limited data gathering.

II. Goal

The goal of this guidance is to enable the community to categorize the residences into three groups. The three groups are those residences experiencing: (a) obvious sewage treatment problems with clearly defined solutions, (b) no problem, and (c) exposure to potential problems representing a planning risk that requires resolution by the acquisition of original data.

III. Criteria for site-specific needs determination

A. Direct evidence that demonstrates obvious need due to malfunctioning systems includes:

1. Failure by surface (breakout) ponding of filter field discharges can be identified through direct observations, mailed questionnaires, and remote imagery (infrared photography).

2. Sewage backup in residences can be identified through response to mailed questionnaires, knowledge of local septage haulers, or knowledge of local health or zoning officials.

3. Detected sewage effluent or tracer dye in surface water, by means of site visit or various site effluent detection systems.

4. Flowing effluent pipe detected by remote infrared photography, site visits, knowledge of local officials, or results of mailed questionnaires.

5. Contamination of water supply wells (groundwater) can be demonstrated by sampling and analyses for whiteners, chlorides, nitrates, fecal coliform bacteria, or other indicators, and a finding of their presence in concentrations which significantly exceed background levels in groundwaters of the area or primary drinking water quality standards. Demonstration of trends toward groundwater pollution due to malfunctioning systems could aid in concluding a problem exists.

B. Indirect evidence that may demonstrate inferred need due to limitations of treatment systems includes:

1. Seasonal or year-round high water table considering possible water table mounding by residential use. Seasonal or annual water table can be determined by taking transit sightings from a known lake level, if the dwelling in question is adjacent to a lake or other surface waters. Elsewhere, Soil Conservation Service maps may indicate depth to groundwater. If these data are unavailable, soil borings may be employed during an on-site investigation described below.

2. Water well isolation distances (depending on depth of well and presence or absence of impermeable soils). Isolation distances may be addressed in part by lot size. In cases where a community water system is installed or is concurrently planned, this criterion will not be considered. Lots, including consolidated lots, which are less than 10,000 square feet in area, will be assumed to have insufficient isolation distances. However, before this criterion may be used as areawide evidence, a correlation with results of limited representative sampling which substantiate water well contamination must be made.

3. Documented groundwater flow from a filter field toward a water supply well can often override seemingly adequate separation distances.

4. Bedrock proximity (within three feet of filter field pipe) can be assessed by utilizing existing SCS soils maps. If reasonable suspicion exists that bedrock will be a site limitation and it cannot be quantified, an on-site investigation may include representative soil borings as appropriate.

5. Slowly permeable soils with greater than 60 minutes/inch percolation rate.

6. Rapidly permeable soil with less than 0.1 minutes/inch percolation rate. Soil permeability will be assessed by evaluting existing SCS soils maps and related use limitations data. Should the data be unavailable, and should other data indicate strong possibility of permeability-related lot limitations, appropriate numbers of soils borings may be made during the on-site investigation.

7. While holding tanks, in certain cases, can be a cost-effective alternative, for purposes of site-specific needs determination, a residence equipped for a holding tank for domestic sewage should be considered as indirect evidence of need for sewage treatment facilities. Location of holding tanks will be identified through records of local permitting officials, septage haulers, and results of mailed questionnaires.

8. On-site treatment systems which do not conform to accepted practices or current sanitary codes may be documented by owners, installers, or local permitting officials. This category would include cesspools, inadequately sized system components (the proverbial "55 gallon drum" septic tank), and systems which feature direct discharge of septic tank effluent to surface water.

9. On-site systems: (a) incorporating components, (b) installed on individual lots, or (c) of an age, that local data indicate are characterized by excessive defect and failure rates, or non-cost-effective maintenance requirements.

IV. Needs determination for unsewered communities

For projects in which the scope of work is difficult to assess during the Step 1 application, it is recommended that Step 1 be divided into 2 phases to more effectively allow estimation of the planning scope and associated costs. Phase I will consist of a review of existing or easily obtainable data. Phase II will consist of on-site investigation and representative sampling necessary to confirm assumptions based on indirect evidence identified in Phase I. Alternatives development for those lots determined to have need may be completed and incorporated into the facilities plan. Both phases should be addressed in the plan of study and grant application. This is discussed in greater detail below.

A. Phase I

The review of existing or easily obtainable data may include the following as appropriate:

1. A mailed questionnaire regarding each resident's knowledge of on-site system and its performance

2. Review of soils maps

3. Review of local permit records

4. Lot evaluations to estimate depth to water table (lakeshore areas)

5. Calculation of lot sizes

6. Remote photographic imagery (e.g., infrared)

7. Leachate detection sensing of ground or surface water in the area.

This preliminary data will be used to categorize each lot within the planning area into one of three groups:

1. Obvious-problem
2. No-problem
3. Inconlusive.

The "obvious-problem" group consists of those lots where at least one criterion of direct evidence of a need (specified on page 2 of this guidance) is satisfied or where, by summarizing indirect evidence validated with limited sampling, there exists a high potential that a problem does exist. (See Phase II Work, On-Site Investigation, as outlined below.)

The "no-problem" group consists of those lots where there is evidence that the present system is adequate and functioning properly and likely to continue to do so with proper cost-effective operation and maintenance, based upon the review of available information.

The "inconclusive" group consists of the remaining lots where available information does not substantiate their placement into either the "obvious-problem" or "no-problem" category.

The next step is to attempt to recategorize the "inconclusive" group into either group (a) or (b) by making reasonable assumptions based upon the inferred evidence criteria noted in Section III.B. The on-site investigation would also be the source of information on those lots where information was not previously available.

For example, on-site systems located on lots with apparent continuous high groundwater and very tight soils could be placed in the "obvious-problem" category, even though there is no direct evidence of failure. The on-site investigation, however, should validate the assumption by representative sampling to confirm that indeed there is high groundwater and tight soils in this area and obtain further information that this is causing a problem with on-site systems.

In addition, it may be necessary to gather field data on a minimum number of lots where the evidence is not available to substantiate the placement of these lots into either the "no-problem" or "obvious-problem" group.

Indirect evidence, which is based primarily on construction standards, generally identifies lots which probably do not have adequate on-site systems. This probability is verified by a small amount of on-site investigation as explained in Phase II. Indirect evidence does not identify lots which have no site limitations but which in fact do not have an adequate operating system. The use of indirect evidence, alone, may result in the erroneous conclusion that the on-site system is adequately operating. This situation is especially prevalent in areas with high percolation rates, where system failure is not evident to the observer. Thus, a sampling program should consider, to some extent, lots that exhibit no indirect evidence of need.

B. Mid-Course Review

At the end of Phase I, the results of the Phase I effort should be presented for review and concurrence before proceeding to Phase II. The Mid-Course Meeting facilities plan review is an appropriate time for the presentation and discussion of the Phase I results. Phase II will consist of on-site investigation and sampling, alternative development for specific need areas and completion of the facilities plan.

The following should be considered at the Mid-Course Meeting:

1. It may become apparent during Phase I that on-site alternative technology systems will not approach the cost-effective solution for the substantially defined obvious used area. In this case, a preliminary cost estimate for conventional collection and treatment should be compared to that for the innovative/alternative treatment solution. If cost estimates and technical analysis indicate that the use of alternative technology is not cost-effective, the analysis may be terminated and a cost-effective collection and treatment solution developed without proceeding into the on-site investigation of Phase II. This would also apply in areas where a substantial obvious need has been

justified, where a high concentration of dwellings occur in a municipality, and where on-site systems would not be a viable solution because of site limitations. Any such exclusion of on-site treatment should be clearly quantified and supported by documentation in accordance with PRM 78-0 and PRM 79-8.

2. The number of lots to be investigated during the on-site evaluation should be reasonably estimated. If the original estimation of on-site work included in the Step 1 Grant Agreement is found to be in error at the end of the preliminary evaluation (Phase I), a request to amend the grant amount, if necessary, may be submitted and a grant amendment expeditiously processed provided there is concurrence at the Mid-Course Meeting.

3. The manner of presenting this data in the Facilities Plan is discretionary, although it should be clearly apparent to anyone reading the Facilities Plan upon what basis a given residence was determined to have or not have a need for wastewater treatment. Should need be demonstrated for a given residence, sufficient information should be acquired to determine potential treatment alternatives. (For example, if a residence is determined to need treatment facilities on the basis of an illegal discharge of septic tank effluent, additional information will be required to determine if any limitations to on-site treatment exist.)

C. Phase II work

Indirect evidence requires reasonable verification in order that a lot be placed into the "obvious-need" category. This is accomplished by identifying combinations of indirect evidence criteria that indicate an increased risk or potential of a problem, and representative sampling. Sampling results supporting a significantly increased risk justify placement of a lot into the "obvious-need" category.

For example, an on-site system located on a lot with marginal soils (i.e., a percolation rate of about 60 minutes/inch) would be considered a low risk situation. If, however, this same lot has adjacent lots with direct evidence of malfunctioning systems and has a short-duration of seasonal high groundwater, for example, the combining of low risk factors elevates the net risk to a high risk situation. After representative sampling of these parameters during the on-site investigation to confirm these assumptions, placement of all similar lots into the "obvious-need" category can be made.

Representative Sampling Method

The planning of representative sampling should address the following considerations on the basis of Phase I results:

1. Delineate areas that exhibit indirect evidence and/or inconclusive need.

2. Delineate areas, if possible, that exhibit one or more common limiting physical parameters that may be associated with a type of indirect evidence of need.

3. Sample to confirm the assumed physical constraint for on-site sewage treatment or the indirect evidence of need and correlate with actual occurrence of wastewater treatment deficiencies. The number of lots, public areas, or rights of way adjacent to private lots exhibiting inconclusive or indirect evidence of need that are to be further analyzed normally should not exceed 30% but should be at least 15% of the total lots within a discrete area assumed as exhibiting an inconclusive need or indirect evidence of need. Measurable constraints to sewage treatment may be: high groundwater and its depth, predicted duration and recurrence interval, groundwater flow direction and velocity, depth to bedrock, highly permeable or impermeable soils that do not allow for treatment, and the physical condition of existing on-site systems. Sampling may be random or stratified according to the requriements of the analytical design selected as appropriate to test the strength of an assumption. In any event, decisions about what is to be sampled, the sampling design, and the size of the sample should meet the test of cost-effectiveness.

4. Water quality parameters that can be evaluted and utilized as pollution indicators include, but are not limited to: chlorides, nitrates, phosphate, fecal coliform, surfactants, whiteners, and other synthetic organics inherent to domestic wastewater.

5. The analysis should be completed and study areas classified as exhibiting direct evidence of pollution problems, indirect evidence of pollution problems, the combination of direct and indirect evidence, and no need. If, after the Phase II analysis is completed, discrete areas of the Plan of Study Area (POSA) remain inconclusive as to evidence of need, no need may be construed for those areas.

V. Planning for treatment alternatives

Based upon data assembled during Phase I and Phase II, residence should be categorized as follows:

A. Residences having adequate treatment facilities (no-problem).

If a conveyance system determined to be cost-effective to transport wastewater passes a lot that has no need for sewage treatment, there will be no limitations on hookups to the sewer. However, a sewer will not be funded by EPA if the sewer is purposely routed to areas exhibiting no need.

B. Residences not having adequate treatment facilities.

1. Capable of on-site upgrading of septic tank and filter field (standard system).

2. Capable of on-site upgrading with non-standard on-site treatment.

3. Not capable of on-site upgrading (treatment must be off-site).

Preliminary alternatives to be compared for cost-effectiveness should include a combination of selective no-action, on-site upgrading, and off-site treatment alternatives. For each discrete area, the generally determined generic alternative should reflect the specific need defined by the common physical limitation of the discrete area.

Standard system ypgrading is defined as expansion of an existing filter field, construction of a filter field, repair or replacement of defective components or construction of an entire on-site system in compliance with approved specifications. This alternative is viable where lot limitations such as small size or slow percolation would not preclude it.

Non-standard on-site system upgrading may include a mounded filter field, alternating beds, pressure distribution systems, aerobic systems, sand filters, and other alternatives permissible under the State and local code. These should be considered where lot size and water well isolation distances are adequate, and where other limitations such as high groundwater and slow percolation preclude standard systems. Off-site treatment such as cluster systems should also be considered in such cases, and possibly graywater/blackwater separation.

Septic tank replacement should be considered only as necessary. For purposes of cost-effectiveness calculations, the number of septic tanks requiring replacement should be estimated on the basis of permits issued and knowledge of local septic tank pumpers and installers regarding the type, life, age, and condition of existing installations. Information on the size and condition of the current treatment systems, gathered during home-to-home interview surveys, sampling, and inspections, should also be used. For those systems for which information pertaining to septic tank conditions cannot be obtained, cost-effectiveness calculations should should assume 100% replacement.

When a system is found to be malfunctioning on the basis of direct evidence, information pertaining to lot limitations must also be obtained. This information should be sufficient to allow for alternatives planning, and should include all relevant parameters listed under Item III.B of this memorandum.

Limitations on Planning

Estimation of the cost-effectiveness of on-site treatment in general, and of particular types of on-site treatment, should be based on information acquired during Phase I and Phase II, including any representative sampling. Only the limited amount of on-site investigation, normally less than 30% of the total lots that exhibit inconclusive need and/or indirect evidence of need, should be conducted in the Phase II portion of the Step 1 grant.

When generic on-site solutions are generally determined for discrete areas, it is contemplated that it will normally be cost-effective to specify construction requirements through the use of generic component designs; plans; performance, quality, and workmanship specifications; and unit price/estimated quantity procurement.

Field work necessary to select the design of individual drainfields including on-site soil borings, percolation tests, surveying, work to specifically identify present septic tank and soil absorption field location and inspection is generally to be viewed as Step 3 work. For practical purposes, site specific design and construction should normally proceed in tandem on a lot-by-lot and area-by-area basis. The establishment of a management district's authority must be completed before a Step 2 or 2+3 award. The development of a management district's program must be completed before a Step 3 grant award or before authorization to proceed with construction procurement is granted under a Step 2+3 grant.

VI. Public participation

The following comments are intended to demonstrate how this guidance relates to the standard requirements for public participation. It is not all inclusive.

A. A useful "mailing list" may include all owners of residences within unsewered areas in the planning area and other interested and affected parties.

   The requirement for consulting with the public set forth in 40 CFR 35.917-5(b)(5) will be considered satisfied if questionnaires are submitted by individuals on the "mailing list."

B. The public meeting required by 40 CFR 35.917-5(b)(6) provides an opportunity for property owners to be informed of whether or not they have been found to need wastewater treatment facilities. During the meeting they can respond to the consultant's determination of their need status. A map with each lot designated as no-need, obvious-problem, or inconclusive would be helpful for public understanding. This meeting could be conveniently scheduled at the end of Phase I.

C. The final public hearing required by 40 CFR 35.917-5 should be scheduled at the end of facilities planning.

C

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON D.C. 20460

JUL 16 1980

OFFICE OF WATER
AND WASTE MANAGEMENT

MEMORANDUM

SUBJECT: Access and Control for On-Site System Upgrading

FROM: William A. Whittington, Acting Director
Facility Requirements Division (WH-595) William A. Whittington

TO: Charles Sutfin, Director
Water Division, Region V

Thank you for your inquiry of June 16, 1980, regarding the possibility of grant applicants meeting the requirement for "access and control of" on-site wastewater treatment in compliance with PRM 79-8, 40 CFR 35.918-1(h) and 40 CFR 35.935-3(b)(3), through county or municipal ordinance, using public health and police powers to allow access, inspection and the right to require upgrading of on-site systems.

EPA regulations requiring the Regional Administrator to determine that interests in the land are sufficient to assure undisturbed use and possession for the purpose of construction and operation for the life of the project have been satisfied by the use of perpetual or life-of-the-project easements or other binding convenanis running with the land.

In our opinion, an ordinance which would assure the grantee a perpetual (or life-of-project) and assignable right of unlimited access to each individual system at all reasonable times for such purposes as inspection, monitoring, construction, maintenance, operation, rehabilitation and replacement could be used to satisfy EPA funding requirements for "complete access to and control of wastewater treatment works on private property. . .". Of course the use of any such ordinance should be approved on a "by project" basis.

We would appreciate receiving samples of any ordinances you may develop as this may prove to be a very effective means for providing the required access for these on-site systems.

APPENDIX C

EPA Memo on Access and Control for On-Site System Upgrading

APPENDIX D

Septic Leachate and Groundwater Flow Survey -
Steuben Lakes, Indiana
August 1979

1.0 INTRODUCTION

Previous investigations of the Steuben Lake study area on-site septic systems have revealed little degradation of surface or groundwaters in the project area (EPA, 1979). Groundwater throughout the region is of the calcium magnesium bicarbonate type, very hard with a high iron content which becomes solubilized under reducing conditions. This chemical composition of the natural waters promotes rapid precipitation of soluble phosphorus compounds.

A previous late fall septic leachate survey was conducted along the shorelines of Charles Lake, Little Otter Lake, Big Otter Lake, Snow Lake, Lake James, Crooked Lake and Lake Gage of the Steuben Lakes region (KVA, 1979). Only 65 septic leachate groundwater plumes and four stream source plumes were found entering the lakes. The total of 69 plumes was a very small number of plumes in comparison with the estimated 3,494 lakeshore residences lying within the proposed sewer service area (EPA, 1979). The frequency of the plumes was directly related to the soils classification (Figure 1). The majority of the plumes, 41 of 69, was associated with moderately rapid and rapidly permeable soils or occurred in cut and fill canal regions of uncertain soil type (Figure 2).

The most substantive inputs of phosphorus related to wastewater have been identified with a large plume of bog-like leachate issuing from Marsh Lake through Little Otter Lake, Big Otter Lake, Snow Lake, and finally dissipating in the upper basin of James Lake (KVA, 1979). The path of the stream source plume corresponded to a noticeably high level of total phosphorus ranging from 0.096 mg/l at the entrance of Little Otter Lake to 0.011 at the discharge from James Lake to Jimmerson Lake (Figure 3). The trophic analysis

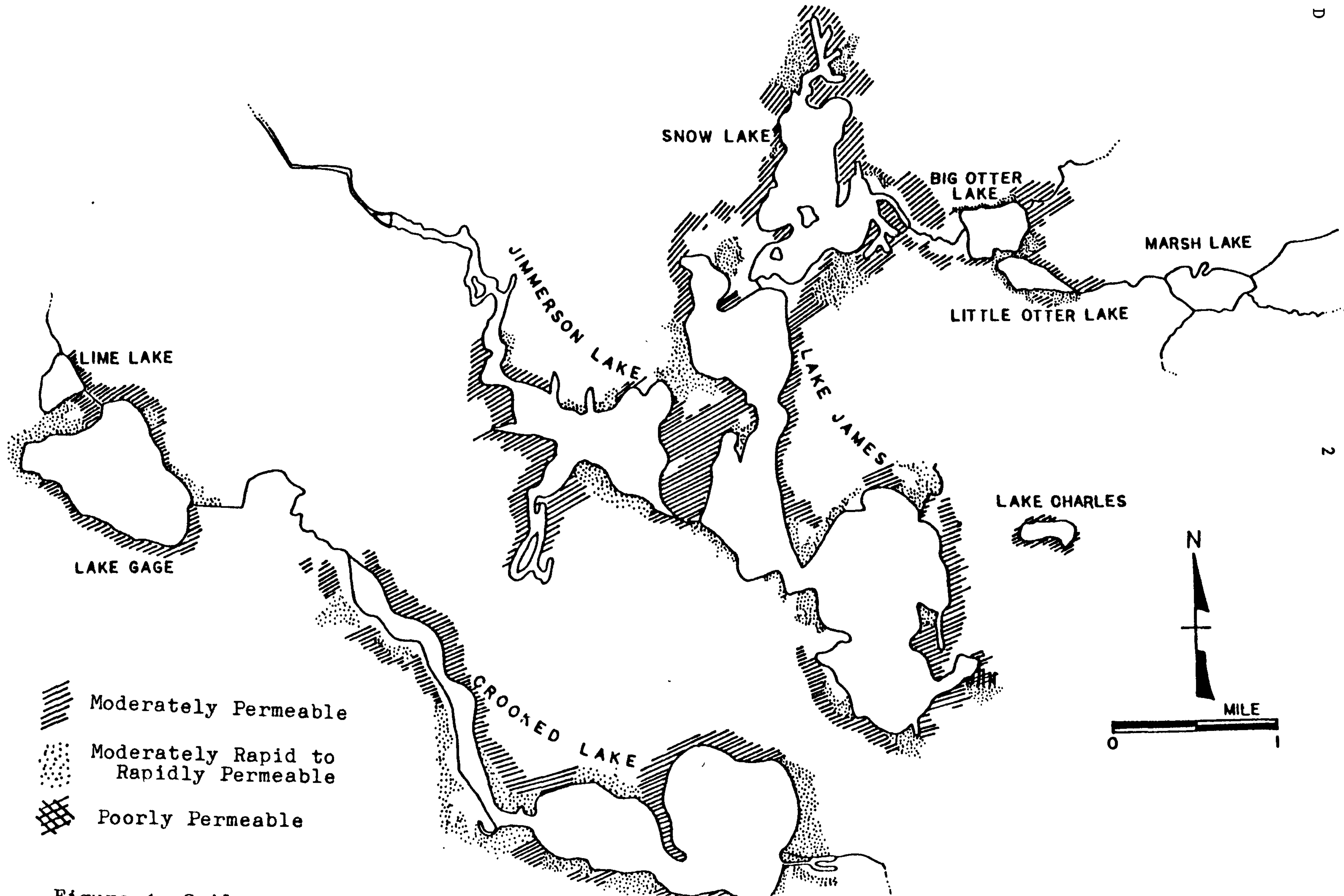

Figure 1. Soil types in the Steuben Lakes area

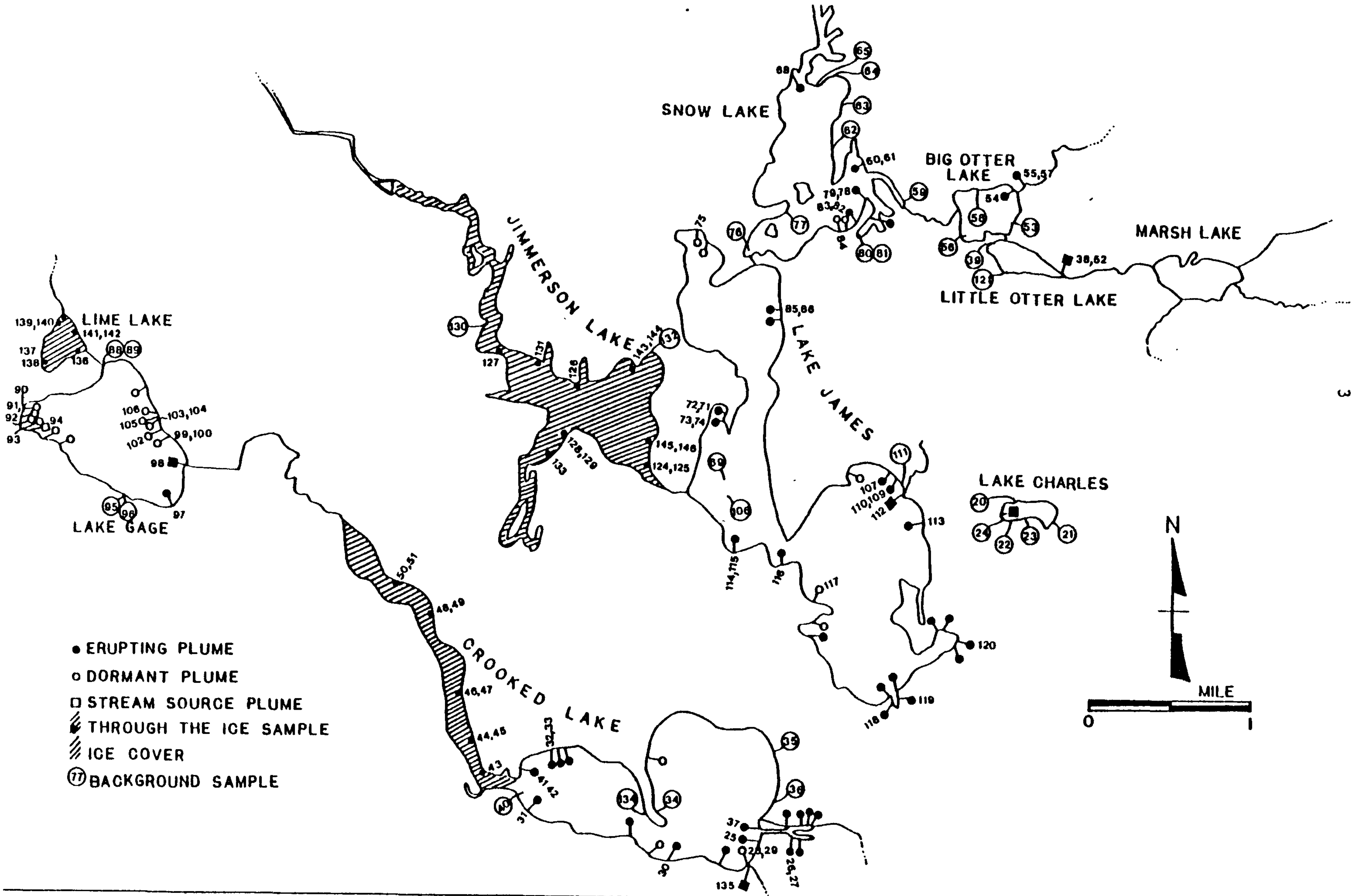

Figure 2. Plume locations in the Steuben Lakes region. KVA Septic Leachate Survey - December 1978

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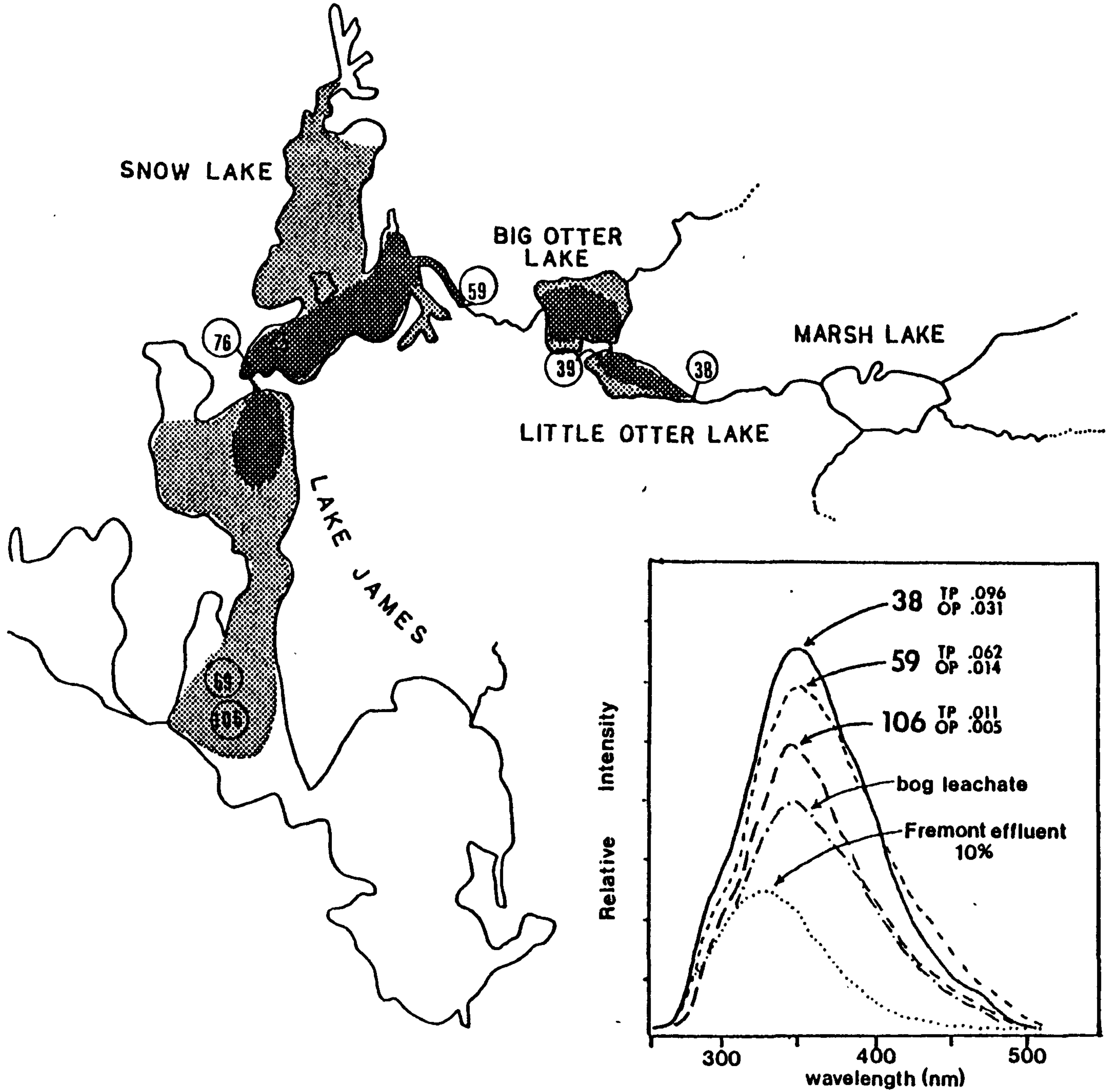

Figure 3 . Large bog-like plume path through the Steuben Lakes.

KVA Septic Leachate Survey - December 1978 of the lakes, based upon Dillon's model (1975) projected Marsh Lake, Big Otter Tail Lake, Snow Lake, and James Lake as eutrophic in status with significant input from the single stream source (EPA, 1979).

Some public comments were reeeived that the late fall survey may not have been conducted during the period of year most conducive to detecting failures. Summer loadings from seasonal dwellings usually peak during the late August period and traditional overflow failures may be more common at this time. Ironically, past studies of septic leachate plume emergence have found the highest discharge frequency during late fall or early winter, corresponding to the delay of travel of peak summer loadings through soil before shoreline emergence.

To provide a comparison to the late fall study, during August 1979 K-V Associates, Inc. conducted a septic leachate survey along the shorelines of James Lake, Crooked Lake, and Jimmerson Lake of the Steuben Lakes region. Continuous leachate transects were performed on these three lakes along with pertinent groundwater flow measurements to establish the general inflow pattern of these three lakes as well as Lake Gage, Snow Lake, Little and Big Otter Lake. The August period represents the time of heaviest recreational usage of the local water resources. More than 76% of the total on-lake summer population around these lakes is seasonal (16,681 total residents with 12,731 seasonal units in 1976) (Wapora 1979). The purpose of the study was to compare the frequency of discharges during summer to that found earlier during December.

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While the late fall - early winter period is usually an optimal period for observing the seepage of slowly moving groundwater leachate discharges resulting from midsummer on-site septic system loadings, temporary traces of summer overflow failures might be obscured by such time. Previous bacteriological sampling of the lake shorelines during December revealed very few locations with fecal contamination shown by the presence of fecal coliforms. Only three locations exceeded the limit of 200 fecal coliform organisms/100 ml, although elevated concentrations ($\geq$100 organisms/100 ml) were found in canals on the eastern shore of Crooked Lake and on the stream linking Crooked Lake and Lake Gage.

2.0 METHODOLOGY

K-V Associates, Inc. equipment employed in this survey included a portable battery-powered septic leachate detector (ENDECO Type 2100), a portable well point sampler, and the K-V Associates Model 10 Dowser™ groundwater flow meter. The general procedure has been described previously (Kerfoot and Skinner, 1979; KVA, 1979). A dual channel system recorded conductivity and UV fluorescence of background and discharges along the shallow lake perimeters. The septic leachate detector is calibrated against stepwise increases of wastewater effluent from a local sewage treatment plant, added to the local lake water.

The intake probe of the leachate detector is placed in the lake water along the shoreline in a vacuuming-like manner as the boat progresses. The common procedure is to scan the shoreline bottom in depths from 1 to 3 feet (1 meter or less) and draw in shallow groundwater inflow through the lake bottom. Even though septic installations some distance back from the shore may create discharges in water depths greater than 3 feet (1 meter), usually some seepage to the surface is apparent. By driving the groundwater sampler beneath the shallow bottom and probing vertically, the operator can locate the core of the deeper plume sample without having to make time-consuming transects out from shore through deeper waters. Both ground and surface water samples collected from plume locations were filtered to .40 um and acidified to pH 2. Samples were placed in chilled coolers and shipped to WAPORA, Inc. in Cincinnati, Ohio for nutrient analysis. The Indiana State Board of Health in Indianapolis provided fecal coliform bacteria analysis.

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2.1 Types of Plumes

2.1.1 Groundwater Plumes

Three different types of groundwater-related wastewater plumes are commonly encountered during a septic leachate survey: 1) erupting plumes, 2) dormant plumes, and 3) stream source plumes. As the soil becomes saturated with dissolved solids and organics during the aging process of a leaching on-lot septic system, a breakthrough of organics occurs first, followed by inorganic penetration (principally chlorides, sodium, and other salts). The active emerging of the combined organic and inorganic residues into the shoreline lake water describes an erupting plume. In seasonal dwellings where wastewater loads vary in time, a plume may be apparent during late summer when shoreline cottages sustain heavy use, but retreat during winter during low flow conditions. Residual organics from the wastewater often still remain attached to soil particles in the vicinity of the previous erupting plume, slowly releasing into the shoreline waters. This dormant plume indicates a previous breakthrough, but sufficient treatment of the plume exists under current conditions so that no inorganic discharge is apparent. Stream source plumes refer to either groundwater leachings or near-stream septic leaching fields which enter into streams which then empty into the lake.

2.1.2 Runoff Plumes

Traditional failures of septic systems occur in tight soil conditions when the rate of inflow into the unit is greater than the soil percolation can accomodate. Often leakage occurs around the septic tank or leaching unit covers, creating standing pools of poorly-treated effluent. If sufficient drainage is present, the effluent may flow laterally across the surface into

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nearby waterways. In addition, rainfall or snow melt may also create an excess of surface water which can wash the standing effluent into water courses. In either case, the poorly-treated effluent frequently contains elevated fecal coliform bacteria, indicative of the presence of pathogenic bacteria and, if sufficiently high, must be considered a threat to public health.

3.0 COMPARATIVE RESULTS

This survey was conducted in an attempt to determine if heavy summer loading would increase the frequency of discharge plumes previously observed during an early winter survey in December, 1978 (K-V Associates, 1979). The following is a lake-by-lake comparison of effluent plumes, nutrient loading, and bacterial content of the summer survey versus the winter septic leachate survey. See Tables 1 and 2 for nutrient analyses, Table 3 for bacterial analyses and Figure 4 for plume locations and sample sites of the August, 1979 leachate survey.

3.1 Crooked Lake

Nutrient analyses of Crooked Lake water samples taken during the summer and winter months showed characteristics very similar to previous analyses. Plumes were found concentrated in canal or stream areas. Total phosphorus concentrations appeared to be slightly lower during the summer survey. Levels of phosphorus were generally less than .01 mg/l during August and were above this in most cases in December. Nitrates also proved to be equivalent between the two seasons, with the results averaging around .15 mg/l.

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Table 1 Analysis of Surface Water (S) and Groundwater (G) Samples Taken Around the Periphery of Crooked Lake, Indiana, August 1979.

Sample Numbers	Bkg/Ctr	TDS ppm	Ortho PO_4 as P ppm	Total P ppm	NO_2-N ppm	NO_3-N ppm	NH_3-N ppm	Organic N ppm	Cl- ppm	Na ppm	Fe ppm	Comments
Crooked												
1S		343	<.01	<.01	<.01	.01	<.03	.57	76	43	110	Center basin 1
2S		324	<.01	<.01	<.01	.02	<.03	.68	76	43	90	Gold Coast
2G		717	.50	.52	<.01	.01	2.08	10.4	133	175	17,500	
3S		327	<.01	<.01	<.01	.02	<.03	.72	76	41	60	House #248
3G		744	<.01	<.01	<.01	.05	1.70	1.90	183	59	5,500	
4S		486	<.01	<.01	.01	.14	.04	.96	95	60	750	East end canal, north fork
4G		529	.01	.02	.01	.07	.98	60.4	39	65	11,700	
5S		444	<.01	<.01	.02	.67	.08	.18	72	43	750	East end canal, south
5G		1089	<.01	<.01	<.01	.01	.18	1.07	336	165	3,500	
6S		421	.07	.08	<.01	.39	<.03	.37	88	60	630	4-H Park Stream
6G		570	<.01	<.01	<.01	.04	1.78	1.82	66	31	10,400	
7S		334	<.01	<.01	<.01	.02	<.03	.68	77	44	500	Lagoon - basin 2
7G		459	<.01	.01	<.01	.02	2.75	24.4	75	37	122,000	
Jimmerson Lake												
8S		244	<.01	<.01	<.01	.02	<.03	.50	30	13	630	Center
9S		263	<.01	<.01	<.01	.01	<.03	.74	30	16	130	Ebhart's
9G		573	.02	.03	<.01	.07	22.2	10.3	6	5	16,500	
10S		260	<.01	<.01	<.01	.01	<.03	.68	30	17	90	West shore
10G		378	<.01	<.01	<.01	<.01	1.75	2.95	12	7	5,400	
11S		267	<.01	<.01	<.01	.01	<.03	.62	31	17	190	Stoner's
11G		325	<.01	<.01	<.01	<.01	<.03	.36	2	5	3,600	
12S		251	<.01	<.01	<.01	.01	<.03	.60	32	17	30	March by 300 W
12G		694	<.01	<.01	<.01	.01	10.8	1.20	22	12	3,900	
13S		269	<.01	<.01	<.01	<.01	<.03	.68	30	17	30	Canal - northeast bay
13G		359	<.01	<.01	<.01	.30	.76	.49	8	4	1,400	
14S		263	<.01	<.01	<.01	.01	<.03	.74	28	15	90	Marsh south west bay
14G		368	<.01	.01	<.01	.02	1.90	3.60	9	5	33,000	
James Lake												
15S		262	<.01	<.01	<.01	.01	<.03	.56	32	18	90	Middle basin
16S		270	<.01	<.01	<.01	.01	<.03	1.48	61	18	90	Upper basin
17S		278	<.01	<.01	<.01	.02	<.03	.50	31	17	160	Middle basin #2726
17G		555	<.01	<.01	<.01	.08	26.0	2.00	17	10	10,600	
18S		257	<.01	<.01	<.01	.02	<.03	.70	31	17	190	Middle basin east shore
18G		273	<.01	<.01	<.01	.01	.03	3.30	27	17	2,000	
19S		254	<.01	<.01	<.01	.01	<.03	1.60	52	17	320	Upper basin east shore
19G		408	<.01	<.01	<.01	<.01	.37	18.8	23	7	14,200	
20S		243	<.01	<.01	<.01	.02	<.03	1.38	56	18	270	Upper basin west shore
20G		353	<.01	<.01	<.01	<.01	<.03	3.60	3	4	10,400	
21S		266	<.01	<.01	<.01	.01	<.03	.60	30	17	160	Spring Pt. Canal
21G		289	<.01	<.01	<.01	.01	.14	15.4	3	15	2,100	
22S		261	<.01	<.01	<.01	.02	<.03	.87	28	15	130	Lake James Marina
22G		468	<.01	.01	<.01	<.01	14.0	10.5	26	15	13,300	
23S		257	<.01	<.01	<.01	.02	<.03	.37	30	18	130	Potawatamee Canal
24S		304	<.01	<.01	.01	<.01	.05	1.85	30	17	1,600	Beyond bridge Lagoon Bay
24G		648	.02	.04	.04	.50	30.0	17.5	15	14	194,000	
25S		259	<.01	<.01	.01	.01	<.03	.80	31	17	500	Near Red Sand Beach
25G		453	<.01	<.01	.01	.01	2.30	5.00	45	26	11,500	
26S		328	<.01	<.01	.01	.01	<.03	.88	49	29	600	Canal before Potawatamee
26G		700	<.01	.02	.01	<.01	62.0	68.5	26	18	37,800	
27S		259	<.01	<.01	.01	.01	<.03	1.15	57	19	90	Upper basin - north shore
27G		286	<.01	.01	.01	.01	.65	3.45	49	17	3,500	
28S		286	<.01	<.01	.01	.01	<.03	1.32	56	22	130	Snow Lake inlet
29S		257	<.01	.01	.01	.01	<.03	1.34	63	18	90	Pokagon View
30S		264	<.01	<.01	.01	.03	<.03	1.37	67	19	470	Upper basin - west shore
30G		412	<.01	<.01	.03	.41	<.03	1.28	73	6	300	

Table 2. STEUBEN LAKES: Distribution of Leachate Plumes

LAKE	TYPES OF PLUMES					
	Erupting		Passive		Stream Source	
	1978	1979	1978	1979	1978	1979
Little Otter	--	ns	--	ns	1	ns
Big Otter	2	ns	--	ns	--	ns
Snow	5	ns	2	ns	--	ns
James	18	17 (7)	5	7 (1)	1	1 (1)
Crooked (1st & 2nd Basins)	16	3 (2)	3	1	1	1 (1)
Gage	1	3 (2)	13	ns	1	ns
Jimmerson	ns	4	ns	5	ns	--
Crooked (3rd Basin)	ns	--	ns	3	ns	--
TOTAL	42	24 (9)	23	16 (1)	4	2 (2)

() = Repeats of Previous Locations

ns = not sampled

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Table 3. Bacterial count of shoreline water samples of Crooked and Jimmerson Lakes, Steuben County, Angola, Indiana. August, 1979.

Lake	Station	Fecal Coliform No/100 ml	Location
Crooked Lake	B1	270	4-H Park stream
	B2	430	East end canal, Lot #1428
	B3	50	East end canal, inlet stream
	B4	80	East end canal, north fork
	B5	<10	Sunset Inn
	B6	<10	Second basin lagoon
	B7	100	Oak Grove Resort
	B8	<10	#168 Moser
	B9	10	3rd basin, end of road 425 west
	B10	20	3rd basin, lot #2814, marshy canal
Jimmerson	B11	270	Bledsoe Trailer Park, #A-18
	B12	<10	East corner, near lot #8485
	B13	0	North end channel
	B14	<10	Trailer Park north
	B15	10	Northwest outlet of lake
	B16	<10	Oak Shores Rd., opposite farmlands
	B17	100	Speculation house in development tract
	B18	<10	Tanglewood subdivision, Bobays
	B19	<10	Hilltop Trailer Park, south cove
	B20	70	Marshy canal, east end of south shore

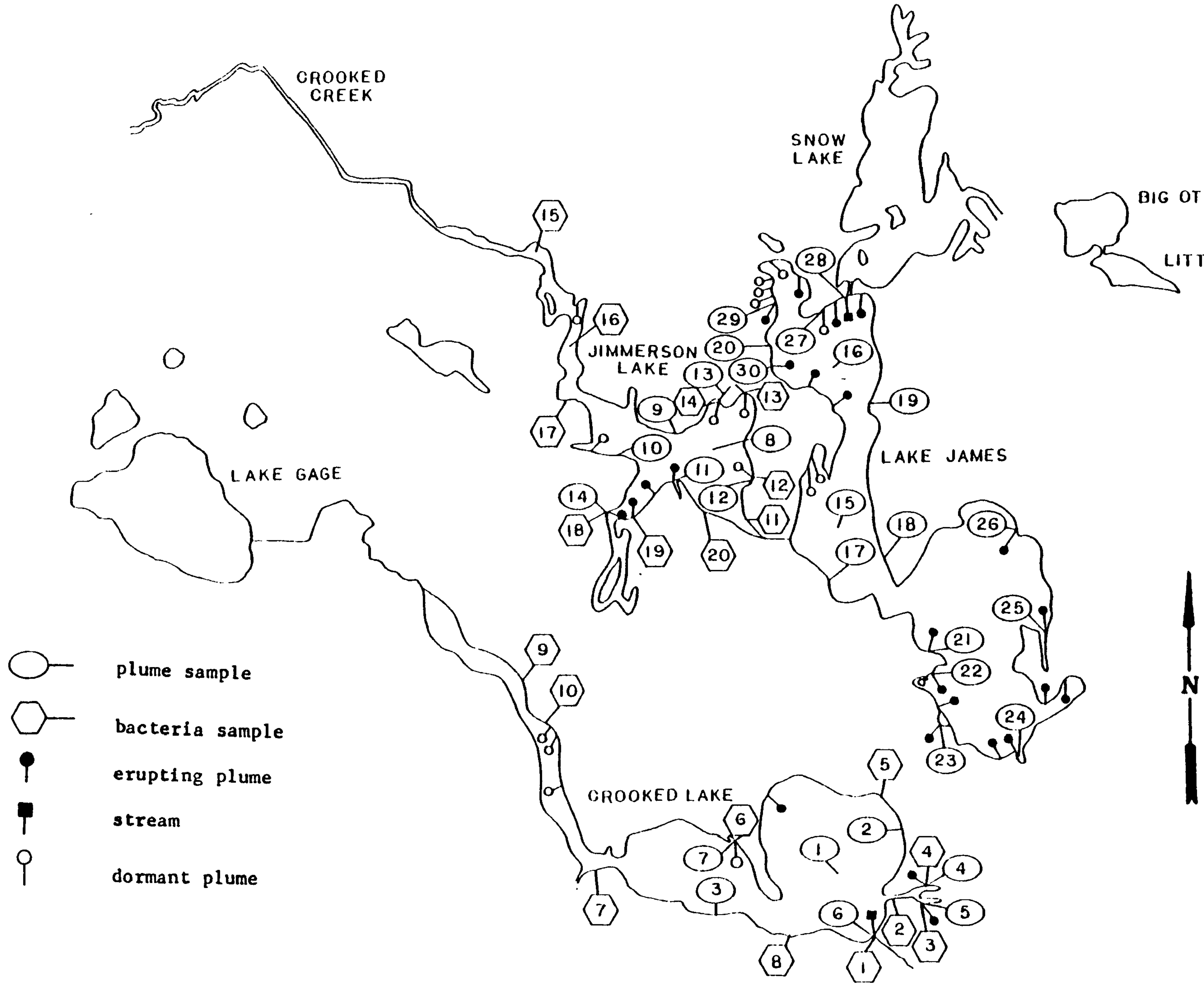

FIGURE 4 - PLUME LOCATIONS ON STUEBEN LAKES - AUGUST 1979

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Most surface water samples were found to contain around .03 mg/l of ammonia-nitrogen during the summer survey. In winter conditions, ammonia-nitrogen levels of water samples ranged between .1 and .2 mg/l. Groundwater samples were found to contain higher levels of ammonia-nitrogen (NH_4-N) during the summer, falling within the range of 1 - 3 mg/l.

Levels of fecal coliform bacteria in surface waters were shown to be slightly higher in August, 1979. In December, only one of the 10 samples was higher than the State's maximum safe level of 200 organisms/100 ml of water. In the August sampling period, two sites (the 4-H Park Stream and the Canal in Steuben County Park) were found with greater than 200 organisms/ 100 ml water and the remaining eight samples averaged about 36 cells/100 ml water.

3.2 Jimmerson Lake

As was the case with Crooked Lake, Jimmerson Lake exhibited almost no noticeable difference in the nutrient content of most samples taken at the two times of the year. The levels of total phosphorus (TP) and ammonia-nitrogen (NH_4-N) in the surface waters were very similar. Total phosphorus averaged .01 mg/l for both time periods while mean values of about .03 and .05 mg/l were shown for ammonia-nitrogen during the summer and winter collections respectively. However, groundwater levels of ammonia-nitrogen were noticeably higher during the summer survey. The highest concentration found in the winter survey was 1.49 mg/l and all other samples were below .1 mg/l. During the summer, 50% of the samples taken were above 1.0 mg/l with a high level of 22.2 mg/l at a nominal background site of muck bottom along the north shore. The high groundwater concentrations of ammonia-nitrogen apparently did not correlate with plume locations. Nitrate-nitrogen concentrations increased during winter with .01 mg/l or less during the summer, and a mean concentration of .048 mg/l during the winter survey.

Ten locations were sampled for bacterial content during summer, compared to nine the previous December survey. Bacteria levels were 10 or fewer fecal coliform organisms/100 ml water at both times of the year with the summertime exceptions of 270 near Bledsoe Trailer Park and 100 organisms/100 ml water in a marshy canal near a development on the west shore.

3.3 Lake James

Again, as in the other two lakes, locations and frequency of plumes closely coincide, and only minor or occasional variations could be observed for each time of the year. Only a slight reduction in total phosphorus could be seen from the summer surface samples when consistent concentrations of less than .01 mg/l were observed compared to levels averaging just over .01 mg/l in winter. Average levels of ammonia were observed to be about 2 mg/l in winter and 10 mg/l in summer for groundwater plume samples taken from canals, harbors, and sheltered or semi-enclosed small bays, particularly the Lagoona Bay, Lake James Marina and Red Sand Beach areas. The higher levels found during the August survey included one sample from a canal below Pokagon State Park on the northeast shore (lower basin) which registered as high as 62 mg/l. Nitrate concentrations correlated very closely between the two seasons. Levels of fecal coliform bacteria were not analyzed on Lake James due to a delay in sample transit to the laboratory.

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4.0 GROUNDWATER FLOW DETERMINATIONS

The field team made measurements at 76 sites around seven lakes to determine the rate and direction of shallow groundwater flow at the near-shore water table surface. Lakes included in this survey were Gage, Big and Little Otter, Snow, Crooked, Jimmerson and James. Flow vectors pointed into the lake for most north and eastern shores, indicating a net westward procession. Tight soils, notably clay and dense mucks around the Otters and Snow Lake preempted any discernable readings at several locations. Because of unfavorable terrain considerations, we could not take data on the many canal embankments. Flows were usually less than 10 feet per day (see Figure 5 and Table 4).

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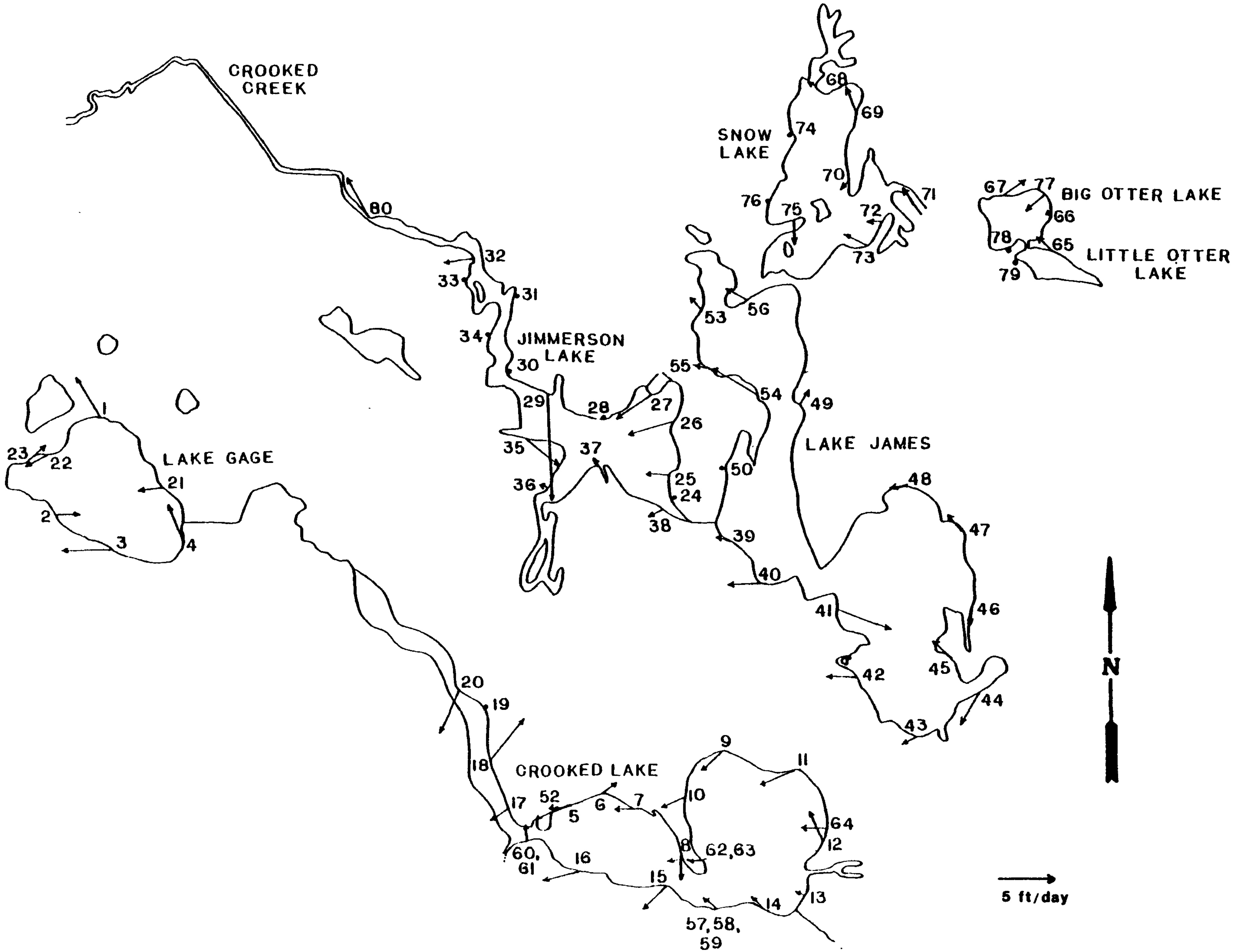

Figure 5 - Direction and rate of Groundwater Flow at selected stations around the Steuben Lakes Shoreline, August 1979

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Table 4. Observed rates of groundwater flow

Station	Location	Flow Direction	Flow Rate FPD
Lake Gage			
1	#227	330° NW	9
2	#222 Lake Gage Dr.	90° E	5
3	#97	270° W	10
4	#144	335° N	9
21	#236 High Vu Camp entr.	265° W	4
22	#194 Lake Gage Rd.	250° W	5
23	#169 Keirns (Lake Gage Rd.)	50° NE	4
Little Otter Lake			
65	Boat Rental site	315° NW	4
79	Opposite Sta 78 (Big Otter)	2-4' deep dry holes (no water)	
Big Otter Lake			
66	Cranston Development	225° SW	1
67	Lot 12 + 13	60° NE	5
77	Cranston Development	225° SW	6
78	Near Little Otter (S. shore)	hard rock fill - could not dig down	
Snow Lake			
68	#250	300° NW	2
69	#303 Roebels	340° N	6
70	#376	215° SW	3
71	#438 Sprague Addition	325° NW	4
72	#495 Sprague Addition	275° W	3
73	#510 Next to canal	295° W	5
74	#126 Morley Addition	No flow through muck	
75	Deer Island	185° S	4
76	Pokagon Estates	dry holes to 3'	no flow
Crooked Lake			
5	#308	245° W	7
6	#1008	50° NE	3
7	First house on canal	270° W	5
8	#906	180° S	5
9	#740	235° SW	5
10	#830 Doty	235° SW	5
11	Opposite Sunset Inn	245° W	7
12	#810	330° NW	6
13	Public Beach	285° W	2
14	#142	305° NW	4
15	#220	225° SW	6
16	#326 Laubers	255° W	7
17	#1919 Gremaux	230° SW	4
18	3rd basin east side	35° NE	10
19	#2430	No flow	no water readings

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Table 4. (Continued)

Station	Location	flow Direction	Flow Rate FPD
Crooked Lake			
20	#2821	210° S	8
51	#1122 Burkett (site A)	280° W	4
52	#1122 Burkett (site A)	250° W	1
57, 58	#168 Moser (site B)	300° W	4
59	#168 Moser (site B)	270° W	2
60, 61	Oak Grove (site C)	355° N	3
62, 63	#894 (site D)	255° W	3
64	Garner (site E)	265° W	5
Jimmerson Lake			
24	Trailer park	no flow	no water measured
25	North end of trailer pk.	270° W	4
26	#8306 County 300 W	250° W	9
27	Point between canal N. shore	235° SW	9
28	#6804	no water	-
29	North shore W. end	175° S	20
30	North shore W. end	-	-
31	North shore S. of Crooked	-	-
32	#4521	265° W	6
33	West shore	no water	-
34	West shore	no water	-
35	#3030 Targlewood Seibert	130° SE	8
36	Southwest shore	290° W	2
37	Near a point	335° NW	2
38	#1043	250° W	3
80	#144 S. end of Crooked	390° N	9
Lake James			
39	#2828	300° W	3
40	N. basin-SE shore	270° E	7
41	#2348 Spring Pt.	110° E	11
42	#1866 Potawatamee Acres	275° W	5
43	S. basin-South end	250° W	3
44	#1306 Savles Bay	210° SW	7
45	#1052 Nelson	315° NW	5
46	#738 Glen Eden	195° S	3
47	#39 W - Elen Eyer	320° NW	4
48	Potawatamee Inn	265° W	3
49	Pokagon Beach	35° NE	3
50	#3152	dry hole	no water
53	#4064 Pokagon View	320° NW	3
54	#3490	295° W	11
55	Phillips Bay	285° W	3
56	N. basin-North End	295° W	5

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5.0 DISCUSSION

Two types of possible problems are common to on-site systems: hydraulic failures and qualitative failures. The categories can be defined thusly:

1. A hydraulic failure of the leaching system refers to a system backup causing poorly-treated sewage to overflow on the surface of the ground, a failure to be expected of almost all on-site systems as a function of time and loading rate.

2. A qualitative failure refers to a failure of the leaching system to adequately oxidize wastewater,kill microorganisms and precipitate phosphates, a failure inherent with improper design with respect to groundwater. The term "qualitative" implies that the system has failed to meet the degree of treatment expected from a properly-operating system. This is reflected by poor water quality in leachate produced by the recharged treated water.

Hydraulic failure of systems near lakeshores areas can be detected by rivulets of stream source plumes which enter shallow water. Bacterial analysis of the direct inflow also exhibits high bacterial cell counts of indicator organisms. Qualitative failures can be detected in two ways. In unconsolidated deposits, most plumes from nearshore septic systems will enter the lake through the lakeshore bottom into the shallow periphery, from 0 to 3 feet (1 meter or less) deep. Rather than scanning the entire bottom area, one conducts a survey along a line parallel to the shoreline in about 1 foot depth of water. Even though the center of a plume may exit at greater depths, usually a portion of the dispersing leachate will create a signal which is then explored by probing vertically with a wellpoint sampler. When the core of the leachate plume from the septic system is located, a sample is withdrawn to evaluate the quality of the water relative to expected performance.

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In consolidated and stratified deposits, the possibility exists that a septic system may leach into a highly porous strata which is slanted. Such a formation may channel poorly treated wastewater into greater depths of a lake through an interrupted confined aquifer, while no plumes of wastewater would be apparent along the lake shoreline. The Steuben Lakes study area soils are generally loamy (composed of clay, silt and sand) and highly variable in composition, ranging from poorly-drained silty and clayey loams to the well-drained loamy sands and excessively well-drained gravely sandy loams (EPA, 1979). The earlier winter survey (December 1978) and summer (August 1979) surveys conducted along the Steuben Lakes shorelines found few failures of on-site septic systems, the most noticeable number in James and Crooked Lakes. Most identified failures were restricted to cut and fill canal regions, highly porous soils, or stream inflows.

In high bluff regions east of Lake James, a large number of traditional hydraulic failures have been identified by local health officials (Figure 6). The tight soils of the area may predispose septic installations to hydraulic failures. However, a high frequency of hydraulic failures can exist without any impact on the lake water as long as the liquid does not flow into the lake shore.

The clayey soil compositions of the area limit the vertical and lateral flow of soil water. Most shoreline regions exhibited low groundwater inflow conditions (less than 10 feet per day lateral flow). Where clay deposits, the bedded material restricts flow through the porous deposits, even though the sand and gravel deposits may hold considerable trapped water. However, if an extensive lateral deposit of porous material underlies the poorly permeable soils, and the deposits extends into the lake bottom, the possibility of transport of leachate exists.

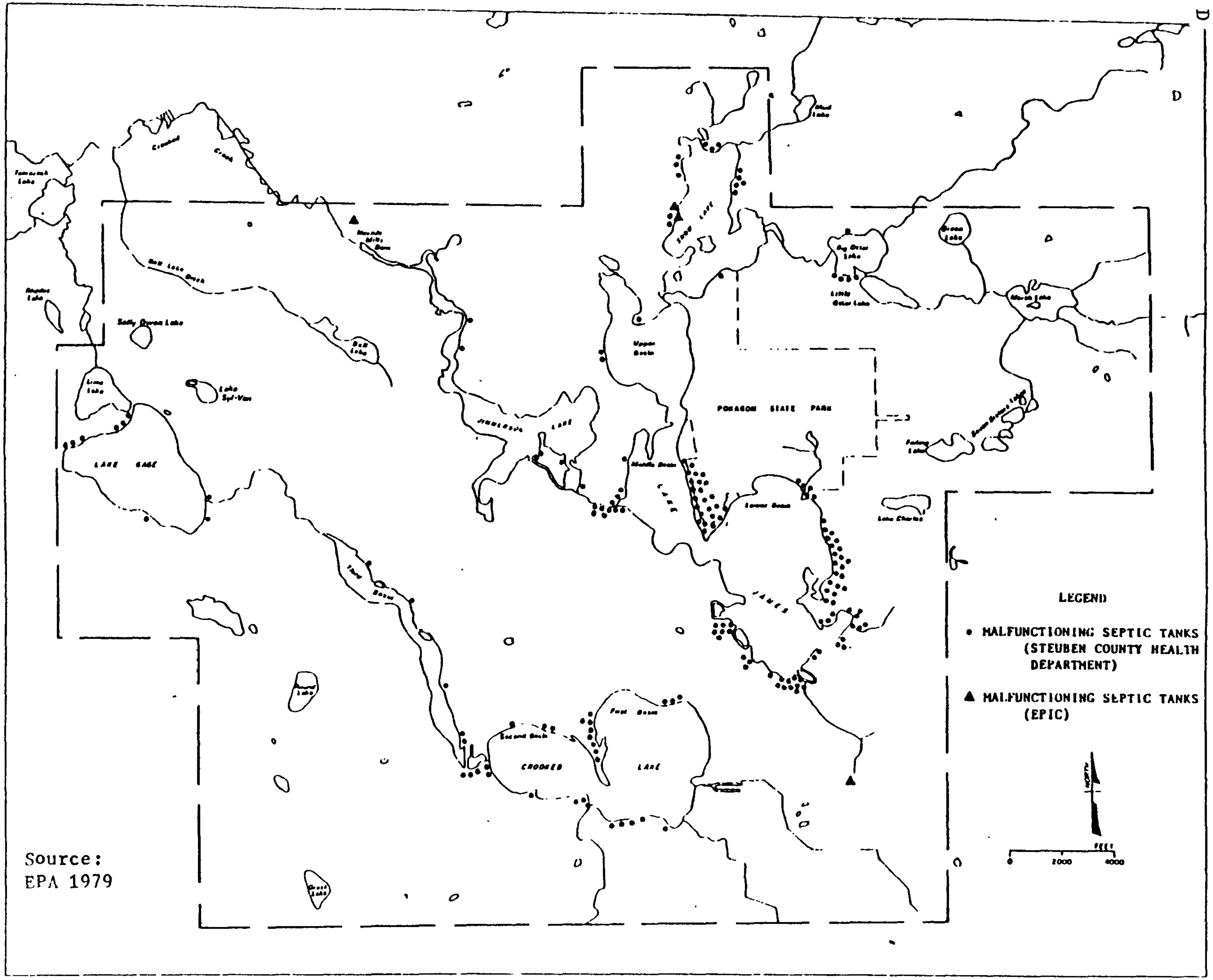

Figure 6 - Location of Hydraulic Malfunctioning Septic Tank Systems

The southern portion of the Steuben Lakes study area contains surface deposits of well-drained Fox and Boyer soils. In many regions, these soils are underlain by coarse sands and gravel which may serve as natural under-drainage systems. A detailed study of well-water quality was initiated by Tri-State University during 1979 (TSUER, 1979) to determine if any groundwater impacts were apparent from on-lot septic system functioning.

The water observed from well samples generally exhibited a high standard of quality. Well samples taken near Crooked Lake showed some potential impact from wastewater systems. The probability of on-site well failure is low, even in areas with high frequencies of qualitative failures. For well contamination to occur, the well point must intercept the plume of poorly-treated wastewater originating from the leaching fields. Because the position of the well point varies in 3 dimensions, the probability of coincidence with the plume is low. Hypothetically, only 8% of the wells in a checkerboard lot area would intercept plumes from leaching pit installation on 20,000 sq. ft. lot areas (KVA, 1976b). Five of twenty samples (20%) showed coincidental rise to nitrate and chloride elements frequently associated with leachate conditions. It is important to note that the rises in nitrate are well below the permissible 10 mg as nitrogen of US EPA's Interim Primary Drinking Water Standards. However, further investigation may be warranted in the Crooked Lake region, particularly along the northern and eastern shores, to determine if a confined strata may be diverting wastewater loadings to deeper water regions.

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6.0 CONCLUSIONS

The septic leachate survey of August, 1979 around the shores of Crooked Lake, James Lake and Jimmerson (Steuben County, Indiana) enabled some comparisons of the impacts of septic leachate intrusions to the lakes from nearby soil tank absorption systems under summer recreational stress versus winter slack use conditions. The conclusions below derive from leachate detector shoreline scans, nutrient and bacterial water sample analysis, and shallow groundwater flow measurements.

1) Groundwater plumes occurred irregularly around the shorelines of the three subject lakes, and coincide closely with locations developed earlier in the December, 1978 survey. Plumes again appeared to correspond closely with soils classified as moderately rapid to rapidly permeable and especially stream inlets or weedy more stagnant cut and fill canal regions common on each of the lakes. The actual number of plumes revealed was low overall, 25 sites on Lake James, and less than ten on each of Crooked Lake and Jimmerson Lake.

2) The large stream source plume emanating from Marsh Lake and entering James Lake from the southern end of Snow Lake was still detectable in summer above background level, but again was at a low level in phosphorus and nitrogen.

3) With the exception of ammonia levels on James and Jimmerson Lakes, nitrogen and total phosphorus values for interstitial groundwater samples taken in summer were substantially lower than the distribution of similar samples drawn in the winter.

4) The fecal coliform bacterial survey of Jimmerson and Crooked Lakes turned up only three locations exceeding the State's maximum safe level of

bacteria for full body contact. These locations were the 4-H Park stream and Canal at Steuben Co. Park on Crooked Lake, and the shore stretch alongside the high density Bledsoe's Trailer Park. Bacterial impacts are isolated and do not appear to be a significant hazard to recreational swimming areas.

5) Groundwater flow patterns showed some irregularities resulting from complex soil matrices (which include clays and mucks), but portray a general southwesterly flow with a low velocity estimated at less than 10 feet per day.

6) While shoreline surveys of the Crooked Lake region have revealed few instances of plumes from nearshore hydraulic or qualitative failures of on-lot septic systems, well samples indicate that confined subsurface strata should be evaluated for the possibility of natural underdrainage discharge into deeper portions of the Lake.

D

7.0 REFERENCES

EPA. 1979. Environmental Impact Statement: Alternative Waste Treatment Systems for Rural Lake Projects. Case Study Number 4, Steuben Lakes Regional Waste District, Steuben County, Indiana.

EPIC. 1979. Steuben Lakes Septic Tank System Analysis. EPA Environmental Monitoring and Support Laboratory, Cincinnati, Ohio.

Heier, A. and M. Osborn. 1977. Malfunctioning Septic Tank Systems. Steuben County Health Department, Angola, Indiana.

Kerfoot, W.B. and S. Skinner. 1979. Septic Leachate Surveys for Lakeside Sewer Needs Evaluation. Presented at the Water Pollution Control Federation Conference, Houston, Texas.

Kirchner, W.B. and P.J. Dillon. 1975. An Empirical Method of Estimating the Retention of Phosphorus in Lakes. Water Resources Research, Vol. 11 No. 1.

K-V Associates. 1979. Investigation of Septic Leachate Discharges into Steuben Lakes, Indiana. K-V Associates, Inc. Falmouth, Massachusetts 02540.

K-V Associates. 1979b. On-lot Waste Disposal Systems: Public Health and Water Quality Implications. Department of Public Health, Town of Barnstable. K-V Associates, Inc. 281 Main Street, Falmouth, MA 02540.

TSUER. 1979. Investigation of Well Water Quality within the Steuben County Regional Waste District, April and May, 1979. Tri-State University Engineering and Research Center. Angola, Indiana.

8.0 APPENDIX

D

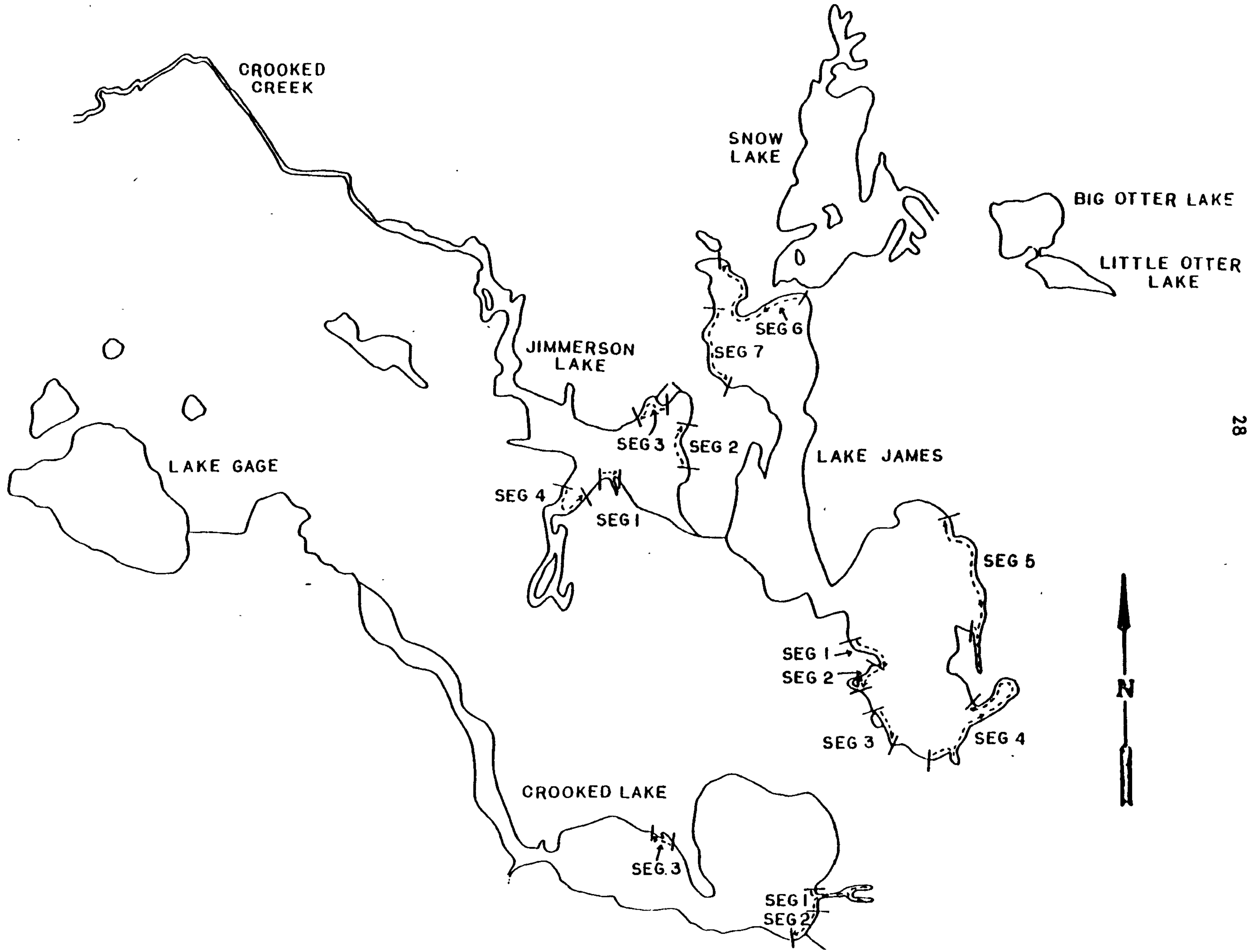
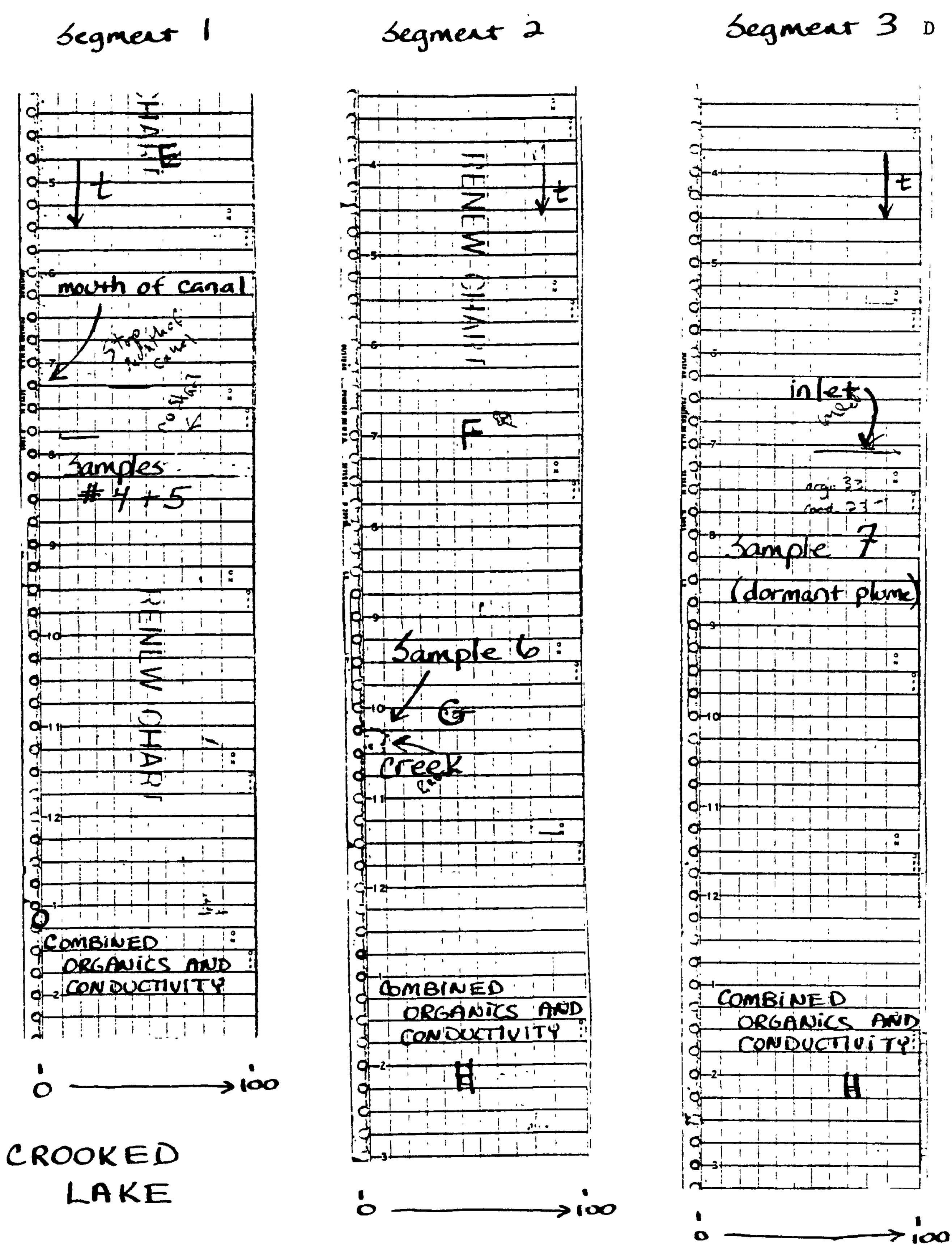


FIGURE - 7 MAP OF SELECTED SEGMENTS OF THE CONTINUOUS LEACHATE DETECTOR SCANS STUEBEN LAKES, AUGUST 1979



The combined signal recording used for Crooked Lake highlights erupting plumes and will tend to dampen broad plume areas such as the east end canal (samples 4 + 5).

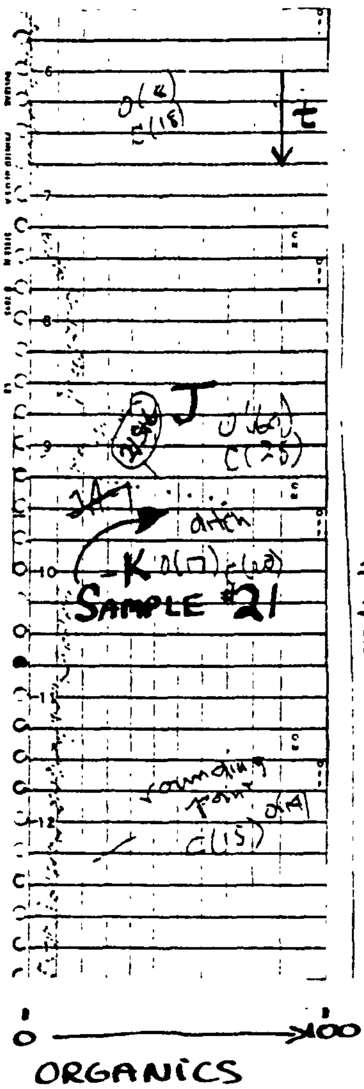
D

Segment 1

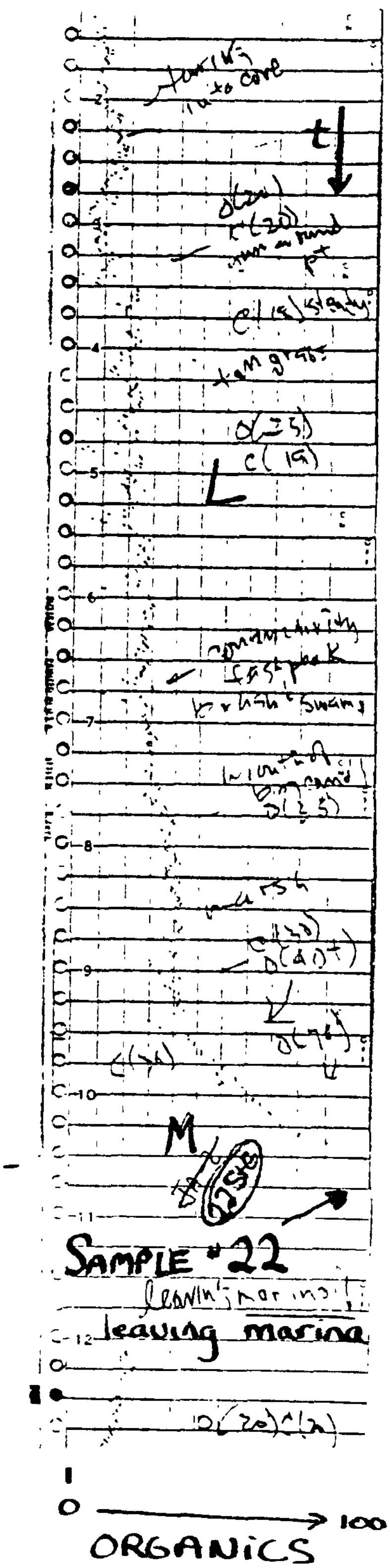
Segment 2

LAKE JAMES

- part 1 -



Sample #21 - sharp organic rise seen here accompanied by significant change in conductivity.

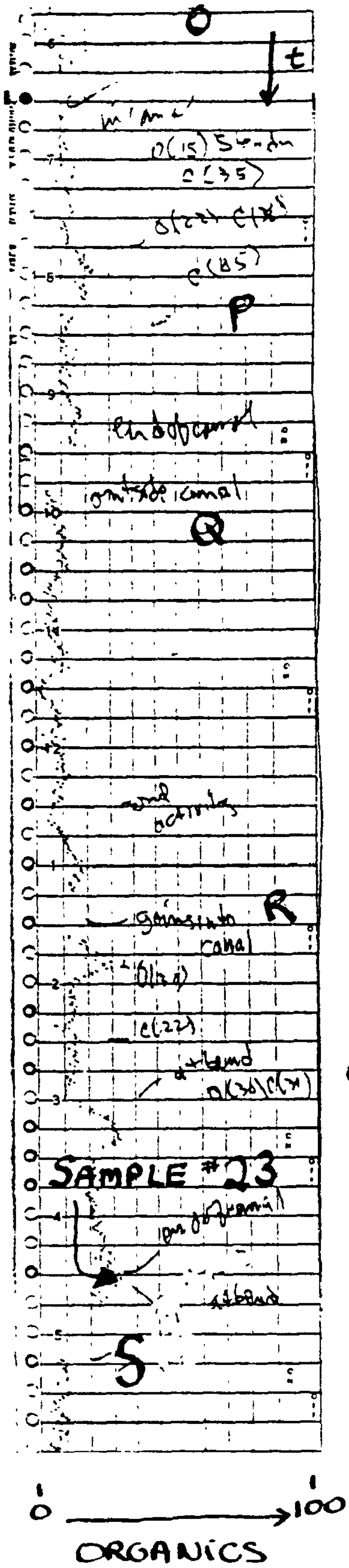


Sample #22 - also accompanied by significant change in conductivity.

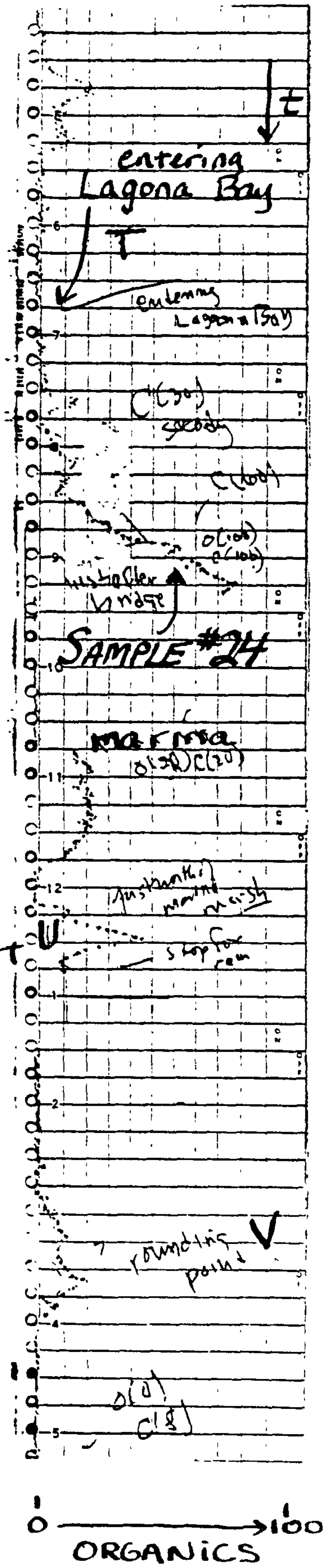
Segment 3 | Segment 4 | D

LAKE JAMES

- part 2 -

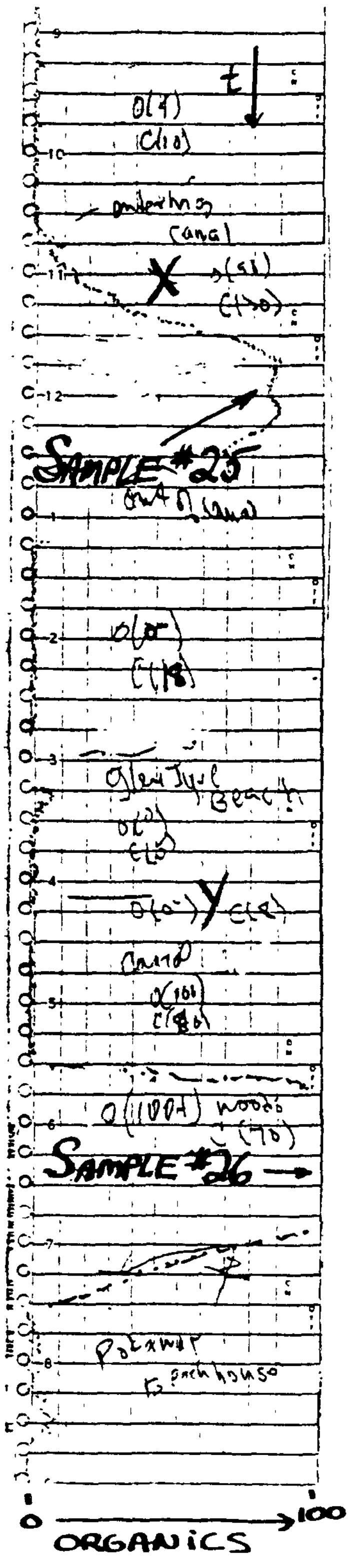


Both samples #23 + 24 accompanied by significant change in conductivity.

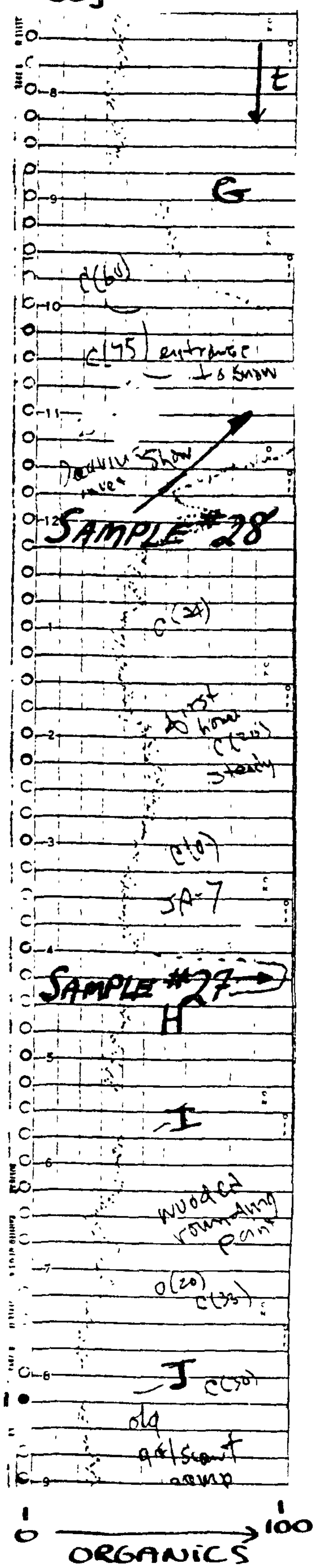


D

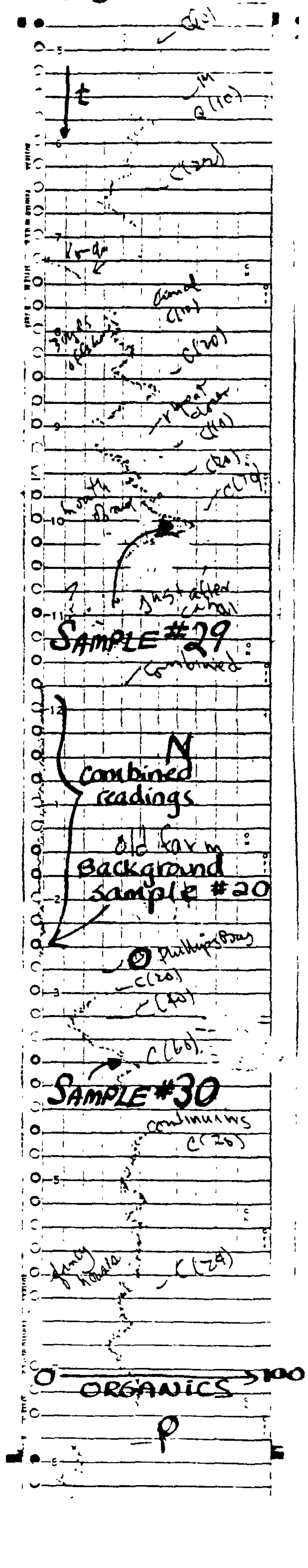
Segment 5



Segment 6



Segment 7



LAKE JAMES

-part 3-

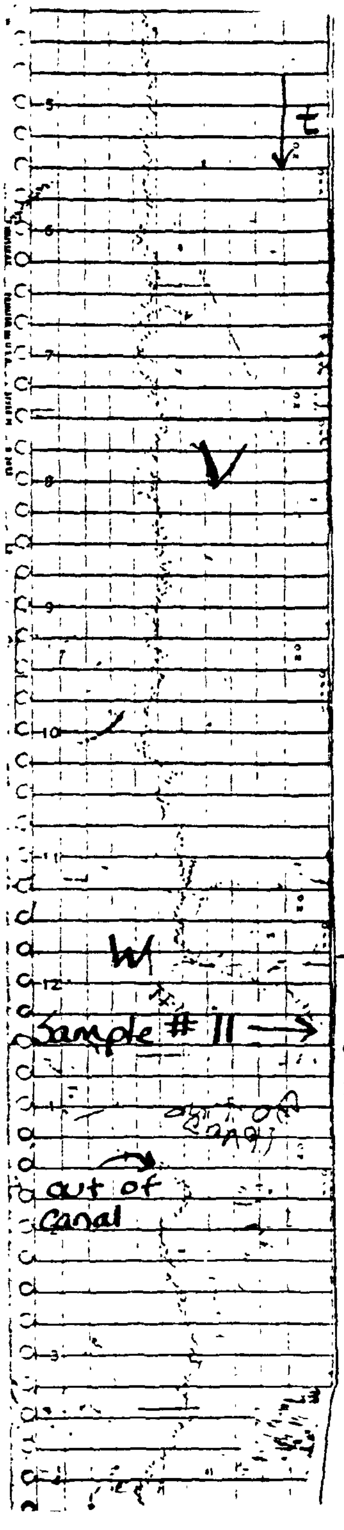
Sample #27 was a dormant plume. The rest showed accompanying rise in conductivity.

D

Segment 1

Segment 2

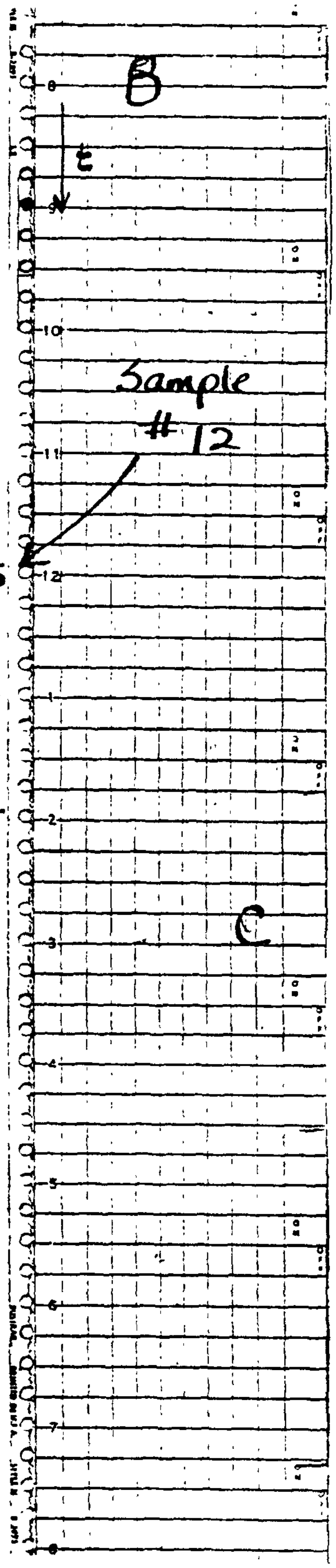
JIMMERSON LAKE
-part 1-



0 ——→ 100

ORGANICS

→ Entered canal - Sharp organic rise accompanied by significant change in conductivity.



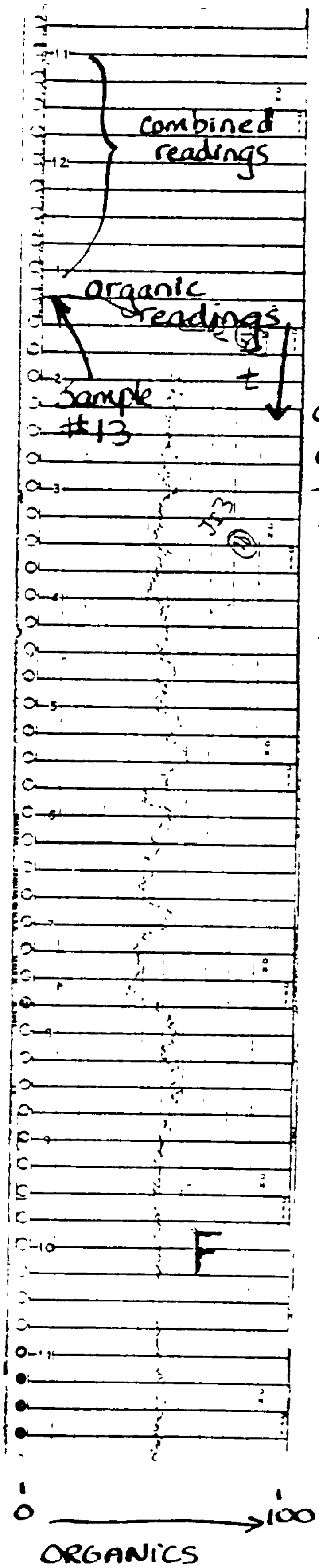
Combined readings showed no erupting plumes. From field notes, high organic readings (dormant plumes) prompted collecting sample #12

0 ——→ 100

COMBINED ORGANICS AND CONDUCTIVITY

D

Segment 3

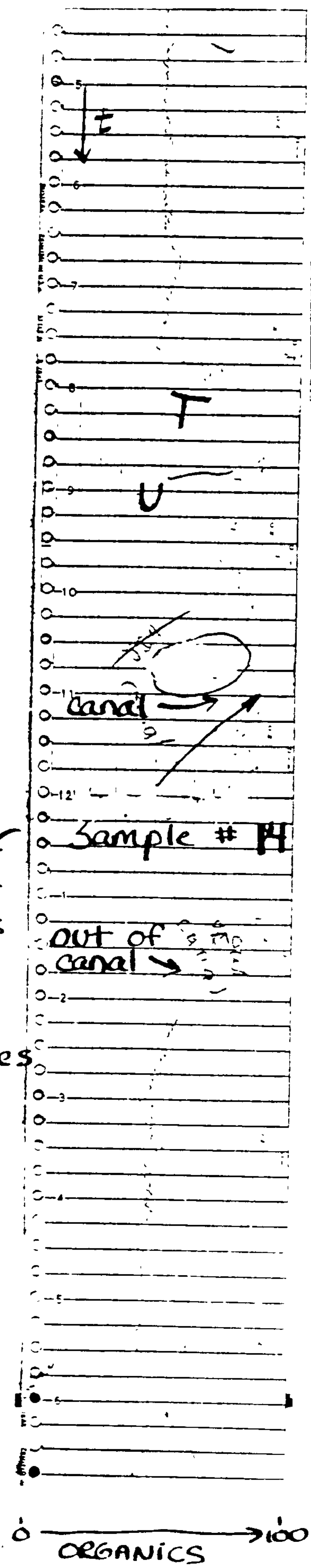


JIMMERSON LAKE

High organic and slow rising conductivity readings for sample #13 from field notes. Switched to organic readings only, after sample was taken.

Sample #14 - organic readings of 100+ as seen here were also accompanied by significant changes in conductivity (from field notes).

Segment 4



APPENDIX E

Revised Limited Action Present Worth and User Charges -
Steuben Lakes Project Area

LIMITED ACTION ALTERNATIVE
PRESENT WORTH, USER CHARGES

ASSUMPTIONS

On-Site Systems	Year 1980 - 4171 EDU's (50% seasonal, 50% permanent) Year 2000 - 6196 EDU's (50% seasonal, 50% permanent) 50% (4171) septic tanks to be replaced 10% (4171) ST-SAS's to be replaced
Capital Costs	\$1,877/ST-SAS \$ 265/septic tank
O & M	\$60/ST pumping (50% once/3 years, 50% once/5 years) \$400/H_2O_2 treatment (2% of drainfields/year) \$6/well sample (1/well/5 years) \$40/groundwater sample (20 tests, 3 samples/test) Sanitarian @ \$25,000/yr. - 260 days/yr. Surveyors @ \$12,000/yr. - 130 days/yr. (1980), 200/yr. (2000) Secretary @ \$12,000/yr. - 260 days/yr. (20% fringe benefits for sanitarian, surveyors, secretary, soil scientist @ \$325/day - 51 days/yr. (½ day rentals - see cost calculations
Salvage Values	50 year useful life for ST's; 20 years for all else
Present Worth	6 5/8%, 20 years
User Charges	Eligibility - 100% of site analysis and replacement system charge Federal funding - 85% of site analysis; replacements State funding - 6% of these items Debt retirement - 6 7/8%, 30 years, 1980 capital Debt reserve - 20% of debt retirement

Alternative Costs

	Capital Costs	($ x 1000) O&M Costs	Salvage Value
Existing Systems:			
Replace 2086 ST's	552.8	-0-	331.7
Replace 417 ST-SAS's	782.7	-0-	66.3
Pump 1043 ST's/yr.	-0-	62.58/yr.	-0-
H_2O_2 83 DF's/yr.	-0-	33.20/yr.	-0-
	1,335.5	95.78/yr.	398.0
Future systems:			
Add 2025 ST-SAS's	190.05/yr.	1.52/yr./yr.	429.3
	190.05/yr.	1.52/yr./yr.	429.3

E

Alternative Costs (Continued)

Salaries:			
Sanit. - $25,000/yr. - 260 days/yr.	-0-	25.0/yr.	-0-
Surveyors - $12,000/yr. - 130 days/yr.	-0-	6.0/yr.	-0-
$12,000/yr. - 3½ days/yr/yr.	-0-	0.16/yr./yr.	-0-
Secretary - $12,000/yr. - 260 days/yr.	-0-	12.0/yr.	-0-
		43.0/yr.	
		0.16/yr./yr.	
20% fringe benefits	-0-	8.6/yr.	-0-
		0.03/yr.	
	-0-	51.6/yr.	-0-
		0.19/yr./yr.	
Retainer:			
Soil Scientist - $325/day - 51 days/yr.	-0-	16.58/yr.	-0-
	-0-	16.58/yr.	-0-
Water samples analyses:			
Wells - $6/sample - 834/yr.	-0-	5.0/yr.	-0-
Wells - $6/sample - 20/yr./yr.	-0-	0.12/yr./yr.	-0-
Shallow groundwater - $40 x 20 x 3	-0-	2.40/yr.	-0-
	-0-	7.40/yr.	-0-
		0.12/yr./yr.	
Engineering, Legal, Contingencies:			
Site Analysis	120.2	-0-	-0-
Legal, etc. (9% construction cost)	1,176.6	-0-	-0-
	1,296.8	-0-	-0-

Alternative Costs

Total Alternative Costs			
Total 1980 costs	2,632.3	171.35/yr.	398.0
Total 1980-2000 costs	190.05/yr.	1.83/yr./yr.	429.8

Present Worths

($ x 1000)

Total Alternative P.W. = 2,632.3 + 10.9909 (171.36 + 190.05) + 81.155 (1.83) - 0.2772 (398.0 & 429.8) = 6523.7 31.155

Local Share (1980)

($ x 1000)

1980 Local Share = 9% ($2,632.3) = 236.91

User Charge (1980)

	($)
Debt Retirement - 0.07958 (9%) ($2,632,300)	18,853
Debt Reserve - 20% (above)	3,770
Annual O & M	171,360
Total 1980 annual local cost	$193,983

User Charge = $193,983/4171 ≈ $50/residence/year

APPENDIX F

No Action Alternative Present Worth -
Steuben Lakes Project Area

NO ACTION ALTERNATIVE
PRESENT WORTH

ASSUMPTIONS

On-Site Systems	Year 1980 - 4171 EDU's (50% seasonal, 50% permanent) Year 2000 - 6196 EDU's (50% seasonal, 50% permanent) 1% of existing systems needing to be replaced/year
Capital Costs	$1,877/ST-SAS Sanitarian @ $18,000/yr. - 260 days/yr. to permit on-site systems (12 hr/new system, 16 hr./replacement)
O & M Costs	$60/ST pumping (once/10 years) Surveyors @ $12,000/yr. - 130 days/yr. (1980), 200 days (2000) to inspect on-site systems once/5 years
Salvage Values	50 year useful life for ST's, 20 years for all else
Present Worth	6 5/8%, 20 years

($ x 1000)

Alternative Costs	Capital Costs	O&M Costs	Salvage Value
Existing Systems:			
Replace 42 ST-SAS's/yr.	78.83/yr.	-0-	178.1
Pump each ST once/10 yrs.	-0-	25.03/yr.	-0-
	78.83/yr.	25.03/yr.	178.1
Future systems:			
Add 2025 ST-SAS's (inc. pump).	190.05/yr.	0.61 yr/yr	429.3
	190.05/yr.	0.61 yr/yr	429.3
Salaries:			
Sanit. - $18,000/yr. - 260 days/yr.	18.00/yr.	-0-	-0-
Surveyors - $12,000/yr. - 130 days/yr.	-0-	6.00/yr	-0-
$12,000/yr. - 3½ days/yr./yr.	-0-	0.16/yr./yr.	-0-
20% fringe benefits	3.60/yr.	1.20/yr.	-0-
		0.03/yr./yr.	
	21.60/yr.	7.20/yr. 0.19/yr./yr.	-0-
Total Costs	290.48/yr.	32.23/yr. 0.80/yr./yr.	607.4

Present Worth

Total Present Worth = 10.9909 (290.48/yr. + 32.23/yr.) + 81.155 (0.80/yr./yr.)
0.2772 (607.4)
= $3,443.4

period. Also, emergent plumes from on-site systems will be detected by scanning the lake shore with a fluorescent meter; sites having plumes will be further analyzed using a shoreline transect with 5 samples per plume to be analyzed at the Tri-State University for bacteria and nutrient levels).

The results of the site analyses described above will be used to identify specific measures that can be taken to correct malfunctioning on-site systems and polluted wells in the Study Area.

LIMITED ACTION ALTERNATIVE
SITE ANALYSIS

Description of Work to be Done

The first step in adopting the Limited Action Alternative will be a site analysis of existing wastewater disposal units and wells in the Study Area. This site analysis will consist of a sanitary survey, sampling and metering of wells, soil sampling, inspection and excavation of on-site systems, and shallow groundwater sampling near lake shores.

A survey team will conduct a sanitary survey of each home, resort, and business in the Study Area. The team will ask residents to complete a questionnaire regarding their wastewater systems and wells and will inspect these facilities. The results of the survey will be used to plan work to be done for the remainder of the site analysis.

Following the sanitary survey, a team will obtain well water samples from wells located within 50 feet or downhill from septic systems. These samples will be tested at Tri-State University for fecal coliform bacteria and nitrates.

Also following the sanitary survey, a team will inspect septic tanks that are suspected of being undersized or leaking. The team will locate tanks to be inspected, will uncover and pump them, and will inspect them for construction, size, leaks, condition, and types of sanitary tees and baffles. The team will also rod influent lines (noting roots, other obstructions, and collapsed pipe) and effluent lines (noting these items plus distances to headers, distribution boxes, bends, and obstructions).

Next, soil samples will be taken on lots where there have been septic system malfunctions not explained by the sanitary survey or septic tank inspections and on lots where drainfields are suspected of being inadequate to provide effective effluent disposal. The samples will be examined to determine soil texture and color, depth to the seasonal high groundwater level, and water table depths at suspected areas of soil disposal units and at alternative disposal sites on or near the lots. The soil sampling team also will probe the suspected part of the soil disposal unit for depth, size, and type.

After soil samples have been taken, a team of laborers will inspect subsurface disposal units of those on-site systems having recurrent backups or past surface malfunctions not explained in prior steps. The team will hand excavate effluent lines, will hand excavate test pits (to examine size, depth, and type of soil disposal unit), and will evaluate soil hydraulics (soil crusting, decomposition and silting in of aggregate, soil distribution) as reasons for on-site system failures.

Then well water meters will be installed to monitor flows to those on-site systems with limited hydraulic capacity as determined by the sanitary survey, soil sampling, and excavation of the soild disposal unit.

Finally, the impact of wastewater disposal on lake water will be investigated by examining shoreline groundwater. The direction of groundwater flow along lake shores will be determined at ½ mile intervals two times over a one year

APPENDIX G

Limited Action Site Analysis

ASSUMPTIONS

Existing Systems	4171 EDU's (56% permanent, 44% seasonal) 70% possibly having undersized or leaking septic tanks 50% requiring soil sampling (small lots, old systems) 10% requiring drainfield inspection		
Step 1 - Sanitary Survey	100% (4171 EDU's) ÷ (5/person/day) = 834 days		
	Sanitarian -	75 days	
	Sr. Engineer -	75 days	
	Soil Scientist -	42 days	
	Jr. Engineer -	75 days	
	Surveyors -	525 days	
	W. Q. Scientist -	42 days	
		834 days	
Step 2 - Well Sampling	70% (4171 EDU's) ÷ (10/person/day) = 292 days		
	Surveyors -	250 days	
	W. Q. Scientist -	42 days	
		292 days	
	Well sample tests - $6/sample x 2920 (Tri-State University)		
Step 3 - Septic Tank Inspection	70% (4171 EDU's) ÷ (6/person/day) = 487 days		
	Jr. Engineer -	487 days	
	3-person crew - $450/day x 487 days Waste Disposal - $10/tank x 2920		
Step 4 - Soil	50% (4171 EDU's) ÷ (4/2 persons/day) = 1042 days		
	Soil Scientists -	540 days	
	Surveyors -	502 days	
		1,042 days	
Step 5 - Drainfield Inspection	10% (4171 EDU's) ÷ (3/supervisor/day) =		139 days
	10% (4171 EDU's) ÷ (1/2 persons/day) =		834 days
			973 days
	Sanitarian -	139 days	
	Laborers -	834 days	
		973 days	
Step 6 - Well Water Meters	20% (4171 EDU's) x (6 inspections) ÷ (24/day) = 208 days		
	Surveyors -	208 days	
	Meter installation - $175/meter x 834 meters		
Step 7 Groundwater Sampling	Scan of lake shore (Kerfoot estimate) =		38 days
	100 plumes ÷ 2 plumes/day x 2 persons =		100 days
			138 days
	Sanitarian -	35 days	
	W. Q. Scientist -	68 days	
	Surveyor -	35 days	
		138 days	
	Nutrient analyses - $40/series x 5/plume x 100 plume		

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<u>ASSUMPTIONS</u> (continued)

Step 8 -	Shoreline work = 20 days	
Shoreline	Sanitarian -	10 days
Hydrology	W. Q. Scientist -	3 days
Surveys	Surveyor -	7 days
		20 days

Step 9 -	Steps 1 - 8 = 400 days
Supervision,	Sanitarian - 400 days (including Steps 1,5,7,9)
Documentation	Sr. Engineer - 25% (400) + 25 for report = 125 days
Clerical	Secretary - 400 days

LABOR SUMMARY

	DAYS PER STEP									
	1	2	3	4	5	6	7	8	9	TOTAL
Sanitarian	75				139		35	10	141	400
Sr. Engineer	75								50	125
Jr. Engineers	75		487							562
Soil Scientists	42			540						582
W. Q. Scientists	42	42					68	3		155
Surveyors	525	250		502		208	35	7		1,527
Laborers					834					834
Secretary									400	400
	834	292	487	1,042	973	208	138	20	591	4,585

Local Management Agency Costs

Salaries	Sanitarian @ $25,000/yr. x 400 days	$ 38,460
	Surveyors @ $11,000/yr. x 1,527 days	64,600
	Laborers @ $12,000/yr. x 834 days	38,500
	Secretary @ $12,000/yr. x 400 days	18,460
		$160,020
	20% fringe benefits	32,000
		$192,020
Rent	Office @ $300/month x 18 months	$ 5,400
Service Contracts	Well samples analyses* - $6/sample x 2,920	$ 17,520
	Septic tank inspection - $450/day x 487 days	219,150
	- $10/tank x 2,920	29,200
	Well water meters - $175/meter x 334	145,950
	Groundwater samples* - $40/sample x 500	20,000
		$431,820
Equipment & Sampling	Fluorescent meter	$ 14,000
	Groundwater flow meter	4,000
	Field sampling equipment	4,000
	Paper supplies	6,000
	Cameras & film for documentation	3,000
	4 vans @ ($350 & $120 gas-oil)/mo. x 18	33,840
	Total Local Agency	$ 64,840
Summary	Salaries	$192,020
	Rent	5,400
	Contracts	431,820
	Equipment & Supplies	64,840
	Total Local Agency	$694,080

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Consultant Costs

Direct Labor	Sr. Engineer @ $35,000/yr. x 125 days	16,830
	Jr. Engineers @ $20,000/yr. x 562 days	43,230
	Soil Scientists @ $25,000/yr. x 582 days	55,960
	W.Q. Scientists @ $25,000/yr. x 155 days	14,910
		$143,715
Other Direct Costs	Report Reproduction	$ 400
	Communication	1,500
	Graphics, report preparation	3,000
		$ 4,900
Travel	House rental for office, sleeping - 18 mos.	$ 9,000
	Other per diem @ $20/day x 1,424	28,480
	100 RT x 20 miles x $0.20/mile	400
		$ 37,880
Summary	Direct labor x 3.0	$431,145
	Other direct costs x 1.2	5,880
	Travel x 1.2	45,456
		$482,431

Total Costs

Local Management Agency Costs	$ 694,080
Consultant Costs	482,481
	$1,176,561

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